YAESU
FTX-1F

THE MASTERCLASS MANUAL

**A Complete Guide to the Filters, Audio Settings and Operational Prowess for
the Yaesu FTX-1F Transceiver**

"The power to be everywhere, the ability to be heard everywhere."

LZ3AI

Sofia, 2026

Table of Contents

ABOUT THIS BOOK: MUCH MORE THAN AN INSTRUC-TION

This is not another translation of the technical manual. This is a "Masterclass" – a practical synthesis between **Yaesu's engineering thought** and Tony's real-life experience, LZ3AI.

The FTX-1F is a revolutionary transceiver, but its strength remains hidden behind complex menus and layered features.

- **Intuitive navigation:** Detailed paths through menus and the secrets of quick control.

- **Light Intelligence:** A complete explanation of the VMI system and LED indication, which allow you to control the radio almost "blindly".

- **Energy independence:** All about battery power, DC-IN and USB-C, battery care, and how not to run out of power at the top of the mountain.

- **Mastery of Acceptance:** Deep immersion in SDR filters, DSP settings, and unique features like Memory Tune (MT) and other semi-hidden in touch menus magic.

This book is written for those who don't just want to work with a radio station, but want to master the airwaves and feel radio as a part of themselves. Whether you're on SOTA activation or in the home Ham Shack, this guide will turn your **FTX-1F** from a complex machine into a natural extension of your senses.

"Because in the field you have no time for mistakes – you only have time for QSO's."

INTRODUCTION: The Philosophy of Field Work

The FTX-1F isn't just a scaled-down copy of a basic transceiver. It's a tool of freedom. When you step out of the comfort of a radio shake and stand on a peak or a forest clearing, the rules change. Here, the battery is finite, the antenna is often compromised, and the ambient noise is unpredictable.

The mastery of working with **FTX-1F** is not about using maximum power, but about knowing the capacity of your radio so that even with 5-6 watts you can make a connection that others fail with 100 watts.

This release applies specifically to **FTX-1F**, but that doesn't mean it won't be useful for the full **FTX-1 Optima** kit as well, except for the missing texts about the power amplifier and the antenna-matching device that comes with it.

Conventions

Let's adopt a few conventions useful in navigating the text:

- **<FUNC>** - hardware button/knob/encoder (in triangular brackets **BOLD**);
- <PAGE3> - a software button (standard text in triangular brackets), but if the paragraph talks about a button as a priority or for some reason it needs to be emphasized, it can be bold and without a hardware button;
- **IPO** – no triangular brackets when it comes to the function itself, not the button;
- **<FUNC** rotation> - a button with an action inserted in brackets (what to do with it);
- <PMG (**PW)**> - hardware button (button, key) with two functions and respectively capabilities - with a short press one function is activated, and when held - the other;
- <AF/RF/SQL> - hardware button (knob, key, encoder) with several functions that are switched either depending on the mode or by pressing the hardware button;
- <PAGE1> - determines which page should be selected, deliberately omitting the rest of the information on behalf of the page, namely instead of the full titles <PAGE1/3 SSB>, <PAGE2/3 CW> and <PAGE3/3 FM/C4FM>.

Important note about firmware

All descriptions, procedures, and illustrations in this manual are based on a specific version of the **Yaesu FTX-1F software (more precisely, firmware),** current at the time of writing (you can see which one is in the screenshot).

The manufacturer periodically releases updates to add new features or optimize current ones. You may notice some differences in menu names or the behavior of some buttons on newer firmware versions.

Attention: The menus and functions described are current for firmware version as of **March 2026.** With future updates, **Yaesu** may change the names or location of some settings.

If you find a discrepancy, first look at the version section in the function menu of your radio to check the relevance of your firmware:

<FUNC hold><PAGE3>< EXTENSION SETTING >< SOFT VERSION >

This "Master Class" is a living organism and reflects real experience with the available equipment, but always keep in mind the dynamic nature of Yaesu's software development.

Types of firmware in FTX-1F

Unlike older radios, FTX-1F is not a "monolithic" system. It consists of several specialized modules, each of which has its own program (firmware). When you check the versions in the menu, you'll see the following abbreviations:

1. **MAIN:** This is the main system software. It manages the logic of the buttons, the graphical interface, and the coordination between all the other parts.
2. **DSP:** The software of the digital processor. It is responsible for signal filtering, noise cleaning, and audio quality.
3. **SDR:** Controls the high-frequency unit and spectrum analyzer visualization (Waterfall).
4. **DST:** This layer is responsible for processing the data and displaying it on the display.
5. **OPT:** This is the firmware for external or embedded optional modules. On the FTX-1F, it controls the intelligent operation of the **Optima tuner**.

LZ3AI advises: to change the firmware

When Yaesu releases an update, sometimes it affects only one of the modules (for example, only the DSP). Always compare the current versions on your radio with those from the manufacturer's official website. It is not necessary for all modules to have the same version number (for example, MAIN can be v1.02 and DSP is v1.05).

If you decide to update, download and follow the latest manufacturer's instructions absolutely exactly. This way you ensure that you will not have problems afterwards.

If you don't follow the latest instructions exactly, there is no one else to blame and you will join the many posts on social networks and forums "After a firmware update, this or that does not work for me – what should I do?" and hope for an easy solution.

Important! All changes and settings to the transceiver are at your own risk, regardless of whether you have read this disclaimer or not (disclaimer). The author is not responsible for damage caused by improper actions and recommends that you always consult the official management of Yaesu before making system changes. The author is not responsible for actions related to the texts in this book. Any claims for costs and/or damages, that occurred during such actions are null and void.

Practice – checking and installing new firmware

1. Check what your firmware is.
2. Check what is the latest firmware published on **the Yaesu** site and what improvements have been made to it.
3. Replace the firmware, if necessary, in strict compliance with the latest instructions from the manufacturer.

CHAPTER 1: Intuitive Management – The "Digital Heart" of the FTX-1F Transceiver

Unlike **FTDX10** or **FTDX101**, where you have multiple physical buttons, **the FTX-1F** relies mainly on hybrid control. Moreover, when controlling, you also need to listen to the sounds that the radio makes – they can tell whether the operation has been performed or not is permissible for the specific mode, frequency or other circumstance.

1.1. What do LEDs tell us?

Maybe even before we see the display, several LEDs light up. They give us a lot of useful information.

1.1.1. The power LED

It is located above the <LOCK (POWER)> button. It is not just an indicator of power on, but a real-time diagnostic tool. This is the first indicator of the "health" of **FTX-1F**.

- **Blue (Permanent):** The radio is on and powered normally - the battery is in good condition or you have a stable external power supply. The radio is turned on by pressing and holding the **<LOCK (POWER) hold>** button. It continues to light up even when the radio is locked and the display has gone out after a while – this is a visual reminder to turn off the transceiver if you have done work and are moving or stowing it away.
- **Green:** The battery is fully charged (only displayed when the radio is turned off but connected to a charger).
- **Red:** The radio is turned on for charging, the battery voltage has dropped below the critical threshold, and charging begins.

1.1.2. VMI (VFO Mode Indicator)

The two large LEDs on the side of the main frequency setting encoder aren't just for beauty. Their main role is to display the status of the transceiver, work as a smart indicator of the current mode of operation, and help you understand what the encoder is currently managing without looking at the display:

- **Blue:** Normal Reception Mode (VFO).
- **White: The** radio works with channels from memory (MEMORY).
- **Red: The** frequency purifier (CLARIFIER) is activated. Use caution as you are accepting at a frequency different from that of transmission.

For the VMI system, other colors can be set from the function menu or turned off altogether:

- **<FUNC** hold><PAGE3><DISPLAY SETTING><VFO IND COLOR><VMI COLOR VFO>
- **<FUNC** hold><PAGE3><DISPLAY SETTING><VFO IND COLOR><VMI COLOR MEMORY>
- **<FUNC** hold><PAGE3><DISPLAY SETTING><VFO IND COLOR><VMI COLOR CLAR>

1.1.3. The LEDs (MAIN and SUB) above the main encoder

These indicators are directly related to the status of the two independent receivers (VFO-A and VFO-B) and indicate the status of the radio's MAIN and SUB channels.

- **Green:** When the corresponding channel (MAIN or SUB) is "open" and receives a signal (the noise canceller is open – there is a signal above the threshold of the squelch). Only the channel that has a squelch is lit up in green when it receives a useful signal.

- **Red:** Only the diode of the channel it is currently broadcasting on is lit. This is critical when operating in SPLIT mode so you know which VFO you are broadcasting on.

1.1.4. The battery LED next to the charging socket

This indicator works in "offline" mode of the battery when it is removed from the radio and is plugged into an external power supply:

- **Red constant:** The battery is currently charging. This is a "fast charging" in which the controller applies maximum current.
- **Extinguished:** The battery is fully charged and the process has been stopped.
- **Red flashing:** An error indication. This happens if the battery is too hot (after a long transmission operation) or if there is a faulty cell. In this case, charging stops automatically for security reasons.

1.1.5. LZ3AI advises: for the light indication and battery charging

LED color preferences: You can customize the colors of the two large LEDs on the side of the main encoder or even exclude them from the menu. I don't find any good reason to do so, and I highly recommend that you leave the red color for the CLARIFIER. This is the best protection against accidental frequency shifted operation, especially during races or SOTA activations.

Understanding the indication: There is a significant difference between the LED on the battery itself and the status LED on the radio above the **<POWER (LOCK)>button**:

- **The radio LED** (above **<POWER (LOCK)>**): Indicates the system status (on/off/locked) and the overall power health of the radio during operation.
- **Battery LED:** Indicates the status of the battery itself, the chemistry inside the battery pack, and has no connection to the operation of the radio.

TX Control: Always keep an eye on the small LEDs above the main encoder. If you're in SPLIT mode, the red diode will tell you at which frequency you're actually broadcasting so you don't make an accidental mistake. Changing the display isn't always so obvious, but the light on the LEDs is.

Battery Monitoring: If the LED above the **<LOCK (POWER)>** button starts to change color from blue to red during transmission and you are without external power, it is a sign that your battery is "squatting" under load and it's time to reduce the power to 5W or switch to external power to maintain signal stability.

Working in the dark: Large blue LEDs are an excellent reference for finding the encoder, but if they interfere with you during night observations (e.g. SOTA activation in twilight), you can reduce their intensity without having to turn them off. Find in the menu

<FUNC hold><PAGE3><DISPLAY SETTING><LED DIMMER>.

Charging: When charging the field radio through a solar panel, monitor the passage of the LED above the <LOCK (POWER)> button from red to green – this is a more reliable indicator of the end of the cycle than the display icon. If it lights up green, turn off the power – this will extend the life of the cells and avoid unnecessary heating.

Safe charging of the battery with PD (Power Delivery) via USB-C: If you are using the battery's built-in USB-C charging port (extremely convenient when using the PowerBank with PD in the mountains or if you have a spare battery), observe the following critical rule:

NEVER charge the battery through its USB-C port while it is mounted on the radio and the transceiver is turned on!

1. **Risk of damage:** Charging via the USB port of the battery is designed for "self-charging" when it is removed from the transceiver.

2. **The right way:** If you want to charge the battery while it is on the radio, use only the dedicated **DC-IN** input on the transceiver itself with the original cable/adapter.

3. **In an emergency:** If you need to charge the battery from an external USB source directly (suppose you don't have a connector for the **radio's DC-IN** input), first remove it from the back of the **FTX-1F**, charge it separately with PD (this happens relatively quickly), and only after the indicator light on the battery itself goes off, remount it. Or get a backup battery, which you can charge separately while the other is mounted on the radio.

Ignoring this rule can lead to overheating of the battery controller or a defect in the power circuit of the radio. Colleagues are often tempted to plug the phone cable into the battery while working on a frequency, thinking that they are simply "helping" the power supply. With **FTX-1F**, this is dangerous.

1.1.6.   LED practice and battery charging

1. Remove the battery from the radio and plug it in to charge from an external adapter with a USB-C cable.
2. Track how the LED changes during charging.
3. Install the radio battery and plug in additional power through the **DC-IN port**.
4. Track how the LED above the <LOCK (POWER)> button changes in different situations described in the text.

1.2.   Touch display (touchscreen)

1.2.1.   Screens rendered with <DISP>

A touchscreen is not just a monitoring screen, but an active tool. The first thing you need to do is play around with the hardware button <DISP> to see what can be shown on the display and choose one of the three options according to the priorities for the specific case:

- **Screen 1 (Single Band):** A full view of a single band (MAIN channel) with a large "waterfall", an active S-meter and a full set of software buttons for filters and settings below the frequency.
- **Screen 2 (Dual Band - Left/Right):** Two bands located horizontally next to each other. The active waterfall is only for the MAIN channel, and the buttons at the bottom below the measuring system have been reduced to make room for the second VFO (SUB channel) and the waterfall.
- **Screen 3 (Dual Band - Up/Down):** Two bands of the two channels (MAIN and SUB) located vertically (one below the other). In this mode, the waterfall is missing, but detailed data for both channels (frequency, mode, S-meter) and other data specific to each of them are visible at the same time.
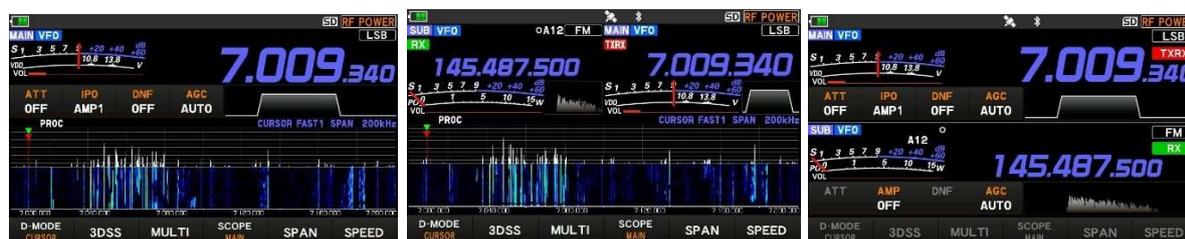
1.2.2. LZ3AI advises: about the display image

- Use Screen 1 to search for weak signals (DX) and fine-tune filters. Screen 1 is indispensable when hunting for distant signals because of the detailed waterfall. Start with this screen, but don't settle for it alone. On Screen 1, the software button <SCOPE> is always set to MAIN and when you try to change it, you hear a triple sound (invalid operation). As convenient as it is for your usual work, in certain cases you will inevitably encounter the other two screens, so explore them as well.
- Use Screen 2 when operating on two bands at the same time (for example, VHF for coordination and HF for activation) to see spectrum activity.
- Use Screen 3 when you're working on two bands and are exposed to direct sunlight, or if the battery is weak – the lack of a dynamic waterfall saves power and makes the frequency more legible. There are no software buttons under the measuring system. Screen 3 is most convenient for simultaneous operation on two frequencies when you monitor both at the same time – for example, the frequency for a total call and the operating frequency.

- Switching the main operating frequency is done by pressing the small encoder on the left <SUB DIAL>. The base frequency is set by the main frequency setting encoder. On a dual-frequency screen, the frequency of the SUB channel is tuned by the small encoder on the left <SUB DIAL>, and the main frequency is again tuned by the main tuning encoder.
- On Screen 2 and Screen 3, depending on whether you are in VFO or MEMORY mode, the displayed information may change slightly, but the structure (single-band, dual-band horizontal, and dual-band vertical) remains the same.
- With <DISP hold> you can temporarily turn off the display. The display switches on automatically the first subsequent use of any of the controls. Convenient function to store the battery in critical condition.

1.2.3. Practice: Screen 1, 2 and 3

1. Press the **<DISP** click> button and look at the display elements on the different screens. Think about which screen will be most convenient for you to use under what circumstances.
2. Turn off the display with <DISP hold> and then turn it back on.
3. Review in the description the meaning of all icons and inscriptions on the display on all three screens. Get to know what means what in the following table.

(battery icon)	Battery status in 3 steps
(charging icon)	Charging
LOCK	no random changes are possible (locked)
HI-SWR	high SWR (error message, antenna problem)
MSG	Voice memory playback
REC	moment – the recording in the voice memory is paused Lights Up Constantly – Voice Memory Recording
FINE	Fine-tuning the frequency
FAST	Quick frequency adjustment
S-DX	S-DX function on
VOX	VOX function on
(satellite icon)	flashes – searches for satellites for GPS positioning lights up all the time – GPS positioning is successful
(bluetooth icon)	flashes – no Bluetooth device connected lights up all the time – a successfully connected Bluetooth device
MAIN	icon on the MAIN side of the screen/channel/frequency
SUB	icon on the side of the SUB screen/channel/frequency
VFO	VFO mode
M-ALL	calls all channels from memory, regardless of the range
M-HF	calls only channels from memory in the HF band
50MHz	Calls only channels from memory in the 50 MHz band

M-AIR	calls only channels from memory in the AIR range
M-VHF	calls only channels from memory in the VHF range
M-UHF	calls only channels from memory in the UHF band
M-GRP	calls only channels from memory marked as M-GRP
WHY	The sound processor (transmission compressor) is activated
KEYER	The built-in electronic telegraph key is activated
MONI	The sound monitor is activated
TUNE	The automatic antenna tuner is activated
BK-IN	appears when the CW Break-in function is activated
➕➖	appear at positive or negative frequency shift when working through a repeater
ANT1/ANT2	only for "Optima" – shows the currently selected antenna terminal.

4. Make it a habit to look at the top bar of the screen as often as possible (the so-called status bar).

1.3. Screenshots

Unlike taking notes on paper, **the FTX-1F** allows you to instantly capture everything you see on the display – frequencies, filter settings, or an interesting waterfall signal.

- **Technique: To** take a screenshot, press and hold the hardware button <S-DX> the second one from the top left. Of course, this can only be done if you have a microSD card inserted into the slot. With a microSD card inserted, the SD light up on the status bar.
- **Indication:** If the screenshot is successful, a confirmation of the saved file will appear on the display. The photos are automatically stored on the microSD card in the \FTX1\CAPTURE\ folder.

1.4. LZ3AI advises: about screenshots and SD card

- Use this feature to "shoot" your settings before experimenting with new parameters in menus. This way you will always have a visual benchmark to return to in case of need.

- Don't just rely on screenshots. Save your menus and settings before you start exploring the radio on the **microSD** card so you have a quick way to restore them in case of an error.

1.4.1. Recording and recovering from the microSD card

The microSD card is recorded from

<FUNC hold><PAGE3><EXTENSION SETING><SD CARD><MEM LIST SAVE> и

<FUNC hold><PAGE3><EXTENSION SETING><SD CARD><MENU SAVE>.

You may need to click on the successful recording window that appears, as it doesn't hide on its own. Restoring the configuration and menus is done by

<FUNC hold><PAGE3><EXTENSION SETING><SD CARD><MEM LIST LOAD> и

<FUNC hold><PAGE3><EXTENSION SETING><SD CARD><MENU LOAD>.

1.4.2. Practice: screenshots and SD card recording

1. Put a microSD card with a capacity of less than 32 GB in the FTX-1 slot if you don't already have one inserted there.
2. Take photos on the three screens – Screen 1, Screen 2 and Screen 3.
3. Save the transceiver configuration and menus to the microSD card.
4. Review what information the microSD card menu provides.
5. Remove the microSD card and examine its structure with a card reader on a computer. Check if the screenshots on the three screens have been saved.

1.5. On-air preview (3DSS and Waterfall)

1.5.1. Let's see the air

Before broadcasting, it is good to "see" the air. When working in the field, especially in strong sunlight, the visibility and contrast of the display are critical. Set your refresh rate in advance and explore the features that make faint signals visible and stand out from noise.

1.5.2. Operational management of the waterfall

- For operational operation, use the software buttons <SPAN> (range) and <D-LEVEL> (density or sensitivity of the waterfall). <SPAN> you will see immediately in the bottom bar with soft buttons, and <D-LEVEL> is on the first page <PAGE1> of the menus.

- Make it a habit to leave <D-LEVEL> as the last featured feature – this way it will always be "at hand" by rotating the encoder <FUNC rotation>, which is invaluable at changing noise levels.
- Use **<D-LEVEL> (the** waterfall density or sensitivity setting) to "extract" weak signals above the antenna's own noise threshold (not to be confused with the <D-CONTRAST>
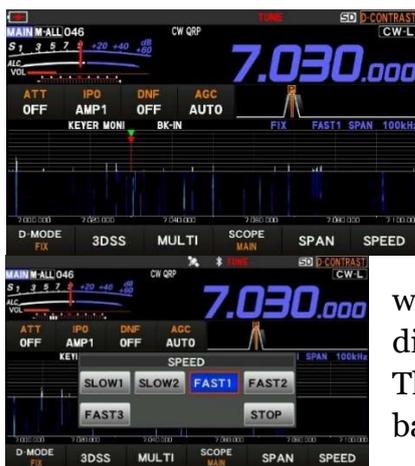
soft-button, which adjusts the visual contrast on the display). In the field, you will often hear signals that are barely noticeable. Adjust the waterfall so that even the faintest signals leave visible traces, stand out from the background (noise).

- Set the <SPEED> speed to <FAST> to pick up quick calls. Use the levels <SLOW1> or <SLOW2> (see below) when you want to monitor the overall trend of the range and distinguish persistent media from momentary interference. The speed is set by the <SPEED> button in the soft-button bar below the waterfall on the far right.

1.5.3. Waterfall management with <D-MODE>, <3DSS>, <MULTI>, <SCOPE>, <SPAN> и <SPEED>

Take a look at the soft buttons in the bar under the waterfall and study what each one changes. In short:

- <D-MODE>: Specifies the waterfall and cursor mode. There are three options: <FIX>, <CENTER> and <CURSOR>. The currently selected option is displayed under the inscription on the <D-MODE> button.
- **<3DSS>:** Switches between the traditional 2D waterfall and the innovative 3D (Three-Dimension Spectrum Stream) mode, which adds depth to the signals over time. On it, you can distinguish a faint signal that surfaces for a while from background noise. On a regular waterfall, this is sometimes lost, but here (in 3D) the "mountains" of signals are clear.
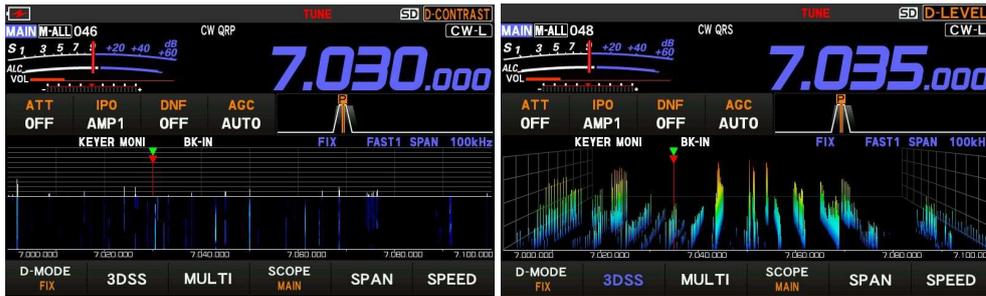
- <MULTI>: Turns the advanced waterfall imaging capabilities on or off. It works for both 2D and 3D waterfall. Maybe it's not rational to stay in this mode if it's not needed – it's too cluttered for me, but everyone has different preferences.

- **<SCOPE>:** This button becomes active in dual-VFO modes. If it is not active, touching it will give you a "ti-" beep (invalid operation). <SCOPE> determines which channel the waterfall is currently referring to, either the primary (MAIN) or the secondary (SUB). It can also be used to toggle the active channel – MAIN or SUB (of course, again, only when both channels are visible).
- **<SPAN>:** Adjusts the width of the monitored range. You can select values between <5k>, <10k>, <20k>, <50k>, <100k>, <200k>, <500k> and <1000k> (values are in kHz). For FT8, keep the SPAN at 5 kHz or 10 kHz. This will see each individual signal in the digital section with maximum resolution. For station search (SOTA), increase to 100 kHz, to see the entire range at once. What value you prefer depends on the specific scope and mode of operation, as well as the specific situation and your goal. Test and you'll choose the best one that works for you right now. Think about when it will be best to change it.
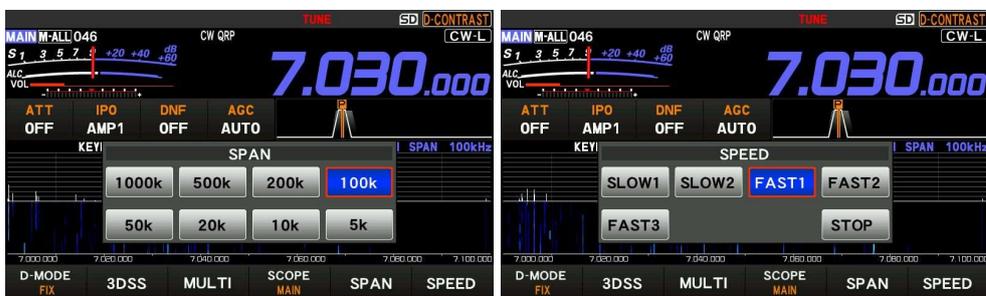
- **<SPEED>:** Adjusts the refresh rate. In addition to the standard levels <FAST1>, <FAST2>, <FAST3>, <SLOW1> and <SLOW2>, there is also <STOP> – extremely useful – it "freezes" the waterfall (takes a snapshot of it), allowing you to calmly adjust the frequency on a signal that has already disappeared, waiting for it to reappear.

If you work in strong sun, change the color scheme of the waterfall to a more contrasting one (e.g. black/white or blue/red). This will help you see the signals without making a shadow with the jacket above the display.

A more detailed explanation of some of the software buttons follows.

1.5.4. Display and behavior modes with <D-MODE>

The selected mode is briefly displayed, after which it can be displayed under the inscription of the **<D-MODE> button**.
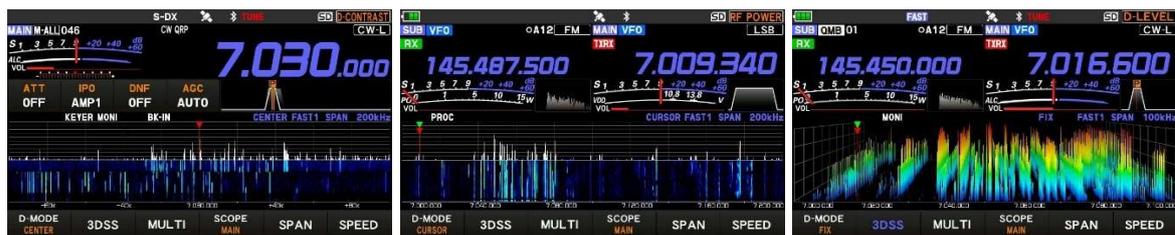
- **<CENTER>:** The current frequency is always in the centre. When retuning, the entire waterfall moves relative to it. It does not depend on the displayed range width and not particularly on the operating mode, but it immediately adjusts the markers in the middle of the display.
- **<FIX>:** The screen is fixed within preset range limits. The cursor moves freely until it reaches the end of the screen. It is convenient to use it in conjunction with <SPAN> which can be set to cover the entire range or the section in which you are operating in a certain mode (say, only for the 7 MHz telegraph section, a SPAN of 50 k will be enough to cover 7,000-7,040 kHz, and for the entire range – 200 k to cover 7.000-7.200 kHz. The default start of the fixed observed range coincides with the beginning of the frequency range, but can be changed by pressing and holding the <FIX> button.
- **<CURSOR>:** The screen remains stationary in its last state, and the cursor moves along the bandwidth. With this mode, for example, you can very quickly and without rotation, you can use first <CENTER> and then <CURSOR> to see what you hear and tune.

1.5.5. LZ3AI advises: to change boundaries in FIX mode

The range boundaries in conjunction with <SPAN> can be set quite flexibly, but this is not very clearly described in the official manuals. By pressing and holding the <FIX> button, a numeric keypad appears on the display, with which we can select the initial frequency of the

fixed range (by default it is the initial frequency for the given range, but with this keyboard it can be changed). Then we can choose with <SPAN> and the fixed bandwidth that we want to observe <5k>, <10k>, <20k>, <50k>, <100k>, <200k>, <500k> and <1000k>. For example, if we prefer to work on telephony, we can choose to start with the beginning

of the telephone section of the range instead of its absolute beginning. And then choose a <SPAN> to cover the entire phone section. The changed start frequency is remembered and does not need to be selected next time unless it needs to be changed again.

1.5.6. Mode <MULTI> - Information Center

With the **<MULTI> button**, you activate a combo view that adds low-frequency analysis to the RF spectrum. This is the "control room" of your signal. It adds an image of the signal at sound frequency with an oscilloscope and a sound waterfall.
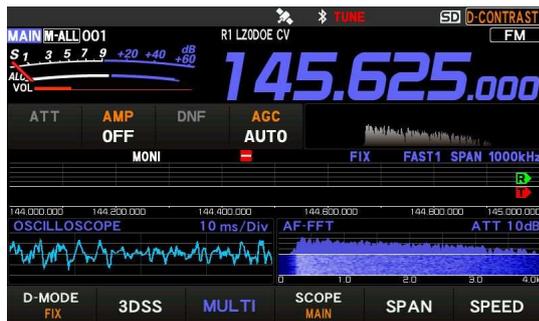
- **OSCILLOSCOPE:** Displays the waveform of the signal in real-time. Helps to visually check the purity of your modulated signal or the rhythm of the received telegraph signs.
- **AF-FFT Audio Preview**: Visualizes the spectrum of the audio you hear with a kind of sound waterfall.

AF-FFT is an abbreviation of Audio Frequency - Fast Fourier Transform.

- **Practical benefit: This is where** you see the real action of DSP filters. If you narrow the filter to 600 Hz (WIDTH) for a telegraph (CW), on the AF-FFT graph you will see how all audio noise outside these limits physically disappears. This helps for precise tuning in the presence of near interference (QRM).

1.5.7. The Mystery of the S-Meter and the "Reset" - Visualization of RF Gain vs IF Gain

Should the S-meter be calibrated?

This is one of the most subtle moments in amateur radio practice. Many people "look" at the S-meter, but few "understand" it, especially with modern SDR equipment such as **the FTX-1F**. Let's unravel these fundamental questions.

It is very important to remember: the S-meter is not an "odometer" that should start from scratch. It is more of a "thermometer" – if the room is 30ºC (high noise), it will show 30ºC, even if you have not turned on the stove (the correspondent).

- If the stove is weak (distant correspondent), even if you turn it on, the temperature will still remain 30ºC (the noise exceeds the useful signal).
- If you turn the stove up, it will rise above 30ºC (if you use the techniques described here to improve the signal-to-noise ratio or point the antenna at your correspondent).
- If the weather warms up (add an AMP amplifier), the temperature will increase, but not from the stove – its heat will not be felt more clearly (the general noises and the useful signal will also increase, and in the new environment there is no guarantee that the correspondent's audibility will improve).

How to measure the useful signal at high noise?

When the noise is S9, you cannot see if the signal is S7 because it is "underwater". The usual amplification won't make things much better. Here are some useful techniques to overcome this case that improve the signal-to-noise ratio:

1. RF GAIN as a threshold: When you decrease RF GAIN (this is done by pressing <AF/RF/SQL click> - a yellow thin gain bar will be displayed with RF-G labeled below the scale on the display and with rotation <**AF/RF/SQL** rotation> counterclockwise), you raise the "lower limit" of the S-meter. Notice that the arrow starts to go up, even if there is no signal. (Note that the next press of the encoder <AF/RF/SQL click> changes the yellow bar to red and the inscription VOL in front of it, which means that as the encoder rotates, the gain at a low (sound) frequency AF change. **MAIN DSP** <AF/RF/SQL hold> displays a display to change the frequency offset and currently available filters).
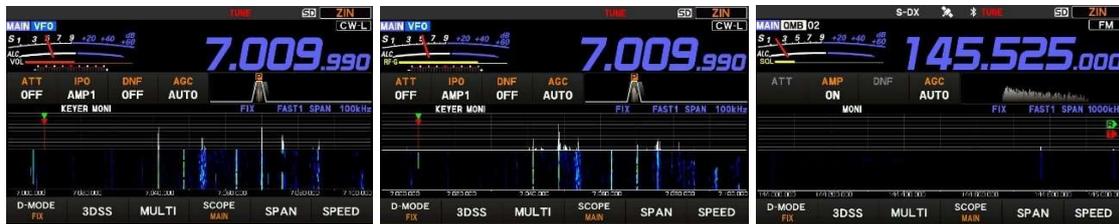
2. **The "cropping" technique:** This is a technique to improve the signal-to-noise ratio in which you change the RF GAIN gain by rotating the <AF/RF/SQL rotation> until the S-meter needle in the presence of a useful signal stands exactly at the level where the background noise was (e.g. S9). At this point, everything you hear is cleared of the "ripples" of the noise, the noise will drop even slightly below the useful signal, and the useful signal should be heard best – in the case of the S9. Of course, despite the high score you will give to the S9 correspondent, it is right to tell him about the presence of almost the same level of QRN or QRM.

3. **The measurement:** If another station now appears and the arrow bounces, for example, to S9 + 10dB, this is the real strength of the useful signal above the noise - S9 + 10dB.

4. **Calibration:** The Yaesu S-meter is factory calibrated so that the S9 corresponds to a precisely defined antenna input voltage (-73 dBm or 50 µV). It is not necessary to calibrate or reset it manually; it is an absolute instrument and displays the measurement result directly.

1.5.8. LZ3AI advises: about the S-meter

- In the mountains, if the noise is high, first try turning on the <IPO> (which will reduce the noise of the S-meter) instead of reducing the RF GAIN with the encoder for the gain <AF/RF/SQL rotation>.
- **<AF/RF/SQL>** is used last to "calm down" you're hearing from background noise. I recommend playing around with the RF and AF gain ratio – in one noisy environment, the best signal-to-noise ratio can be obtained at maximum AF gain and RF operational control, in another – high (or even maximum) RF gain and operational AF control. By adding the <IPO> and <ATT> buttons, the combinations become many, but that's why it's called "mastery" and mastery is acquired with practice.
- RF GAIN in an SDR receiver with DSP can actually be taken for IF GAIN (Intermediate Frequency Gain Control).

1.5.9. Practice: display configuration and reading of the measurement system readings.

1. Tune the radio to 7 MHz in CW-L mode.
2. Change the displayed frequency band to <SPAN> and see what changes occur with the waterfall when changing the values to choose the most convenient one for your particular case.
3. Set the displayed bandwidth of the waterfall with <SPAN> to <50 kHz> (if that's your choice, let's say you prefer CW).
4. Set the marker mode to <FIX>. Take a look at what changes when changing the mode to <CENTER> and <CURSOR>, then revert it back to <FIX>.
5. Hold down the finger (or stylus) of the <D-MODE (FIX)> button until a numeric keypad appears on the display. Select <7><.><0><4><ENT> sequentially, and mark how the beginning of the displayed range changes (if the last decimal places are zeros when typing, you don't need to type them – you select <ENT> directly). Then restore it in a similar way to 7.000 MHz
6. Try with <D-LEVEL> to set the waterfall so that only the useful CW signal is "driven" forward as a thin incident light, the noise will dim to maximum contrast (without touching <D-CONTRAST>, but I recommend checking what exactly it does and <D-CONTRAST> to estimate the difference, then return it to its default value).
7. List all the values of <SPEED> to see what the effect is, then return to the default value.
8. Turn on <MULTI> and take a close look at the screen to see if and when it will come in handy. Try different frequency bands and filters with <MULTI> mode turned on to assess the differences and how you can use this in your practice.
9. List the different types of measurements of the measuring system, study how its image changes and read in the description when what is measured. Rotate the encoder <AF/RF/SQL> at different types of gain (AF and RF) and see how the reading of the S-meter changes compared to the sound you hear. Try measuring the level of different useful signals and decide what RST rating you would give them.

1.6. The multifunction display and quick menus

1.6.1. Function menus and touch buttons.

Despite the limited number of buttons visible, forget the long rummaging through the menus. Most important functions (ATT, IPO, AGC, filters, etc.) are accessible by tapping the corresponding icon on the screen. When you are in the field, time is precious. You can change the functions of the programmable microphone buttons to be more convenient for you, depending on the most frequent mode and mode of operation and your preferences for functions. that require instant response or frequent use (for example, if you work mainly on the CW in combination with frequent antenna changes, <P3> for setting the auto tuner <ANT TUNE>, and <P4> for the <ZIN> button, etc. – it depends on the specifics of your work, your habits and preferences – you and only you know what you use most often). Leave the display for fine-tuning filters when you have enough and relaxed time to do them without unnecessary strain.

<FUNC hold><PAGE3> <OPERATION SETING> <KEY/DIAL> <MIC P1>

<FUNC hold><PAGE3><OPERATION SETING><KEY/DIAL><MIC P2>

<FUNC hold><PAGE3><OPERATION SETING><KEY/DIAL><MIC P3>

<FUNC hold><PAGE3><OPERATION SETING><KEY/DIAL><MIC P4>

You have a fairly wide selection of features that you can assign to each of these four buttons – browse through them and choose the ones that will work best for you.

1.6.2. Practice: configuring the microphone buttons

1. Configure the <**P3**> button on the microphone to set up the auto tuner <ANT TUNE>.
2. Configure button <**P4**> for button <ZIN> (ZIN/SPOT).
3. Check that the <**P3**> and <**P4**> buttons perform their new functions.
4. Check what buttons <**P1**> and <**P2**> are for, and decide whether to leave them as they are by default or reconfigure them as well. By default, the <**P1**> is set to the hardware button <LOCK> and the <**P2**> is set to the hardware button <QMB>, possibly for greater convenience when working from a car, for example (i.e. it is not necessary to set only touch button functions).

1.7. Touch & Tune Centering

1.7.1. Centering from the screen

The FTX-1F allows you to tune into a station simply by tapping its ruler on the waterfall. Depending on the mode, the radio itself finds the right frequency even with thick fingers. However, I recommend tying a stylus (touchscreen stylus) with a cord or other strong thread of not large but sufficient length, somewhere to the **FTX-1F** body so that you are always at

hand. It is especially useful when working with gloves and for people with bigger fingers, but over time you will see that it is comfortable for everyone and in any conditions.

I remind you that when working on the CW, it is very convenient to program a <ZIN> button to accurately center one of the programmable microphone buttons, as we did in the practical exercise above.

1.7.2. Centering with the ZIN button

Yaesu offer the powerful ZIN feature that ensures that you are tuned exactly to the correspondent frequency.

- **How it works**: When you hear a CW signal, short press the ZIN soft button. Press it even 2-3 times if it doesn't work the first time. The radio will automatically "pull" the frequency so that the correspondent's tone matches the signal exactly and is heard with the CW PITCH you set (usually 600-700Hz).

1.7.3. LZ3AI advises: for CW operation and ZIP centering

- **Learn Morse code**: No software can replace the human ear, especially when the signal is at the noise limit, especially in QRP work. In addition, you will have a unique (or at least increasingly rare) skill.
- **ZIN before transmitting**: Always use ZIN before you start shouting. Click it 2-3 times if necessary – you are more likely to moderate a sound from a signal instead of pausing between dots and hyphens. This ensures that your signal falls right into the correspondent's filter bar.
- **The ZIN to APF connection**: If you are using the CW's APF (which I highly recommend), center with ZIN first and only then turn on the APF for maximum accurate signal tuning and selection – invaluable when working with DX.
- **For CW supporters**: At the risk of getting bored, I will once again recommend configuring the ZIN on one of the hardware buttons on the microphone <**P1**>, <**P2**>, <**P3**> or <**P4**>. Check which of these buttons you would use the least with the current configuration and change it to the ZIN function, for example:

<FUNC hold><PAGE3><OPERATION SETING><KEY/DIAL><MIC P3>

1.8. Page navigation with touch function keys

The FTX-1F offers three-page navigation to accommodate all important tools such as touch menus and buttons.

1.8.1. Scroll through functions and touch keys

<**FUNC** hold><FUNC rotation><FWD><**FUNC** click>

<**FUNC** hold><FUNC rotation>< BACK><**FUNC** click>

Instead of **<FUNC click>** you can directly touch the corresponding touch button <BACK> or <FWD>. It is no coincidence that there is also a hardware button **<BACK>** - it is often easier and faster to use it. And there are also situations when only the hardware back button is available.

1.8.2.   LZ3AI advises: for quick access to touch buttons

- Unfortunately, we can't move the buttons on the different pages according to our preferences. The key to speed is to remember which "page" the function you are looking for is on. There are three pages and they are quite appropriately grouped and even labeled.

- Display, gain and filter settings are on page one, CW, monitoring and voice and message recording settings on page two, while APRS and deeper settings (e.g. for repeaters – tones, frequency offset) are on third.
- The settings that are the least changed (and usually once set don't need to be changed) are like touch keys in groups at the bottom of the third page. Who knows why there is also the touch button <HOME> that brings you up fastest to a pre-recorded frequency with the corresponding preferred settings.
- It can be considered as an advantage that when we exit a page, then press <FUNC hold> we return to it again and we do not have to go through all of them again to access it – i.e. the most frequently used (or rather the last) page with functional touch buttons will always be at hand.

PAGE 1/3   SSB

<D-LEVEL>	Adjusts the level (sensitivity) of the waterfall for the best image on the screen.
<D-PEAK>	Adjusts the color density to the signal level of the waterfall screen in 5 steps (LV1 to LV5).
<D-MARKER>	The ON/OFF marker indicates the position of the transmit and receive frequency in the image on the waterfall display.
<D-COLOR>	Changes the waterfall screen display or frequency color.
<D-CONTRAST>	Adjusts the contrast of the TFT display (the difference between light and dark) in 21 steps.
<DIMMER>	Adjusts the brightness of the TFT display in 21 steps.
<MOX>	Includes the PTT (Push to Talk) circuit to activate the transmitter.
<ATT>	Turns on/off ATT (attenuator).
<IPO (AMP)>	IPO activation.
<DNF>	Turns on/off DNF (Digital Notch Filter).

<AGC>	Adjusts the recovery time of the receiver at AGC.
<MIC EQ>	Turns on/off the three-band parametric equalizer for the microphone.
<PROC LEVEL>	Adjusts the gain of the speech processor (compressor).
<ANT TUNE>	Automatic antenna tuning starts.
<TUNER>	Turns on/off the built-in antenna tuner on the FTX-1 Optima or the optional FC-90/FC-80 tuner on the FTX-1F, if fitted. It turns off automatically if there is no antenna or the included antenna has a high SWR.
<NB>	Activates the NB (Noise Cancellation) function.
<DNR>	Activates the DNR (Digital Noise Reduction) function.
<ANT>	Selects the ANT1 or ANT2 connector on the back panel on the FTX-1 Optima.
<TXW>	While operating at different frequencies, tapping <TXW> can listen to what is being heard on the transmitter frequency.
<RF POWER>	Determines the maximum transmission power.
<MIC GAIN>	Adjusts the microphone gain.
< AMC LEVEL>	Adjusts AMC gain (Automatic Microphone Gain Control).
<VOX>	Turns on/off the VOX function.
<VOX GAIN>	Adjusts when VOX is triggered.
<VOX DELAY>	Adjusts the VOX delay.

PAGE 2/3   CW

< LEVEL>	Adjusts at the level of the sound monitor.
<KEYER>	Turns on/off the built-in automatic electronic manipulator.
<BK-IN>	Turns on/off the CW (Broadcast on Air) interrupt function.
<CW SPEED>	Adjusts the desired transmission speed with the automatic manipulator.
<CW PITCH>	Adjusts the CW tone when receiving the CW signal and the side tone monitor.
<BK-DELAY>	Adjusts the hold time after the end of the CW broadcast.
<SENSE>	Activates the auto-reset function (precise frequency setting by the CW null beat method).
<CW SPOT>	Activate the side tone by pressing and holding to set the zero beats.
<MESSAGE>	CW text memory or voice memory function.
<PLAY>	To check the contents of the CW memory or to check the contents of the voice recording.
<RECORD>	It performs a voice recording function.

PAGE 3/3   FM/C4FM

<DTMF>	Sets the DTMF channel and autodial code.
<T-CALL>	Transmits T-CALL (1750 Hz).
<RPT SHIFT>	Sets the frequency shift direction of the transmit/receive repeater (shift).
<REV>	Reverses transmit and receive frequencies in repeater or split memory (reverse) mode.

\<DG-ID TX\>	Assigns the DG-ID the transmission number.
\<DG-ID RX\>	Assigns the DG-ID number for acceptance.
\<APRS S. LIST\>	Displays the list of stations with APRS function.
\<APRS M. LIST\>	Displays the list of messages of the APRS function.
\<APRS BEACON\>	Set the APRS automatic transmission to the beacon to ON/OFF.
\<APRS BCN-TX\>	Manual transmission of APRS beacon.
\<CH STEP\>	Change the frequency of set step intervals.
\<SQL TYPE\>	Selects the type of noise cancellation.
\<TONE FREQ\>	Sets the frequency of the CTCSS tone.
\<DCS\>	By specifying DCS code.
\<HOME\>	Calls the HOME channel.
\<RADIO SETTING\>	Advanced menus for SSB, AM, FM, DATA, RTTY, and digital modes of operation.
\<CW SETTING\>	Advanced menus for CW settings work.
\<OPERATION SETTING\>	Advanced menus for additional transmit and receive settings, interference reduction, scanning, and more.
\<DISPLAY SETTING\>	Advanced display settings menus.
\<EXTENSION SETTING\>	Advanced menus for time and date settings, microSD card settings, firmware version display, and reset.
\<APRS SETTING\>	Advanced menus for APRS operation settings.

CHAPTER 2: Cleaning the Airwaves (NB, DNR, DNF)

2.1. The magic of Direct Sampling SDR

Before we start working with the audio settings, it is extremely important to understand what is happening "under the hood" of the transceiver. Unlike classic radios, the **FTX-1F** uses the modern SDR architecture with direct sampling (Direct Sampling) for the shortwave bands (HF).

This means that the analog signal from the antenna is converted into a digital stream almost immediately. From that point on, everything from amplification and filtering to noise removal is done through mathematical algorithms from the powerful digital processing unit (DSP).

With **FTX-1F**, filters are extremely important because the SDR architecture here is optimized for battery operation and time should be saved as much as possible. Yaesu's DSP digital processing algorithms are at an extremely high level.

2.1.1. Why is this important for us as operators?

- **"Sharp" like razor filters:** Because the filters are software-based, they don't have the physical wear or temperature deviation of old quartz filters. You can narrow the strip to incredible limits without losing sensitivity and even adjusting the cut threshold.

- **Mathematical precision:** The functions we'll look at next (WIDTH, SHIFT, NOTCH) work with surgical precision. They literally "cut" the interference out of the digital picture on the air.
- **No parasitic noises:** Digital processing eliminates many of the internal noises inherent in old circuitry, giving you crystal clear sound even with very weak signals.

2.1.2.   LZ3AI advises: about filters and cosmetics

Don't look at FTX-1F's filters as a cosmetic additive. Thanks to Direct Sampling technology, you have a precise software scalpel. In the following pages, we will learn how to use it to "extract" even the quietest signal from the noise on the air.

2.2.   DNR (Digital Noise Reduction) – the filter that sharply "reduces" noise

2.2.1.   DNR - algorithms

In the case of **FTX-1F**, the **DNR** system has 10 algorithms. There is no direct relationship between the noise cancellation strength (efficiency) and the size of the number of the corresponding algorithm – in a certain noise environment, an algorithm with a lower number can jam more effectively than larger ones. There is no way to give specific advice, rely on your experience and do not hesitate to try different algorithms in different noise environments and types of interference.

Atmospheric noise in the field (most often static sending) of HF is the biggest enemy of the 10-watt radio.

2.2.2.   DNR - levels and activation

For an alternative to turn <DNR> on and off:

<FUNC hold><PAGE1><DNR click>

To change the algorithm (and change the level/efficiency) from 1-10 or OFF:

 <FUNC hold><PAGE1><DNR click><FUNC rotation>

2.2.3. LZ3AI advises: about the DNR filter

- With **FTX-1F**, high levels (but as we have already specified, the strength of the algorithms in different situations does not match the size of their numbers) can make the correspondent's voice sound "metallic" or "underwater". Start with algorithm 1 and change until the noise becomes tolerable, but the voice remains clear. Listen to the following algorithms and if you need to choose another one or go back to the lowercase numbers. nuances to "extract" the signal from the noise.

2.3. NB (Noise Blanker) – protection against local parasites

2.3.1. NB functionality

If you are working near a power line, a fence with an electric shepherd, or using a poor switching power supply for charging, you will hear a rhythmic crackling.

The NB filter (Noise Blanker) of the **FTX-1F** is very effective against this type of impulse noise. Be careful, however – turning it on to the maximum in the presence of very strong neighboring stations in the range can lead to distortions from cross-modulation.

2.3.2. NB Switching on and Setting

For an alternative to turn <NB> on and off:

<FUNC hold><PAGE1><NB click>

To change the algorithm (and change the level/efficiency) from 1-10 or OFF:

 <FUNC hold><PAGE1><NB click><FUNC rotation>

2.4. DNF (Digital Notch Filter) – the automatic whistle "cleaner"

2.4.1. The DNF filter (Auto Notch)

If a colleague "tunes" their transmitter exactly to your frequency, or you have a constant carrier signal from a local oscillator or other generator, <DNF> is your salvation. Never use <DNF> for CW – there is a real danger of suppressing the useful signal!

The DNF filter (automatic Notch) can only be switched on and off from the permanent touch menu below the measuring system:
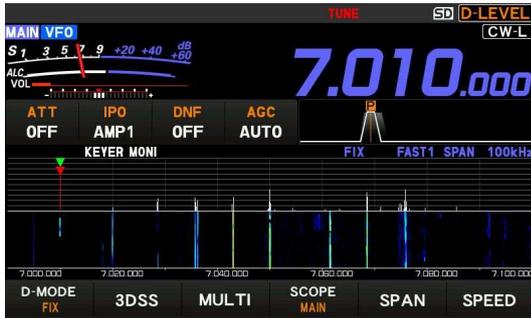
An option to turn on and off is also from the first page of the functional menus:

<FUNC hold><PAGE1><DNF><ON> or

<FUNC hold><PAGE1><DNF><OFF>

2.4.2. LZ3AI advises: about the DNF filter

- Keep the <DNF> on <OFF> (off) until you actually need it.
- Unlike <DNR>, the automatic notch filter <DNF> can sometimes "bite" parts of the useful voice signal if it is very weak, and the telegraph signal can disappear outright, as if it were a harmful interference.

2.5. Gain or attenuation optimization – IPO (Intercept Point Optimization) – the choice of "muscles" for the receiver

2.5.1. IPO Inclusion Point at HF/50MHz:

The first line of defense of the receiver are IPOs and ATTs.

At **FTX-1F**, like its big brothers, the IPO determines whether the signal goes through a preamplifier or goes directly into the mixer.

The FTX-1F gives you complete control over the incoming gain to achieve maximum signal-to-noise ratio. The system adapts according to the range you are working in.

You have three levels of signal optimization in the shortwave IPO adjustment (HF/50MHz), which can also be changed directly from the touch menu below the measuring system on the display:
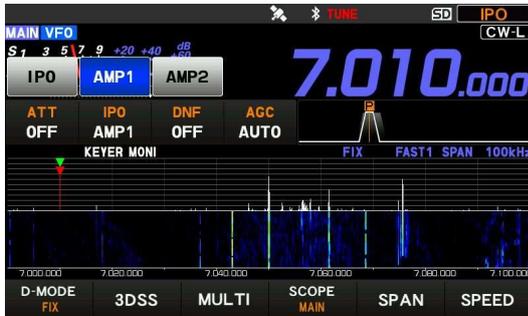
They can also be changed from the first page of the functional menus:

<FUNC hold><PAGE1><IPO><FUNC rotation><IPO> or

<FUNC hold><PAGE1><IPO><FUNC rotation><AMP1> or

<FUNC hold><PAGE1><IPO><FUNC rotation><AMP2>

The software button <IPO> cyclically changes IPO - AMP1 - AMP2.

1. <IPO> (Intercept Point Optimization): Preamplifiers are turned off. The signal goes directly to the analog-to-digital converter.

- **Application**: Best overload resistance. Use it at low ranges (40 m/80 m) or in the presence of very strong adjacent stations.

2. <AMP1>: Includes the first stage of the preamp.

- **Application**: Balanced mode for daily operation of the HF. Increases sensitivity without excessively raising background noise.

3. <AMP2>: Includes a second, more powerful boost.

- **Application**: Use it only on high bands (10 m / 12 m / 15 m and above) or in extremely "quiet" mountain environments to extract the weakest DX signals. You should not be intimidated if its button "disappears" or changes – the radio simply shows it only the available options for the current range.

2.5.2. Input gain at VHF/UHF

The **<IPO>** adjustment of VHF/UHF is different. It can also be changed directly from the touch menu under the measuring system on the display, but there are only two positions – amplifier on and off (an amplifier turned off is equivalent to an IPO):

Unlike HF bands (HFs), where we have IPOs, AMP1s, and AMP2s, with VHF/UHF on **FTX-1F**, things are more direct. Here the architecture is simplified for maximum efficiency. <AMP1> and <AMP2> disappear and <AMP> appears – the radio simply displays only the available options for the current range.

<FUNC hold><PAGE1><AMP><FUNC rotation><ON> or

<FUNC hold><PAGE1><AMP><FUNC rotation><OFF>

- **<AMP><ON>:** Includes the preamplifier for higher sensitivity in low signals (DX) or via satellites.
- **<AMP><OFF>:** Turns it off, which is the equivalent of IPO (Intercept Point Optimization) – the signal goes directly to the first mixer. The radio becomes "iron" against intermodulation from nearby transmitters (TV and radio towers).

Here, the software button is <AMP> (analogous to <IPO>) and cyclically changes <AMP> to <ON> and <OFF>.

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35

2.5.3. LZ3AI advises: to use <IPO>

At low bands (1.8-7 MHz), atmospheric noise is enormous. Turning on a preamp (<AMP1>/<AMP2>) will only "amplify the noise". Therefore, on these frequencies, always start with <IPO> to maintain the dynamic range of the radio. Preamplifiers are for high bands (21 MHz and above) or for extremely quiet locations away from populated areas. Don't overdo it! The rule is: listen with the lowest possible AMP level, which allows you to understand the correspondent. If you turn on <AMP2> at 40 m in the evening, you will simply amplify the noise on the air and "clog" the receiver instead of hearing the weak stations better. The goal of the "game" is to improve the signal-to-noise ratio.

The <IPO> software button on the display when the selected VHF/UHF frequency (or channel) is automatically changed to <AMP> and only offers <AMP><OFF> (equivalent to <IPO>) and <AMP><ON> - on.

2.6. ATT (Attenuator) – the brake for strong signals

2.6.1. Using the Attenuator

On large models (**FTDX10/FTDX101**), the attenuator is in steps (6 dB, 12 dB, 18 dB). On the FTX-1F, it is only one (12 dB per step):

- ATT ON/OFF: Single-stage attenuation. It introduces a fixed attenuation of 12 dB at the input. This "cuts" the peaks of the overload signals. The display does not show the decibels (12 dB), but only ON or OFF.
- How and when: Use it only if the S-meter gets stuck at the end of the scale due to a very strong neighboring signal – only on extremely strong signals. Turning it on will prevent overloading of the analog-to-digital converter (ADC Overflow) and it will work as efficiently as possible.

If you're on Field Day and there's another 100-watt radio 500 meters away from you, your **FTX-1F** will "overload."

- **Technique:** Do not be afraid to turn on the attenuator if necessary. This will not interfere with the loud station you hear, and at the same time it will "calm down" the receiver by preventing the appearance of false intermodulation signals.

2.6.2. The adjustment of the ATT (attenuator)

The attenuator can be switched on and off directly from the sensor menu below the measuring system:
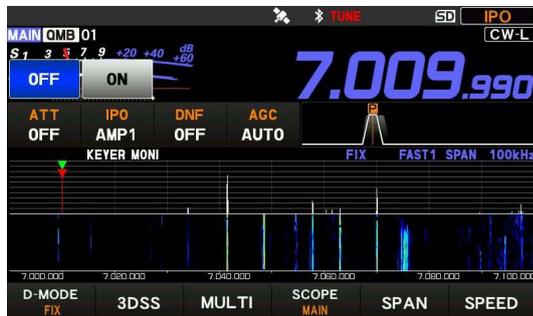
The attenuator does not work on VHF/UHF, which is quite justified and understandable.

It can also be managed from the first page of the function menus:

<FUNC hold><PAGE1><ATT><FUNC rotation><ON> or <OFF>

2.6.3. LZ3AI advises: to adjust the gain

The inclusion of <ATT>, <IPO>, <DNF> and <AGC> is also accessible directly from the icon under the display-measuring system. Simultaneously turning on <ATT> and <IPO> allows for maximum protection against overload. For example, if you are on top with a huge radio tower in close proximity, a good solution is to turn on <IPO> (i.e. turn off the amplifier <AMP>) and add <ATT> (i.e. add another 12 dB). This is the only way to hear something through the powerful interference from the adjacent transmitter. After each use of the <ATT> check to see if you have turned it off – Do not wonder why the air is "dead".

The radio allows the simultaneous operation of <ATT>, <IPO> and <AMP>, which is a unique flexibility for its SDR architecture, so unique that I don't even know when it can be used and if it makes sense.

2.7. Operational use of RF Gain and Squelch – the subtle art of attenuation

2.7.1. The squelch (squelch - noise suppressor)

It is used only for high-band telephony.

Adjusting the gain and noise cancellation for each of the MAIN and SUB channels is done with the same encoder <AF/RF/SQL>, switching between AF, RF and SQL (audio frequency, radio frequency, squelch or noise suppressor). The noise cancellation is only available for the modes in which it can be used. The same encoder in the other modes is an RF or AF gain control, which is alternatively switched by pressing the encoder <AF/RF/SQL click>. Which regulator is switched on is indicated by changing the color of the thin strip (scale) labeled RF, VOL (AF) and SQL and under the display with the measuring system. The main gain encoder (the one on the right) is also used to adjust SHIFT, WIDTH, NOTCH, CONTOUR, and APF when any of these parameters are selected (see below). Enabling this feature is done by long pressing <AF/RF/SQL hold> or by directly touching the image on the bandwidth. Turn off the bandwidth setting and filters with the hardware button <BACK> (they will not hide on their own).

2.7.2. LZ3AI advises: about squelch and the threshold of its triggering

- With **the FTX-1F,** it's better to lower the RF. This artificially raises the radio's "noise threshold." Set it so that the S-meter needle is exactly where the airwave noise level is, so you can only hear the stations that are above it, without losing intelligibility.
- In different situations, different methods of adjusting the gain may be convenient. In one case, it may be better to have the low frequency gain AF high, even maximum, and to work operationally with the gain at a high frequency RF. In another noise environment, it may turn out that the RF is maximum or high, and operationally adjust the gain at a low frequency AF.

2.7.3. Practice: Cleaning the air (NB, DNR, DNF)

1. Find a frequency with loud background noise. Turn on the <DNR> and list all levels (from 1 to 15). Find the point where the correspondent's voice remains natural, but the noise "sinks".
2. If you hear a rhythmic crackling sound (from an electric fence or engine), activate <NB> and change the algorithms from the menu until the interference disappears.
3. Turn on <DNF> while listening to a station that has an annoying interference tone nearby. Watch as the filter automatically finds and cuts the tone. Try a <DNF> for a CW signal to evaluate the effect of drowning out the useful signal.

CHAPTER 3: Surgical instruments in the field (WIDTH, SHIFT, APF, CONTOUR, S-DX)

If **DNR** and **NB** are the "rough brush", then these tools are your "scalpel". In the field, when working with **10 W** or even less, you need to make sure that you hear everything from your correspondent and successfully avoid interfering signals.

3.1. Real-time DSP filter management

3.1.1. DSP Filter Management

One of the biggest surprises in the ergonomics of the **FTX-1F** is the way you control your audio filters (SHIFT, WIDTH, NOTCH, APF, and CONTOUR). These are accessible via the soft-button buttons in the display bandwidth image.

Remember: These settings are not changed via the main encoder or encoder **<FUNC** click and/or rotate>, but with **the MAIN DSP** <AF/RF/SQL (click and/or rotate)>.

- **Mechanism: After** activating the corresponding function from the software buttons (e.g. press **<WIDTH>**), its adjustment is automatically taken over by the main gain adjustment encoder <**AF/RF/SQL** (click and/or rotate)>. Click on (orange)/off (white) for editing, and with rotation it is adjusted. When the color of the parameter is orange, it can be adjusted. The rotation transfers to the next parameter.
- **Logic:** This allows the left hand to stay on the main frequency knob (often because the other hand usually holds the microphone or telegraph key), while the right hand precisely "cuts" the interference through the gain potentiometer. Of course, this logic may not work – it depends on the preferences of the radio amateur.
- **Preview: As** you rotate, keep an eye on the screen – parameters change dynamically and immediately affect both the bandwidth and the AF-FFT graphics (if you are in <MULTI> mode).
- **Output: To** return the encoder to its usual function (volume up), you must necessarily press the **<BACK> button** on the screen or the hardware <BACK>. This control

method is extremely fast once you get used to it, but it requires attention. Always check whether you have pressed <BACK> before deciding to sharply reduce the volume, So you don't accidentally change your filter settings instead of the audio volume.

3.1.2. WIDTH (Bandwidth Bandwidth) Control

This is your most effective weapon against neighboring stations. To change the bandwidth, there is no soft button from the function menu. The change is done directly from the signal display, tapping the desired parameter to changing the color to orange, setting with the encoder the gain <**AF/RF/** SQL rotation>.

- **Important:** The SHIFT, WIDTH, NOTCH, APF and CONTOUR settings are done by rotating the gain encoder <AF/RF/SQL rotation>, not with the main frequency tuning encoder! APF and CONTOUR appear alternately depending on the selected operating mode (there is no way to see them at the same time).

MAIN DSP <AF/RF/SQL hold> or <bandwidth image clicks><WIDTH (change color to orange)> **MAIN DSP** <AF/RF/SQL rotation>

- **When and how:** If someone "steps" on the SSB from the side, shrink the WIDTH from the standard 2.4 kHz to 1.8 kHz or even less. The sound will become narrower and to a certain extent unnatural, but the interference will disappear. With telegraphy (CW), you can go down to 50 Hz for absolute isolation. You may need to press 2-3 times <ZIN> to a perfect frequency setting beforehand.

3.1.3. SHIFT (filter offset)

SHIFT does not change the width, but "swipes" the filter window up or down the frequency range.

MAIN DSP <AF/RF/SQL hold> or <bandwidth image clicks><SHIFT to change color to orange> **MAIN DSP** <AF/RF/SQL rotation>

3.1.4. Specialized audio filters: CONTOUR and APF

These two filters are **Yaesu's** "secret weapon" for extracting signals below the general noise level. It is important to know that they are software-bound to the radio operating mode and are displayed only in the mode for which they are applicable.

When is which filter active?

- **CONTOUR:** Only available on SSB, PSK and RTTY. Changes the "color" of the audio to make the voice or digital signal more legible.
- **APF** (Audio Peak Filter): Only available on CW (Telegraphy). Creates an extremely narrow peak on the frequency of the telegraph tone.

- **Note**: In other modes (such as FM/C4FM), the bandwidth and these filters are not displayed and cannot be used.

Driving mode (identical for CONTOUR and APF):

1. **Activation:** Tap the <CONTOUR> or <APF> button in the bandwidth image (the button will light up orange). Or with **MAIN DSP** <AF/RF/SQL hold>, **MAIN DSP** <AF/RF/SQL rotation> to select the required filter, and then **MAIN DSP** <AF/RF/SQL click> until it turns orange.
2. **Setting: Rotating the** MAIN DSP **Gain Encoder** <AF/RF/SQL rotation> to the right of the screen moves the filter along the frequency scale.
3. **Output:** Press the hardware **button <BACK>** to return the standard encoder function (volume). The image of the filters is not currently hidden.

Techniques for working with CONTOUR and APF

- **In SSB (CONTOUR):** It does not cut everything, but amplifies or attenuates a certain frequency. For very weak signals (QRP), make a small "peak" around 600-800 Hz. This makes the voice "piercing" through the noise without increasing the overall volume.
- **With CW (APF):** This filter is indispensable in contests. It doesn't just cut out the noise, but "lightens" the specific telegraph signal you're tuned to, making it stand out clearly above the airborne background noise.

IMPORTANT: The SHIFT, WIDTH, NOTCH, APF, and CONTOUR settings are always taken over by the **MAIN DSP Sound Boost Encoder** <AF/RF/SQL rotation>! They are not affected by the Main Frequency Setting Encoder or the **<FUNC> encoder**.

3.1.5. LZ3AI advises: about the shift, tape and filters

- If the interference is only on one side (e.g. high-frequency whistling), use <SHIFT> to push the filter in the opposite direction.
- **Important reminder:** The settings of <SHIFT>, <WIDTH>, <NOTCH>, <APF> and <CONTOUR> are done with **MAIN DSP** rotation <AF/RF/SQL rotation> and not with the main frequency tuning encoder!
- Always look at the display before reaching for the gain potentiometer. If the <CONTOUR> or <APF> button glows orange, you change the filter, not the volume. The habit of pressing **<BACK>** immediately after adjusting with the filters is what distinguishes an experienced **FTX-1F** operator from an inexperienced one.

- Use the AF-FFT display as a visual corrective when adjusting <CONTOUR> and <APF>. When you move the indentation or protrusion of the filter, you will see how the corresponding part of the display's audio spectrum literally "sinks" or "pops". You will also see how the low-frequency sound changes when applying <APF>. This is the easiest way to physically understand how you change the tone of the correspondent, to get it out of the noise.

3.2. S-DX (Spectrum DX) – The Weak Signal Hunter

The **<S-DX> button** is not just a filter, but an intelligent visualization algorithm. It works directly with waterfall data to help you "pull out" very weak DX signals that are otherwise lost in noise. From the principle of operation comes the abbreviation S-DX – Spectrum-DX filter.

3.2.1. How and on what principle does <S-DX> work?

Unlike a standard waterfall, which simply colors pixels according to signal strength, **<S-DX>** uses software processing of spectrum frames. It analyzes sequential scan cycles and, through mathematical averaging, "clears" static background noise.

- When you activate it, you will notice that the noise of the waterfall (black/dark spots) becomes more uniform, and faint peaks of distant stations (DX) begin to "glow" more clearly and distinctly.

3.2.2. When is it appropriate to use <S-DX>?

- **With low radio wave propagation:** When looking for SOTA correspondents from other countries and continents whose signal is on the edge of noise.
- **In highly noisy environments:** If you have industrial interference in the field (e.g. from nearby power lines), **<S-DX>** helps your eyes distinguish a useful signal from chaotic noise, while also improving the signal-to-noise ratio.
- **On CW and FT8/FT4/FT2:** In modes where the signal is narrow and weak, **<S-DX>** is an invaluable visual aid.

3.2.3. How is <S-DX> activated?

- In the **FTX-1F <S-DX>** is the second hardware button on the top side of the transceiver.
- When turned on, an S-DX icon (white inscription) lights up at the top of the display in the status bar, signaling that the algorithm is working.

3.2.4. Why do we need <S-DX> in the field?

When you're on top with a small antenna and 5W, your biggest enemy is noise. In these conditions**, the <S-DX>** provides your "night vision". It doesn't directly change what you hear (that's what DNR and DNF are for), but it changes what you see, allowing you to tune exactly to the frequency of a station that you would pass without it.

3.2.5. Does <S-DX> have an impact on sound?

Yes, but indirectly**.** Here's how the algorithm works:

1. **The visual part (spectrum):** The main task of the **<S-DX>** is to process data from the digital spectrum. It calculates the average noise values and "suppresses" them visually, leaving only stable signals to stand out.
2. **The Sound Connection (DSP):** With the FTX-1F **SDR architecture**, the waterfall data and sound data come from the same place – the A/D converter and the FPGA chip. When you enable **<S-DX>**, you're actually changing the way the software interprets that data.
3. **The result:** <S-DX> helps the DNR (Digital Noise Reduction) algorithm work more efficiently. When the spectrum is "smoothed" by **<S-DX>**, it is easier for the digital filter to distinguish the useful signal from the noise in the audio path.
4. **<S-DX>: More than just a picture** Although at first glance **<S-DX>** seems like a purely graphical enhancement of the waterfall, its effect is also felt in the headphones. By software averaging of background noise, it helps the operator to "center" their hearing on the useful signal. When the **<S-DX>** mode Audio often sounds "calmer" because visual signal confirmation helps our brain (and DNR filters) ignore chaotic noise peaks. When the **<S-DX> mode is turned on, the inscription** <S-DX> lights **up on the status bar**.

3.2.6. LZ3AI advises: for the <S-DX> mode

- **Don't keep it on always:** The <S-DX> mode adds a slight delay in the refresh of the waterfall due to mathematical processing. If you're running strong local stations, you'd better turn it off for a more dynamic picture.
- **Combine <S-DX> with <ATT> at loud noise:** If the noise in the field is too high (S5-S7 noise), turn on the attenuator and then run the <S-DX>. This will "cut" the bottom layer of noise and leave only the useful DX signals on the screen.
- **Combine <S-DX> with <DNR>:** If you only relied on <DNR>, the sound may become "metallic" or "artificial". With <S-DX> on, you get a cleaner output point for all other audio filters. For the best field result (SOTA/POTA):

  1. Turn on <S-DX> to locate the weak station of the falls.
  2. Tune right on it. If it's on CW, use <ZIN>, try even <APF>.
  3. Enable <DNR> (usually on algorithm 3 or algorithm 4 for voice). You'll notice that the combination of the visual clarity of the <S-DX> and the audio filtering of the <DNR> makes even the weakest signal understandable.

- **Visual confirmation:** Use **<S-DX>** to decide if it's worth fighting for a station. If the signal is stable when **<S-DX> is turned on**, but disappears when turned off, then you've found a real DX that requires maximum concentration and filters (APF/DNF).
- The **<S-DX** Hold> button as a screenshot tool (its additional function when long pressed) is not always active – for example, for a photo when a digital scale is displayed after <D-MODE FIX hold> is not active and a sound is heard about an invalid operation. Since I do not find any particular sense or good reason for this prohibition, I hope that this will be removed in the next version of the firmware.

3.3. Practice: "surgical instruments" (WIDTH, SHIFT, APF)

1. In SSB mode, tap the <WIDTH> icon. Rotate the encoder to narrow the band to 1.8 kHz. Notice how the timbre of the voice changes and how neighboring stations disappear.
2. In CW mode, turn on <APF>. If you lose the useful signal, turn it off and press 2-3 times<ZIN>. If necessary, rotate the encoder to "slide" the filter peak right onto the signal frequency – the CW indicator should be positioned in the middle of the scale. You need to feel how the telegraph signal literally "surfaces" above the noise.
3. Practice pressing the hardware button **<BACK>** immediately after each filter setting to return the encoder to its volume function (AF Gain).

CHAPTER 4. Working with transceiver memories (MAG, QMB, PMG)

4.1. Information Grouping and Access (MAG - Memory Access Group)

4.1.1. Purpose of MAG

Unlike base stations, field work often requires a quick switch between different types of activities – for example, from the local repeater to the "search" of KV stations.

 FTX-1F allows convenient semi-automatic grouping of already recorded frequencies. Semi-because one of the groups has preferred channels that are manually selected.

4.1.2. How to work with MAG

To use the **MAG function**, you need to be in memory mode. This is done by pressing the <V/M (MW) click> button. If you are in **VFO mode** (alternately switched by the <V/M (MW) click> button), the last listened frequencies for each band are traversed. In general, this button can be said to include a "**memory manager"**" – when clicked, it lists the records by groups, when held it displays a list of memory cells, their contents and allows them to be edited and organized by used groups.

1. **Recording:** The operating frequency for the time being is recorded in memory with the <V/M (MW) hold button>. Before pressing the record button, make sure that the mode and all other settings are correct.
2. **Mode: For** the MAG function to work, the radio must be in memory mode (**<V/M (MW) click>**. Frequency recording is done by pressing longer and changing the name of the recording – for example, repeater number and location (characters are limited).
3. **Filtering**: With each subsequent short press of <**MAG> the** filters are scrolled as listed below (note – the button scrolls the filters, not the frequencies, the frequencies are scrolled with the main tuning encoder). If there is no frequency recorded from a certain group, then this filter is skipped – it is not displayed as a possible selection at all.

    - **M-ALL** – if there are recorded frequencies, then when selecting the **M-ALL filter** (if it can be called a filter), all frequencies recorded in memory without filtering are listed;
    - **M-HF, 50MHz**, **M-AIR**, **M-VHF** and **M-UHF** – filters automatically created by bands (they are fixed and appear as a selection if there is at least one recorded frequency in the given band). If you do not have recorded frequencies from a band, then it will not be displayed as a selection. After the first frequency recorded in the band, this band also appears in the filter selection.
    - **M-GRP** (manually selected) – special (preferred) frequencies. After holding down the **<V/M (MW)** hold> button, the list of recorded frequencies appears, of which some may be selected for the **M-GR**><**P group (filter).** After a selection, the ID of

the selected frequency lights up blue. Saves blue until this selection is manually canceled again.

4. **Frequency selection:** After selecting the filter, you use the main encoder to traverse all frequencies (but only them) from the selected group. The name of the currently selected frequency is written in the middle of the display under the top status information bar – as it is recorded in the memory list.

If signals are detected at any of the recorded frequencies, they are visible on the waterfall, only as wide traces (bands, bars), unlike in VFO mode, when they are very thin "trickles".

4.1.3.   LZ3AI advises: for the M-GRP group in MAG mode

- Use MAG's dedicated M-GRP group to organize memories in preparation for a nature outing and depending on a specific purpose. Once this group may be "Mountain repeaters", other times "Simplex frequencies", "Repeaters in the region of Veliko Tarnovo", "POTA" or "SOTA". Unfortunately, the name of the filter cannot be changed and will always be M-GRP, only you will know what this group refers to in the specific situation. It is just one for the current firmware and always bears the name M-GRP.
- M-GRP saves you from spinning the encoder through hundreds of channels at a time when your battery is running low or time is running out.

4.1.4.   Practice: MAG and frequency channel memories

1. Research on the Internet which repeaters work in the area where you live, what frequencies they work on, whether they have tone unblocking, and with what tone or code. Write them down in memory cells with appropriate names so you can easily find them.
2. Research which frequencies are most commonly used for local connections in your area. Set them up and save them to the next memory cells.

3. You can add other frequencies – for QRP work, for SOTA, for POTA, etc. A pretty good selection of popular frequencies can be made from https://www.galanto.com/ frequencies-antennas-and-little-stubborn-practical/ .

4. Include several of these frequencies in an M-GRP group and try how to switch the individual MAG groups and how to scroll the frequencies in the group itself.

4.2. Quick Memory Bank QMB (Quick Memory Bank)

The QMB function is the "working memory" of the radio. It is separated from the main channel list and serves to instantly and easily, but temporarily record frequencies and settings that you have come across on the air and want to save for a short time, without going through the naming and classification procedure in standard memory with a button **<V/M (MW)>**.

4.2.1. Principle of operation of QMB

The system works on the principle of the FIFO (First In First Out) stack – it has 5 (or 10, according to the settings) positions. With each new entry, the oldest one is automatically deleted to give way to the new one.

The number of channels in the QMB stack can be configured through the menu

<FUNC hold><PAGE3><OPERATION SETTING><BAND/SCAN><QMB CH>,

where you can choose between 5 ch or 10 ch (channels, positions).
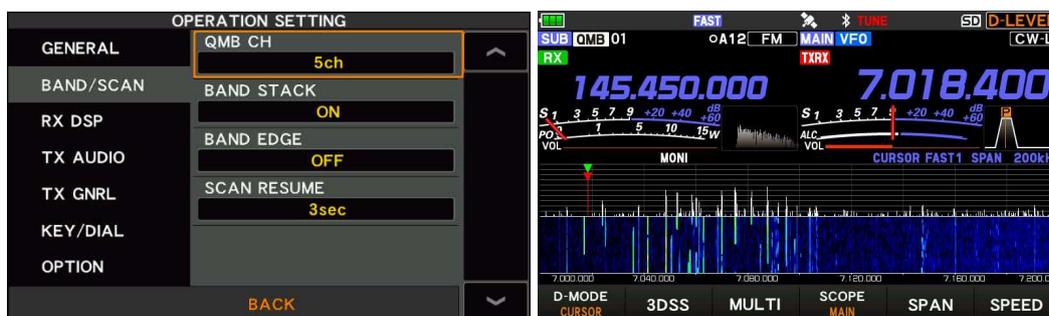
4.2.2. How to work (hardware button) with QMB

- **Recording (<QMB** Hold>): When you come across an interesting frequency in VFO mode, press and hold the **<QMB Hold>** button. The radio will beep confirming that the frequency, mode, and filter settings are recorded in the first free position. A window will also pop up with a notification that it has been recorded in the 1st cell (every time it's the 1st!)
- **Call** (short press **<QMB** click>): With each short press of <QMB click> the radio cycles through the **frequencies recorded in the stack**. The inscription QMB appears on the display to indicate that you are not in VFO, but in fast memory. After QMB, the cell number from the memory in format 01 is also followed 02,03... etc.
- **Output: To** return to normal operation, simply change the frequency with the main frequency setting encoder or press **<V/M (MW)** click>.

When writing to the QMB memory, QMB1 always lights up – the current frequency is recorded there. The rest of the already enrolled ones are moved one cell (position) forward.

4.2.3. LZ3AI advises: to work with <QMB>

Use <QMB> during contests or SOTA activations to "tag" stations that are currently occupied. Record them in QMB and continue searching the scope. After a while, return to them with just one click of the <QMB click> button to check if it's your turn.

4.3. PMG (Primary Memory Group) – your command center

4.3.1. What is PMG (Primary Memory Group)

This is one of the most innovative features in **Yaesu's new SDR** radios. It literally changes the way you follow the airwaves, but it may not be fully polished yet.

In the context of **FTX-1F**, this button is not just a "memory", but a "visual monitor" of your favorite frequencies. The **<PMG (PW)>** button (located just above the middle of the display) is your "quick menu" for the most important frequencies. Unlike standard memories, PMG allows you to monitor up to 5 frequencies simultaneously on the screen, and unfortunately, you can hear them at the same time. but to be able to jump directly to a selected frequencies from the monitored frequencies or to work on it directly from PMG mode.

4.3.2. How does the <PMG (PW)> button work?

<PMG> doesn't just switch frequencies – it creates a "mini-waterfall" for each of the stored frequencies. While working on one frequency, you see (and at the same time hear) if there is activity on the other 4.

- **Frequency Recording:** Set the radio to the desired frequency (and mode) and simply hold the **<PMG (PW)** hold> button. The frequency will be added to the group.
- **Activation:** Short press **<PMG (PW)** click>. The display will change and show columns (bars, bars) for each recorded frequency. The active frequency for transmission is currently wider than the others, but the signal from all five can be heard at the same time. My personal opinion is that it is better to see the activity on the five, but to hear only one – the active one and the transmission one.
- **Selection:** Tap the corresponding "bar" on the screen or rotate the main (large) encoder to switch instantly to this frequency. In the current firmware version, this choice is nothing more than a choice – only a white background appears below the frequency ID and the bar (bar) expands more compared to others that are not selected.

4.3.3. Why do we need the field <PMG (PW)>?

To the current firmware version, **<PMG (PW)>** should be seen as a situational awareness tool rather than a quick communication mode.

Instead of scanning the entire range, you can "pin" the 5 most important frequencies for your activation or your place of residence. For the current firmware, perhaps a good solution is that the selected frequencies are not very active – it makes a little pointless if radio amateurs are constantly working on all five frequencies – the PMG function will only work as a kind of "mixer" of the sound of the five frequencies and will be useless. PMG makes sense when the frequencies are quiet and we are waiting for a signal on one of them to react in some way. A good solution in case of disaster or emergency (crisis) is to listen to 5 SOS frequencies – these frequencies are used only in case of emergency.

In a busy environment, of course, you can still get mixed signals and it is better to switch back to the usual VFO or Memory mode.

A. Editing (adding) the selected frequencies with the PMG button

To add a frequency for monitoring with PMG, you must be in VFO mode. Adjust the frequency and hold **the <PMG (PW)** hold>. If you are not in the correct mode or the desired frequency is already recorded in PMG, you will receive a three-sound signal for an invalid "you-you-" operation.

If you are trying to record a new frequency while all 5 slots are full, the radio will also deny you a recording and notify you of it with an audible signal for an invalid "you-you-" operation. Therefore, always "clear" unnecessary channels by holding down the button before starting work on a new peak or park (SOTA/POTA).

- **Common mistake:** Never try to add frequencies while in PMG mode. The radio will simply delete the current frequency from PMG instead of recording another one.

B. Deleting a frequency from PMG

Deleting frequencies from the PMG group is important because it's a "dynamic" list – it's meant for the frequencies that are important to you today or for the current event/event/natural disaster, not as permanent backups.

- Since the PMG group has a limit of 5 frequencies, you will often need to remove old ones to make room for new ones. You must be in PMG mode. Press the **<PMG (PW)** click> button to enter the monitoring mode.
- Select the slot you want to erase with the main encoder or touchscreen and hold **<PMG (PW)** hold>. If you want to erase all frequencies, repeat this for each of the 5 channels and you will be able to start "fresh".

C. Application scenarios:

- **Natural Disasters / Search & Rescue:** You can set 5 critical frequencies (e.g., local repeater, national disaster channel, mountain service frequency, and two local team frequencies). See activity everywhere at the same time without scanning and losing the start of messages.

  Example 1: In case of an emergency:

  1. Emergency frequency 1.
  2. Emergency frequency 2.
  3. Emergency frequency 3.
  4. Emergency frequency 4.
  5. Emergency frequency 5.

- **DX Hunt (or Race):** You can observe 5 different frequencies on "spots" to find out when a signal is appearing without leaving your current operating frequency.

Example 2: Preparing for Trigger Hunting

1. Activated frequency announced 1.
2. Activated frequency announced 2.
3. Announced activation frequency 3.
4. Announced activation frequency 4.
5. Announced activation frequency 5.

B. Operational Limitation (Important!): Since direct transfer to work from PMG is limited (and the hardware button <**V/M(MV**)> is blocked), the most effective method is:

1. You use <**PMG(PW)>** only to detect signals.
2. Once you have established a signal, you turn off the PMG and select the appropriate channel from your pre-programmed memory channels.

4.3.4. Scan – automated signal search

FTX-1F offers three main levels of automated over-the-air monitoring. It's important to understand that while **PMG** gives you a "panoramic view" of 5 selected frequencies, classic scanning and **PMS** are the tools for actively searching for bandwidth activity.

A. PMS mode (Programmable Memory Scan)

This is one of the most powerful features for advanced operators. It allows you to scan only in a certain segment of the range (for example, only the SSB section), instead of the entire band.

- **Setting the limits:** The special pairs of channels in the memory are used, which are accessed in the usual way: P1L / P1U to P10L / P10U. You write the lower limit in L (Lower) and the upper in U (Upper).
- **Activation:** You call up the corresponding P channel and start the scan. The radio will only cycle between these two frequencies.

B. Classic Scan (VFO and Memory Scan)

- **VFO Scan:** Traverses the entire current range according to the set encoder step.
- **Memory Scan:** Only crawls the channels you have recorded in the radio's memory.

C. Setting up the Signal Detection Action Logic (Scan Resume)

To determine how the radio will react when it detects activity during scanning (VFO, Memory, or PMS), you need to configure the mode from the menu:

<**FUNC** hold><PAGE3><OPERATION SETTING><BAND/SCAN><SCAN RESUME>

Here you have three choices that determine the "intelligence" of the scan:

1. **TIME (1s / 3s / 5s):** The radio stops at the active frequency, allows you to hear part of the call for the selected time (e.g. 3 seconds) and necessarily continues the scan even if the signal is still available. Suitable for a quick overview of the air.
2. **BUSY:** The radio stops on the frequency and stays there as long as there is a signal. As soon as the signal disappears, the transceiver waits a bit (usually 2-3 seconds to finalize the transmission) and automatically resumes scanning.
3. **HOLD:** The radio stops on the first signal found and stops scanning. It stays at this frequency permanently. To continue searching, you need to manually start the scan again. Use this mode if you don't want to miss important information.

D. PMG (Primary Memory Group) Mode

This is your "Activity Monitor". Here you do not scan in the classical sense, but monitor up to 5 frequencies at the same time.

- **Feature: All** frequencies in the group are heard at the same time, with the current one being prioritized and the rest slightly attenuated.
- **Setting:** Frequencies are added to the group by holding down the **<PMG (PW)** hold> button. They are deleted in the same way, only you must already be in PMG mode to delete it.
- **Important:** Since this is parallel monitoring, the "Scan Resume" settings do not affect PMG – it is always active.

4.3.5. LZ3AI advises: about the <PMG (PW)> button and the scan

- **Preview**: The secondary function of the same button **<PMG (PW)>** (on hold or depending on the mode) PW stands for Point Wall or Power Watch, and is the graphical visualization of activity – those "bars" (bars) that you see on the screen. The higher the bar, the stronger the signal on that memory. This allows you to tell if there is a real conversation on the frequency or just interference. without even switching to it.
- **Use scanning as a "strategic radar"**: When you're at the top and shouting at one frequency, take a look at the bars for the others. If you see activity occurring on any of the other frequencies (the bar is picking up and coloring), you can quickly "jump" there, make the connection, and go back in just two clicks or a slight turn of the main (large) encoder.
- **HOLD mode**: Since there are often disturbances or weak signals in the mountains, HOLD mode is the better choice for SOTA/POTA. This way you won't miss the initial of a correspondent just because the set 3 or 5 seconds for a TIME value have expired.
- **For active "hunting" of spots and activations**: Use the scan in BUSY mode, so you won't miss important information during a call, but you won't be stuck on the frequency once it's released. This is the most practical mode for SOTA/POTA activations when you want to find a free frequency or find an active colleague without constantly rotating the encoder.
- **Filter out noise:** Before starting a scan, set the noise suppressor correctly. If the threshold is too low, the radio will stop at any "burst" of static electricity in the air.

- **The power of PMS:** Don't waste time scanning the entire band 40 meters if you're only looking for digital communication. Set your PMS limits from 7.040 to 7.050 MHz and let the radio work for you.
- **ZIN when scanning:** If the radio stops on a CW signal in BUSY mode, you can quickly press ZIN to center perfectly before deciding whether to join the call.
- **For maximum speed:** in PMG mode, arrange 5 frequencies of PMG in adjacent cells of the standard channel memory. This way, when you see activity in PMG, you simply exit and turn the main encoder to go to the corresponding channel, or select it from the list of recorded channels, if you find it easier.
- **Consumption reduction:** When you are in PMG mode, the radio software processes several frequencies at the same time to show you their activity. Although consumption does not jump dramatically, if your battery is on the "last line", it is better to exit PMG mode and stay at one fixed frequency (from VFO) to save some CPU resources and therefore battery.

4.3.6. Practice: the secrets of memory and scanning

1. Write down three frequencies in memory, assigning each to a different name, for example: "BULGARIA", "REPEATER", "CALLING". Practice switching between displaying the frequency and the channel name.
2. Enable memory scanning. Set the hold time from the menu so that you have enough time to hear who's talking before the radio goes on.
3. For give a lower and upper limit for PMS and run a scan of this section.

CHAPTER 5: The Voice That Breaks Through

When you only have 6 watts or even 10 watts, the quality of your audio is more important than the signal strength. You have to sound "piercing" to be noticed in the noise.

5.1. The Microphone Compressor (Speech Processor)

5.1.1. Compressor Setup

Unlike homework, in the field, a compressor is a must. It "thickens" the energy of your voice.

Compressor (Speech Processor):

<FUNC hold><PAGE1><PROC click>

To set the level:

<FUNC click><PAGE1><PROC click ><**FUNC** rotation>

5.1.2. LZ3AI advises: about the compressor

- Do not set the compression to the maximum. This will introduce ambient noise (wind, birds, leaf noise) into your signal, as it will amplify even the weakest signals. Set it so that on the radio scale the compression level (COMP is selected for the display scale) is between 5 dB and 10 dB for normal speech.

5.2. Parametric EQ (PRMTRC EQ)

Yaesu **parametric equalizer** is often a frightening topic, but in fact, its logic is simple when divided into three zones. In the **FTX-1F** transceiver (as with large **Yeasu** stations), you have three independent bands (EQ1, EQ2, and EQ3), each of which has three parameters.

This is the most powerful weapon in Yaesu's menu for shaping your signal. It allows you to change the frequency response of your voice to compensate for the characteristics of your microphone or your specific timbre.

Here's how this "weapon" works and how to set it up for field work:

5.2.1. The three parameters of each bar (EQ1, EQ2, EQ3)

For each of the three bars in the menu you will see:

- **FREQ (Frequency):** Which part of your voice we will process (low, medium or high) at 100 Hz. EQ1 is 100-700 Hz, EQ2 is 700-1500 Hz and EQ3 is 1500-3200 Hz.
- **LEVEL:** How much to amplify (+) or suppress (-) this frequency. The scale is in decibels and ranges from -20 dB to +10 dB.
- **BWTH (Width/Q-factor):** How "wide" the grip should be from 0 to 10. A small value (1-2) means a wide grip (smooth), a large value (9-10) means a very sharp and narrow tip.

5.2.2. QRP and fieldwork settings

For SOTA and low-power operation, our goal is not "beautiful" audio, but "breakthrough" audio. We need to expel the energy from the low frequencies (which only heat the terminal transistors without carrying information) and concentrate it in the high frequencies.

The recommended values in the following example are written in bold. The values for <PRMTRC> are when the compressor is turned off, and for <P PRMTRC> are values when the compressor is switched on.

A. Example configuration "DX/SOTA voice":

<FUNC hold><PAGE3><OPERATION SETTING><TX AUDIO>

      <AMC RELEASE TIME><MID>

<PRMTRC EQ1 FREQ><100 Hz – **200 Hz** – 300 Hz >

<PRMTRC EQ1 LEVEL><**-10**>

<PRMTRC EQ1 BWTH><2 –**3**- 4>

<PRMTRC EQ2 FREQ><800 Hz – **1000 Hz** – 1200 Hz >

<PRMTRC EQ1 LEVEL><**+2**>

<PRMTRC EQ1 BWTH><5>

<PRMTRC EQ3 FREQ><2100 Hz – **2300 Hz** – 2400 Hz>

<PRMTRC EQ1 LEVEL><+8 – **+9** – +10 >

<PRMTRC EQ1 BWTH><2>

<P PRMTRC EQ1 FREQ><100 Hz – **200 Hz** – 300 Hz >

<P PRMTRC EQ1 LEVEL><**-10**>

<P PRMTRC EQ1 BWTH><2 –**3**- 4>

<P PRMTRC EQ2 FREQ><800 Hz – **1000 Hz** – 1200 Hz >

<P PRMTRC EQ1 LEVEL><**+2**>

<P PRMTRC EQ1 BWTH><5>

<P PRMTRC EQ3 FREQ><2100 Hz – **2300 Hz** – 2400 Hz>

<P PRMTRC EQ1 LEVEL><+8 – **+9** – +10 >

<P PRMTRC EQ1 BWTH><2>

B. How to read the parameters:

- **EQ1 (Low): This** is where you adjust the "density". In the field, I recommend lowering the level (LEVEL) to -10dB with a wide grip of 2-4 so as not to waste power in bass that sinks into the noise.
- **EQ2 (Medium):** Here is the body of the voice. Leave it almost neutral or with a slight "peak" around 1000 Hz with an average grip of 5.
- **EQ3 (High): Here** comes the "intelligence" of speech (consonant sounds). Amplify them boldly at +9 dB and more at a frequency of around 2300 Hz with a narrow grip of 2.

5.2.3. LZ3AI advises: about the equalizer at QRP

- Make your voice "metallic". When your correspondent hears your S1-S2 loud speak, he will not appreciate your bass, but he will thank you if your treble "cuts" the airy noise like a razor.

- In the menu, you will see two identical sets of EQ settings: for the PRMTRC EQ compressor turned off and for the P-PRMTRC EQ compressor on. Adjust both sets (with and without compressor) in the same way so that the "color" of your voice does not change when you decide to turn on the processor in harsh conditions. Test all these settings while listening to another radio with the attenuator on, on the **FTX-1F** with the monitor on (<PAGE2> from the function menu) or on an online SDR receiver that you reach with the low power of **the FTX-1F** – the difference in "penetration" is huge!
- When setting the grip, for easy memorization, you can imagine it as 100 Hz per unit, but inversely proportional (subtract the grip number from 10). For example, grip 9 has a high tip and a band of 100 Hz (10-9=1), and 1 is a wide grip with a band of about 900 Hz (10-1=9).

5.3. Setting up the Microphone Amplifier <MIC GAIN>

5.3.1. Path to settings

<FUNC Hold>**<PAGE1><MIC GAIN><FUNC** Rotation>.

5.3.2. Microphone Amplifier Setup Technique

It is understandable that the microphone amplifier is only active in phone modes.

A common mistake, especially when working in noisy environments, is the microphone gain being too high. This does not make you "stronger", but simply introduces distortions and parasitic noise. The default is 50. I have left it unchanged. If you're using a microphone other than the standard microphone that comes with the kit, you may need to change.

Turn on the measuring system on the ALC (Automatic Level Control) display. While speaking normally, the arrow (or scale segments) should move within the designated white area of the ALC scale near the boundary with the blue and never go beyond it at peaks.

- **Too low ALC:** Your signal will be weak and difficult to decipher.
- **Too high ALC:** Your signal will "spill" out of bandwidth (Splatter), sound distorted, and interfere with neighboring stations.

Always test the microphone settings first – boosting it from <FUNC hold><PAGE1><MIC GAIN> with the speech processor turned off <FUNC hold><PAGE1><PROC LEVEL><OFF>. After fixing the correct ALC level, turn on the processor and adjust its compression ratio separately.

5.4. Microphone and Wind (Anti Wind Noise)

If you're at a peak and the wind blows directly into the microphone, the low-frequency blows of the air jet can completely drown out your voice, turning it into an incomprehensible "boom". The following are ways to combat and protect this effect.

5.4.1. Physical protection

Use "windshields" – in the field, even a plain woolen or other fuzzier sock strung over the microphone does a great job. The foam cap is a more aesthetic, perhaps a must-have solution for SOTA/POTA.

5.4.2. Electronic security

In the parametric equalizer (EQ1) menu, apply aggressive cutting of the low frequencies.

- Set the EQ1 FREQ to around 300-400 Hz.
- Reduce EQ1 LEVEL to a minimum (-20 dB).
- Adjust the EQ1 BWTH (width) to 1 or 2 (wide grip).

Result: This will eliminate the low-frequency wind energy that "clogs" the ALC system, and allow your speech to flow clean through the airwaves.

5.5. Practice: the voice that breaks through (EQ and MIC GAIN)

1. Turn on the <FUNC hold><PAGE2><MONI LEVEL> function at an acceptable level where you can hear your own voice clearly in the headphones. I recommend using headphones to avoid a "microphone" effect (feedback between the microphone and the speaker).
2. Turn off the compressor <FUNC hold><PAGE1><PROC LEVEL><OFF>.
3. Change the EQ3 (High) settings to +10dB and see your voice become "metallic" and sharper.
4. Set the <FUNC hold><PAGE1><MIC GAIN> so that the ALC scale does not go out of the marked area when speaking normally. It is recommended to use an artificial load in this setting.
5. Return the compressor to its default value or to the one you already set it to.

5.6. LZ3AI advises: for wind protection

You won't always have a woolen sock on hand. Try a women's one – although it looks thin, it can do an excellent job of protecting the microphone from the wind. And since SOTA is basically a solitary activity, you will have to bring it from home. Short sneaker socks or a cut end from tights are preferable. The women's sock has another advantage - it is light and takes up almost no space.

CHAPTER 6: The Magic of Weak Signals – CW, FT8/FT4/FT2 and APRS

This radio is designed for the era of digital communications. Telegraphy is also still "on the move". In this chapter, we'll look at how to use built-in tools to make connections even when the air seems "closed" for voice work. And some people (like me, for example), prefer CW, digital modes and geolocation (GPS, APRS). I would even say that I got into this matter (of telephony), mainly because of this booklet and my growing interest in SOTA/POTA.

6.1. Telegraphy (CW) – Extracting information from silence

6.1.1. Typical telegraph CW functions

When operating with 6 W (battery) or 10 W, telegraphy is the most efficient way to communicate.

- <ZIN> (Zero-In): With **FTX-1F,** this is a critical feature. Since you are working with very narrow filters (e.g. 100 Hz), if you are not "exactly at zero" relative to the frequency of the correspondent, you simply won't hear it. By touching the <ZIN> button (you may need to click it 2-3 times), the radio will automatically "pick" the signal and center your frequency on it.

    <FUNC hold><PAGE2><ZIN>

- <APF> (Audio Peak Filter): This is **Yaesu**'s "secret sauce" for the CW. Unlike standard filters, APF doesn't just cut the noise, but raises the peak strength for the Morse signal. For this filter to be accessible, you need to be in CW mode and tap the bandwidth image on the display. You press the software button <APF> (the APF inscription below the bandwidth lights up orange) and adjust the peak frequency via encoder to amplify the MAIN channel **MAIN DSP <AF/RF/SQL>**.

6.1.2. LZ3AI advises: for APF

- Use <APF> along with a narrow <WIDTH> (250 Hz or 100 Hz). The correspondent's signal will literally "surface" above the noise.
- Always precede it by pressing the <ZIN> button 2-3 times. And maybe I never said it, I recommend programming one of the microphone buttons with <ZIN>.

6.2. FT8 and other digital modes

6.2.1. FTX-1F and working in digital modes

The FTX-1F is a true SDR radio with a built-in sound card. This means that you don't need additional external interfaces to work on the FT8/FT4/FT2, but you still need: software for the corresponding digital mode, software for accurate timing, a driver for the virtual COM port and for the sound card (downloadable from the **Yaesu** website), and a USB-C cable at one end (the other end depends on the laptop used).

- **Drivers**: Before connecting the radio, install the drivers for the virtual COM port (CP210x) from the Yaesu website. The radio will be recognized as two COM ports (Standard and Enhanced) and an audio device (USB Audio CODEC).
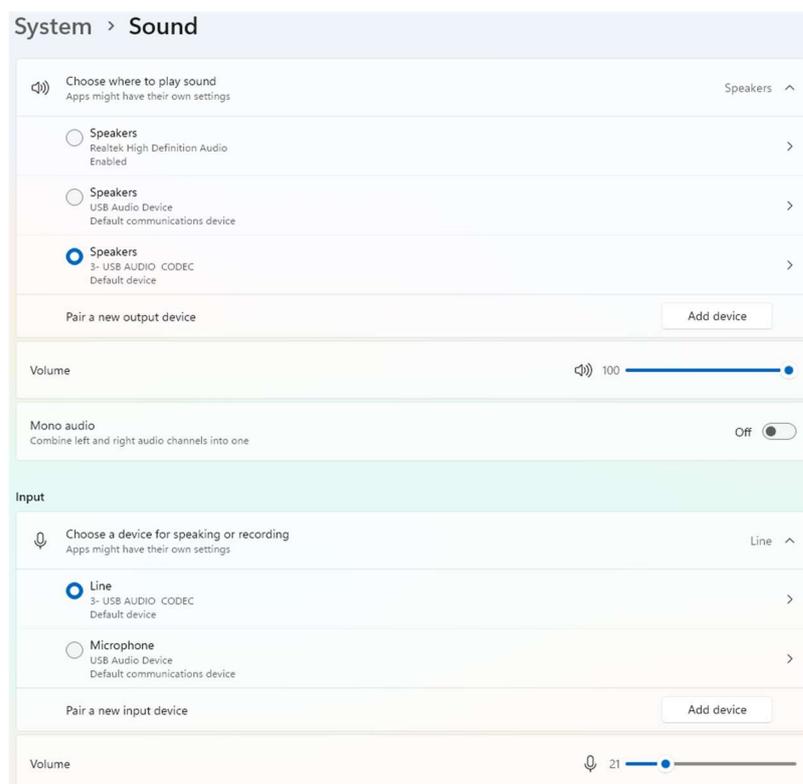
- **Cable:** The most stable way to work is via a USB-C cable. In fact, with this firmware version, still the only one. You can connect **the FTX-1F** directly to a laptop or tablet (you can also connect directly or via an OTG adapter in case the USB-C port is needed for something else as well). The radio will be recognized as an external sound card and a new COM port. At the moment, Bluetooth is mainly used for wireless headphones or for CAT control via mobile applications (e.g. for mobile applications remote frequency monitoring – I've only heard about it and won't go into too much detail). The operation of the FT8/FT4/FT2 entirely via Bluetooth (without cables) depends on the support of the audio profiles in the specific software and tablet. With the current firmware, this is not yet possible. For critical work in the mountains, the USB cable generally remains the "gold

standard". Be sure to insert ferrite filters (ferrite clips) at both ends of the cable to block the RF induction, which may interrupt the CAT connection during transmission.

- **Synchronization**: For FT8/FT4, and especially for FT2, it is critical that the computer's timing is synchronized to the nearest millisecond (use software such as NetTime Sync or Dimension 4).
- **Cooling:** FT8/FT4/FT2 are modes with 100% load. I recommend reducing the power to 5W. With FT8, this is quite enough for connections to the whole world, and you will also protect the battery from rapid drain.

6.2.2. Digital Work Settings

In order for **the FTX-1F to work** seamlessly with external software, the configuration is done at three levels: audio (the internal sound card), data (communications between interfaces), and control (CAT).

For the built-in sound card to work properly, you need to install the Silicon Labs drivers from the **Yaesu website**. After this installation, a new USB sound device appears, which must be selected in the configuration of the software you are using. The levels are adjustable from three places (from the two once, from the third operational during operation, but rarely necessary):

- from the operating system, for example for Windows from Settings/ System/ Sounds/ Output/ Speakers/ USB Audio Codec, respectively there Input/ Line/ USB Audio Codec. If you are using the computer mainly for digital modes, you can turn the sound card into MONO mode, but I have not found that it has any particular meaning, usually the software used does this as well.
- from the radio <FUNC hold><PAGE3><RADIO SETTING><MODE SSB><USB OUT LEVEL> and again there <**FUNC** hold><PAGE3><RADIO SETTING><MODE SSB><USB MOD GAIN>. The same parameters are in the respective PRESET; it is good that they are the same and both are by default <50>. To reach the PRESET configuration, you need to select <N/**W (MODE)** hold><PRESET hold>
- operationally from the RF GAIN radio amplification with the encoder **MAIN DSP** <AF/RF/SQL>. In the end, it is important to get a level of about 40-60 dB at the input of the software for the digital reception modes (the bar should usually be green or orange, depending on the software and version).

For successful communication, the settings for the used COM ports of the radio and software must be the same: 38400 bps, 8 bits, 1 stop bit, no parity. In radio, this is the default (but they may also be pushed in the experiments), they must be aligned with the same for the software used.

It is important to know that **FTX-1F** has three CAT interfaces. More precisely, maybe three CAT logics.

<FUNC hold><PAGE3><OPERATION SETTING><GENERAL><CAT-1>

\<FUNC hold\>\<PAGE3\>\<OPERATION SETTING\>\<GENERAL\>\<CAT-2\>

\<FUNC hold\>\<PAGE3\>\<OPERATION SETTING\>\<GENERAL\>\<CAT-3\>

This is where you configure the "bridge" between the computer and the radio.

- **CAT-1** (controlled by Enhanced COM Port): This is your primary Frequency and Mode Control (CAT) port. For FT8/FT4/FT2/JTDX/WSJT, use this port, set it to 38400 bps (that's the default).
- **CAT-2** (controlled by Standard COM Port): Usually used for PTT control or CW keying, if the software does not support direct CAT commands for this. Set it to 38400 bps just in case.
- **CAT-3** (Rear Panel): Used only if connecting an external device to the ATU/Optima control connector on the rear panel.

Why are there CAT-1, CAT-2 and CAT-3?

 Yaesu has made it so that you can control the radio from three different sources at the same time, for example:

1. **CAT-1** via USB. Connected to the Enhanced COM Port. (main control).
2. **CAT-2** via USB. It is connected to the Standard COM Port. (for second software – e.g. separate LOG software).
3. **CAT-3** through the linear amplifier/tuner jack (for automatic control of the amplifier setting).

In the software (WSJT-X/JTDX and similar):

- **Rig:** If you don't see the Yaesu FTX-1, download and install the latest version of HAMLIB and on WSJT-X/JTDX. If that doesn't work, choose the FT-710 or FT-991A. They use an almost identical set of CAT commands and work stably with FTX-1F. At the time of writing this I am using JTDX v.2.2.159 Improved win64 and hamlib-w64-4.7.0, and for FT2 WSJT-X v.3.1.0 Improved win64 and there is a choice of Yaesu FTX-1 among the possible transceivers;
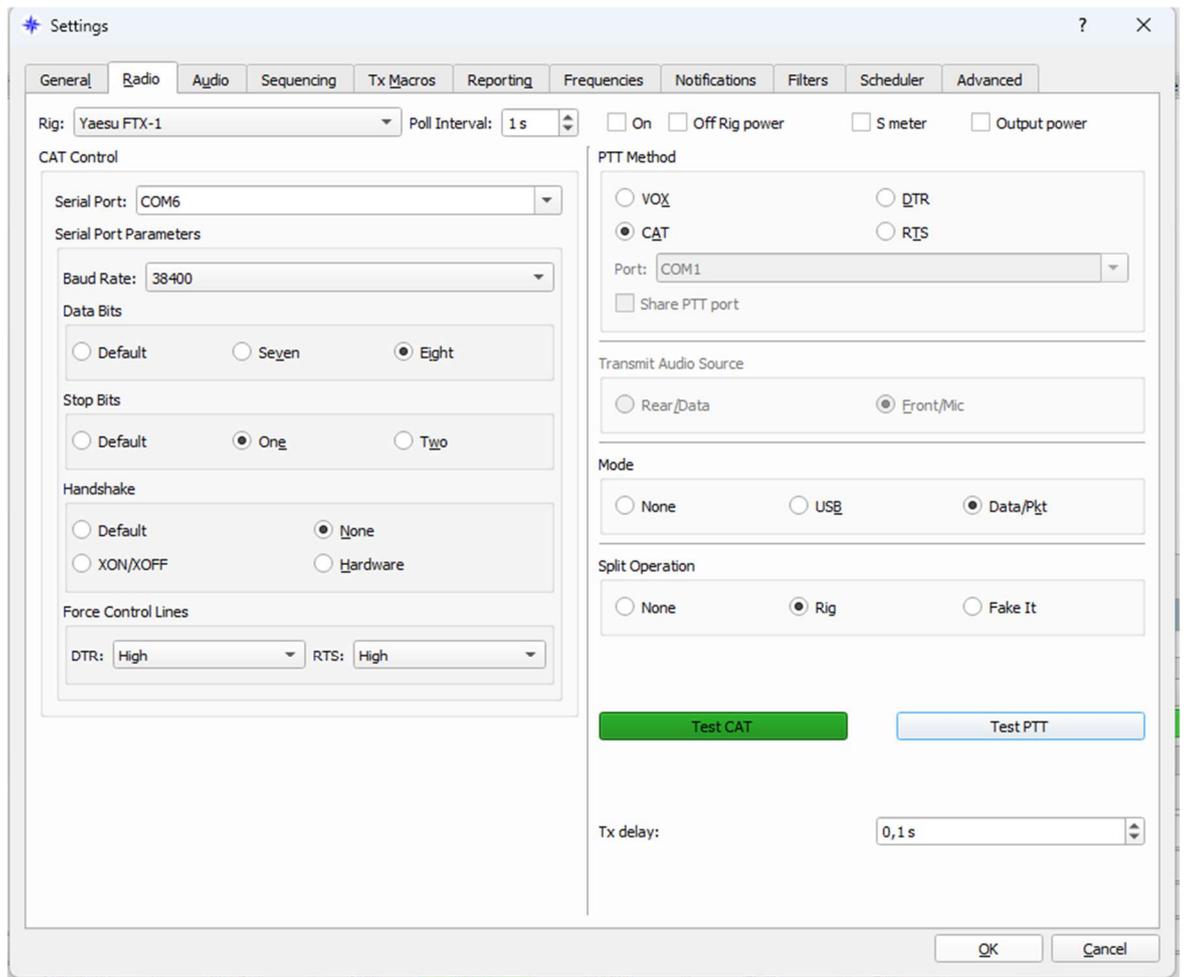
- **Serial Port:** Select the port labeled Enhanced COM Port. It appears additionally after installing the **Yeasu drivers** and plugging the cable into a USB port on the computer.
- It can be COM3, COM4, COM5, COM7 or another, depending on the previously occupied COM ports and the available USB ports. It is good to keep in mind that two new COM ports will appear. If you replace the USB port, others will appear. The most important thing is that all parameters on the radio side and on the computer side are the same, for example, 38400, 8 bits, 1 stop bit, no parity. Set RTS: High and CTS: High (or instead of CTS: High Handshake: Hardware);
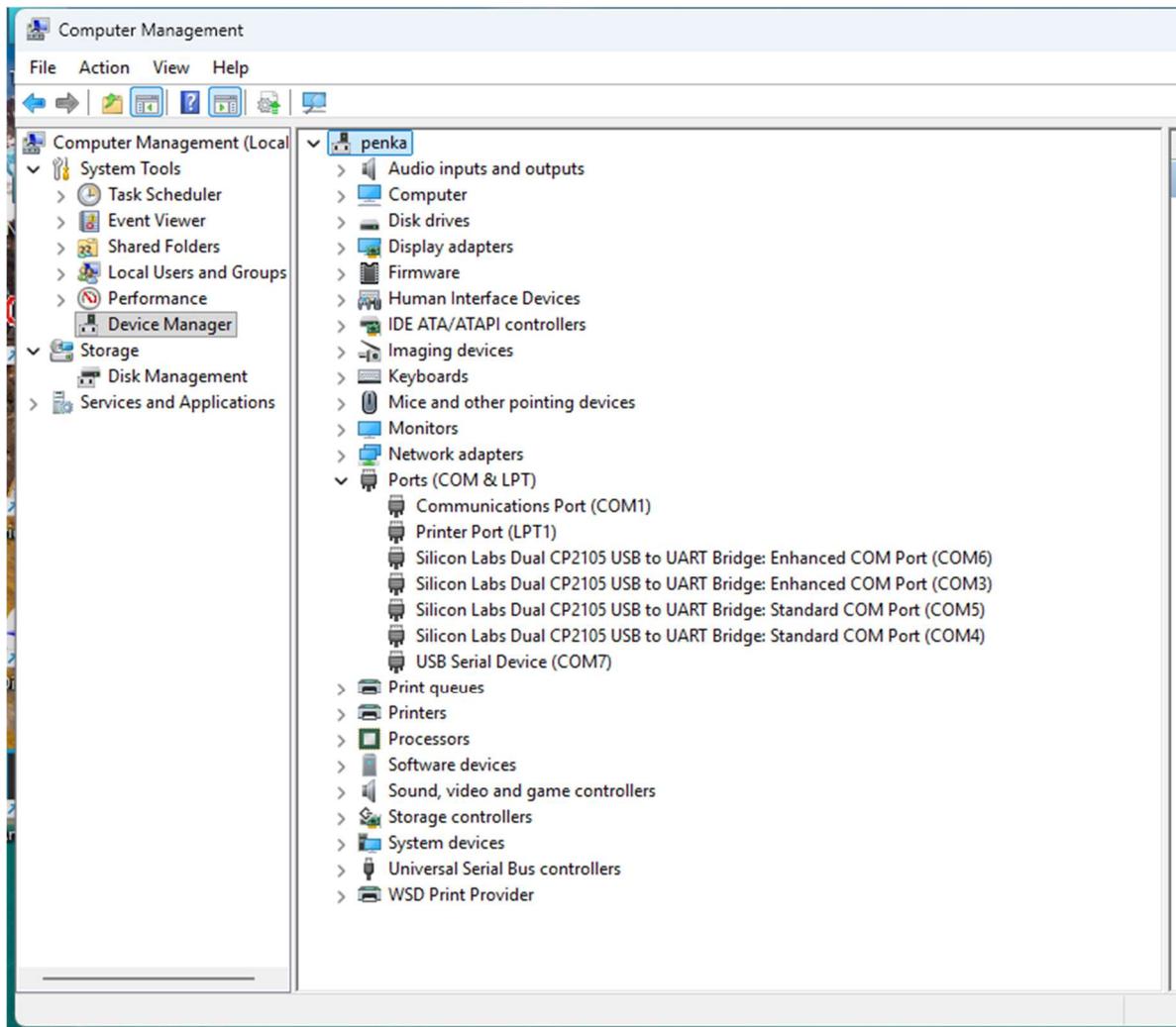
- **PTT method**: Select CAT;
- **Mode**: Choose Data/Pkt;
- **Split Operation**: Select Rig. This is the best option for the FTX-1F because the radio will switch between VFO-A and VFO-B automatically, maintaining a clean signal. In case of a problem with this selection, you can try Fake It instead of Rig. With Rig, the software controls the two VFOs of the radio. When you transmit, it automatically switches the frequency of the transceiver to keep the audio signal in the optimal part of the bandpass filter. With Fake It, the software changes the frequency of the VFO only during the transmission.
- **Audio In/Out:** Select USB Audio CODEC (this is the radio's built-in sound card and its default name, unless you have changed it from the operating system);
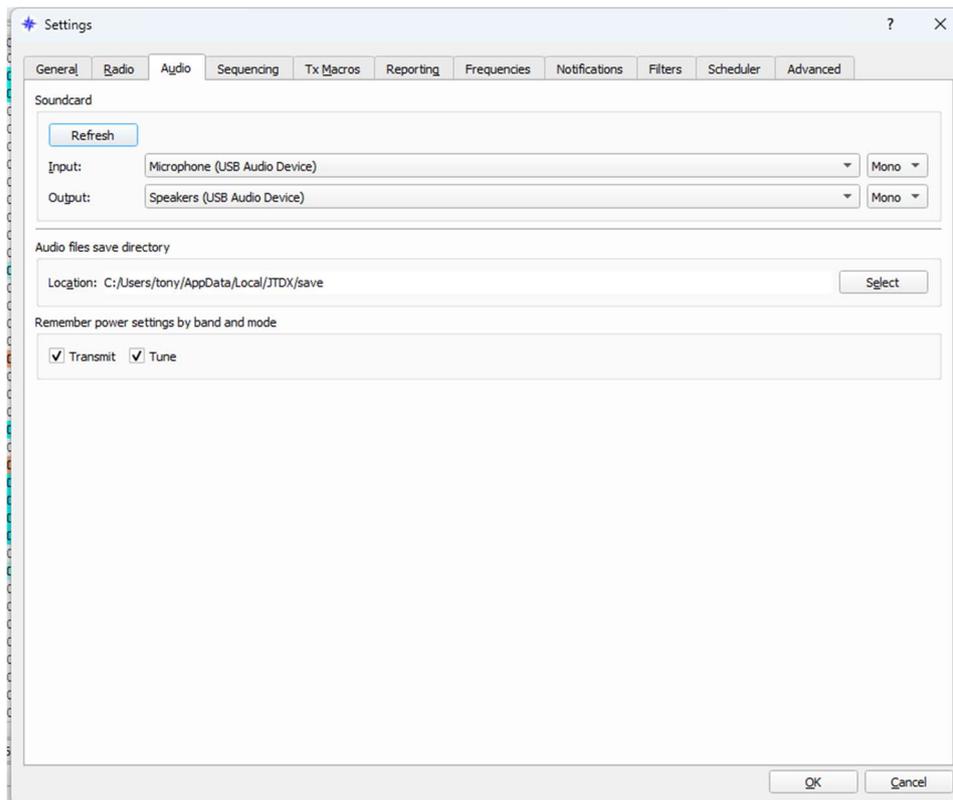
- There will be other mandatory settings in the software that you need to make – at least enter your initial and the quadrant (My Grid) from which you are working (with an accuracy of the 6th character, no more is needed, usually used even up to the 4th;
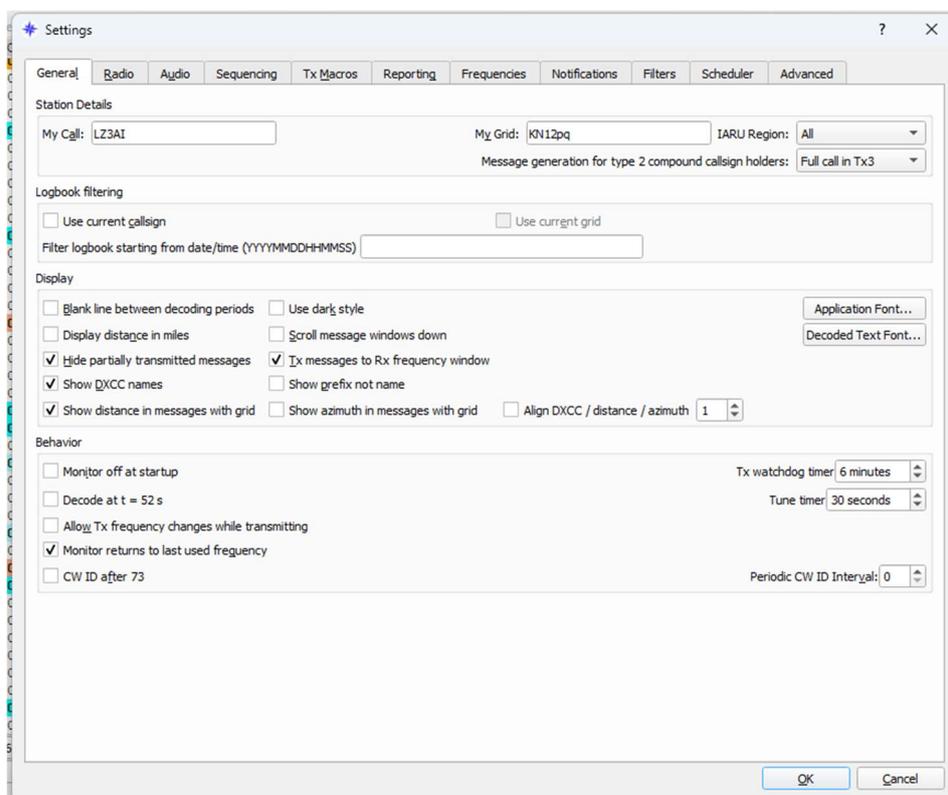
6.2.3. Operational level management in FT8

Proper level setting is the difference between a successful connection and a "scattered" signal that interferes with others. The balance is achieved through a combination of software settings and the physical controls of the radio.

Acceptance (RX): In order for the software (WSJT-X, JTDX) to decipher correctly, the entry level indicator (usually in the lower left corner of the program) must show between 40 and 60 db. If you are using other software, it is likely that its documentation describes the preferred level of reception.

- **Technique: Once** you have set the base levels in the radio menu and in the Windows/macOS/Linux drivers, use RF GAIN on the transceiver for fine-tuning, operational adjustment to the instantaneous noise of the range. You won't have to do this often.

Transmission (TX): Here, the goal is to broadcast a clean signal without digital "trimming".

- **Technique:** Adjust the ALC so that while transmitting, the transceiver's ALC scale remains firm in the white area (without entering the blue area or skipping it). Usually, the default values are ideal, and you won't have to change anything. Use the slider <Pwr> (Power) in the FT8/FT4/FT2 software if you need to adjust the output power, In most cases, it is not necessary, but at the initial setup there you may not see any signal and you will need to check the settings of the transceiver and the connection of the cable.
- **Result:** This helps make sure that the end stage is operating in its linear mode, and your signal is narrow and easy to decode from the rest.

6.2.4. Software compatibility

Since **FTX-1F** is a new model, it is possible that it does not yet appear in the list of your favorite software (WSJT-X, JTDX, Log4OM).

Solution: First download the latest version of the software. It is possible that **Yaesu FTX-1** will also appear with it. Then download the latest version of HAMLIB if the software uses it – there is certainly already Yaesu FTX-1. If that doesn't solve the problem, use emulation. Choose FT-710 or FT-991A. These models use identical logic to the CAT commands and will allow you to fully control the frequency and PTT right away. without waiting for the next version of the program.

6.2.5. LZ3AI advises: for FT8/FT4/FT2

- If you notice that despite the settings, the software does not "see" the audio, check that Windows has muted the "USB Audio CODEC" in the microphone privacy settings – a common problem with new installations (look at whether Settings/Privacy & Security/Microphone/ Let apps access your microphone for the software you are using).

- If the FT8/FT4/FT2 software does not want to trigger the PTT transmission, check the program settings to see if the PTT Method is set to CAT or RTS (via *the Standard COM Port*). With **FTX-1F**, setting up CAT is usually the cleanest and fastest way.
- Since the radio offers three independent CAT settings, the safest way is to set them equally (e.g. 38400 bps) to ensure that the software will "bite" the port, regardless of the internal transfer.
- In JTDX/WSJT, select the port that appears in Windows as the Enhanced COM Port. If the software loses connection when changing the laptop's USB port, check that Windows has assigned a new number to it (e.g., from COM4 to COM7).
- Sometimes, in my opinion, due to the not quite final version of Hamlib with respect to **Yaesu FTX-1,** an unpleasant effect of accidentally changing the transmission frequency or the entire channel (from Main to Sub) In case of a problem when selecting Rig for Split Operation, try Fake It instead of Rig in the digital mode program. If the CAT control switches to the inactive channel (SUB), the frequency color turns gray instead of blue and you need to manually return control by clicking on the encoder <**SUB Dial>.**
- For the same reason, look at the software's PWR slider from time to time, especially at initial launch – sometimes it stays at zero and your broadcast power is minimal or none.
- If you work the CW in a tent and don't want to wake up others with the click of the built-in speaker, **the FTX-1F** has an excellent headphone output with separate level adjustment. Use high-quality "in-ear" headphones (plugs) with good insulation. They will allow you to hear weak signals much better than any external speaker that fights the noise of the wind outside.
- When working with a computer/tablet in the field, it often happens that a high-frequency (RF) signal returns over the cable and blocks the software. Prepare yourself at home. Wind the USB cable around a large ferrite ring near the radio. Or the "shackles" with ferrite filters (ferrite clips) at both ends. This will save your FT8 session from sudden interruption and protect both the radio and the computer or tablet from dangerous electromagnetic pulses. Ferrite filters act as a high-frequency impedance (choke) and do not interfere with the useful digital signal inside the conductors, but they block surface RF currents that try to crawl along the cable braid and "go crazy" the USB port of your computer/tablet.
- When the "sleeping" port: Sometimes the virtual COM port is "locked" by the operating system and this is the only way to restart communication. If everything is set up correctly, but the radio stops responding:
  - Unplug the USB cable.
  - Turn off the radio.
  - Wait 5 seconds, turn on the radio, and then reconnect the cable.
- For a quick diagnosis, you can review Appendix 2.

6.2.6. Practice: the digital bridge (USB/CAT)

1. Put the ferrites (ferrite clips) on the cable and connect it. Launch JTDX (or the software you are using). Set it up and check if the Test CAT lights up green immediately.

2. Change the RTS/CTS settings from Off to High in the software and see if there is a change in the speed with which the radio changes the frequency when clicking on the waterfall. If it works in this situation, leave them on High.

3. Take a "stress test": start transmitting an FT8 with 10 W of power, and at the same time try to change some setting in the radio menu. If the CAT connection does not "fly out", your system is perfectly protected from RF interference.

4. Press Test PTT. The radio should enter transmit mode (red LED and red frequency coloration) and return immediately to receiving after the second press.

5. Monitor the frequency in JTDX (or the software used) and rotate the main encoder of the radio. The frequency in the software should change instantaneously without "jamming".

6. If you're using a laptop and frequently changing the USB port you plug in the radio into, Windows may change the COM port numbers (e.g., from COM3 to COM12). Always keep the Device Manager handy when initially connecting and setting up. Make sure that the JTDX (or the software used) is directed to the Enhanced port. If you see that the radio is unresponsive, first check that the port number in the software matches the one in Windows. Please note that when you change the USB port, the virtual COM port is also replaced – avoid changing them frequently.

6.3. Freedom with Bluetooth (SSM-BT10 module - optional)

6.3.1. Bluetooth

One of the great advantages of **the FTX-1F** at home is the ability to "disconnect" from the radio. The Bluetooth module is an option and is purchased additionally.

- **Comfort at home:** Pair standard Bluetooth headphones or the specialized **Yaesu SSM-BT10**. This allows you to listen to the air as you move around the rooms without disturbing others with the noise of the static radio.

6.3.2. Setup:

- Go to

<FUNC hold><OPERATION SETTING> <OPTION><BLUETOOTH> <DONE>

- Turn it on from

<FUNC hold><OPERATION SETTING> <OPTION> <BLUETOOTH> <DONE> <ON>

and again, there from

<FUNC hold><OPERATION SETTING><OPTION><BLUETOOTH DEVICE LIST>
<DONE>

You select the device you want the radio to connect to by clicking on it and with this the pairing begins. You wait for a moment until a message on the CONNECTED screen.

- When you return to the main screen, the Bluetooth sign in the status line stops flashing (solid lights).
- **Important:** When using Bluetooth headphones, keep in mind that there may be some minimal latency of the audio. This is not a problem for SSB, but it can be slightly confusing with fast telegraph (CW).

6.4. APRS & GPS – Your Digital Fingerprint (LZ3AI-9)

The FTX-1F has a full-fledged APRS (Automatic Packet Reporting System) modem (1200 bps and 9600 bps) that allows you to broadcast your position, exchange short text messages with other radio amateurs, and see their distance and direction towards you. The APRS functionality of this radio is extremely rich – it practically inherits the best of previous Yaesu equipment, while being adapted for field work. This is invaluable in mountain trekking (SOTA) so that your loved ones or fellow radio amateurs can follow your path in real time through the https://aprs.fi website .

6.4.1. Activating the GPS module (optional module)

Since the **GPS** receiver is an optional module, the first step is to make sure the radio recognizes it and it is turned on (purchased separately).

- **Turn On:** <FUNC hold> <PAGE3> <OPERATION SETTING> <GPS> <ON>
- **Check:** The satellite icon should appear on the main display. When the icon stops flashing and becomes permanent, it means that your position is fixed, you have GPS positioning with a minimum of 3 satellites.
- **Cold start: When you first** turn on the module in the field in a new location, it can take up to 2-3 minutes for it to "download" the necessary information from the satellites. Place the radio so that there is clear visibility of the sky above the GPS module. In an apartment block, you may not be able to position yourself at all, and this is normal.

6.4.2. APRS Settings

Once you have a fixed position, go to the modem settings:

<FUNC hold><PAGE3> <APRS SETTING> <APRS SELECT>

There you have three menus, which are selected with <DONE> each of them:

<APRS SETTING>,

<APRS BEACON> и

<APRS FILTER>.

Take a look at them, they are clear enough that you don't understand leave the default and review in the manual later.

Mandatory settings (leave the rest as the default, except you don't want to change any of them and you know what you're doing):

- <APRS SETTING><DONE><GENERAL><CALLSIGN (APRS)>

  Enter your initial with SSID added (for **FTX-1F** as a mobile station, SSID -9 is suitable, e.g. LZ3AI-9).

- <APRS SETTING><DONE><MODEM SELECT><AUTO>

  You can choose which channel to use depending on which MAIN or SUB channel you have set to APRS 144.800 MHz. The most commonly used SUB (VFO-B) is to keep the main channel free for voice connections. A convenient option is <AUTO>

- <APRS SETTING><DONE><GENERAL><MODEM TYPE><1200>

  For Bulgaria, the predominant part of the APRS network is 1200 bps.

- <APRS SETTING> <DONE> <MSG SYMBOL> <MY SYMBOL> <MY SYMBOL> <ICON1>
- <APRS SETTING> <DONE> <MSG SYMBOL> <MY SYMBOL> <ICON1> <\- (House(HF))>

  You can choose another icon to appear on the [https://aprs.fi map](https://aprs.fi)

- <APRS SETTING><DONE><MSG SYMBOL><DIGI PATH><WIDE1-1, WIDE2-1>

  This is a standard choice for the digital path in field work.

- < BEACON><DONE><BEACON SET.><BEACON TYPE><SMART>
- < BEACON><DONE><BEACON TEXT><STATUS TEXT SELECT><TEXT1>
- <APRS BEACON><DONE><BEACON TEXT><STATUS TEXT1><YAESU FTX-1F 73!>

6.4.3. Broadcast Modes (Beacon)

- **Manual: You** only broadcast when you press a button.
- **Auto:** Broadcasts at a fixed time interval.
- **Smart: This** is the most intelligent mode. The radio changes the transmission frequency according to your speed and direction. If you stop for a break, the frequency of the packets decreases automatically so as not to "clog" the airwaves.

6.4.4. LZ3AI advises: for APRS

- **Etiquette on the air:** In the field (especially if you are static on some peak), it is enough to transmit the Beacon once every 10-15 minutes or even less. This saves the energy of your battery and leaves room for other users on the frequency of 144.800 MHz.
- **GPS and battery:** Keep in mind that a working GPS module consumes additional power. If you do not plan to use APRS or record a GPS log, turn them off from the menu to extend your battery life.
- **Time and Date:** Turning on GPS will automatically sync your radio's clock with atomic precision – something very useful if you plan to work on the FT8/FT4/FT2 later. This is the easiest way to have an accurate time for FT8/FT4/FT2 work in the mountains without you need internet for the laptop.
- **APRS in "background" mode:** Since FT8/FT4/FT2 is a dual-band radio, it is best to tune the VFO-B to 144.800 MHz for the APRS, and make your connections (SSB/CW/FM) to the VFO-A. This will transmit the position without interrupting your work.
- **Mute the sound: You will get** bored of the warning sound when there is any change in status or received messages.

<FUNC hold> <PAGE3> <APRS SETTING> <APRS SELECT> <APRS SETTING><DONE><GENERAL><APRS AF MUTE><OFF>

- **Power saving: The GPS** module "eats" from the battery even when you are not transmitting. If you have reached the top and will be working statically from one point, turn off the GPS once you have transmitted your position or save it to the memory for a future transmission without GPS.
- **Short messages:** Remember that through APRS FTX-1F allows sending short text messages (SMS type) directly through the digital channel. Extremely useful for coordination with other triggers where there is no GSM coverage. Even if the signal is too weak for a voice connection, the text message often manages to pass. You can send your exact GPS coordinates to a colleague without saying a word. I recommend trying (practicing) this feature often, because in emergency situations it is irreplaceable.

6.4.5. Practice: Packet path check at APRS

1. Go to the menu and enter your initial with SSID -7 or -9.
2. Set the frequency 144.800 MHz (for Europe) to VFO-B for FM.
3. Set the required parameters for APRS.
4. Activate GPS and wait for the icon to stop flashing.
5. Press the <FUNC hold><PAGE3><APRS BCN-TX button> and check in a minute on your phone on https://aprs.fi if you have appeared on the map. Note that in order to see yourself on the map, you still need to go through an APRS node on the network.
6. Check the current packet path if it is not already there, set the WIDE1-1, WIDE2-1 path.
7. Submit a test packet with <FUNC retention><PAGE3><APRS BCN-TX>.

8. Open https:// *aprs.fi* on your phone, double-check for your initial and click on it, and then Information about whether the information about the broadcast beacon has been refreshed.
9. See the Last Path section on https:// *aprs.fi* where you will see which digipiters your signal has passed through.

Last path: LZ3AI-9>TRTQ40 via WIDE1-1, WIDE2-1, qAR, LZ3SP (good)

CHAPTER 7: System Fusion (C4FM) – Digital Cleanliness in the Field

7.1. What is C4FM?

C4FM (System Fusion) is one of **Yaesu's trademarks,** and with **FTX-1F**, it plays a key role in fieldwork. In digital mode, we can transmit crystal-quality data and voice where analog FM is no longer incomprehensible.

Navigation in the mode:

- **Activation: Press** the hardware button <MODE> and select the <C4FM> icon from the screen.
- **Digital mode selection (DN/VW):** By default, the radio enters DN (Digital Narrow) mode. If you tap the mode icon on the display, you can switch to VW (Voice Wide), but for field work, DN is highly recommended.
- **AMS (Automatic Mode Select)**: If you tap the <AMS> icon on the screen, the radio will automatically switch between FM and C4FM depending on what it is taking.

7.2. The advantages of C4FM in the mountains

In low-signal areas where analog FM begins to crackle, C4FM uses digital error correction. This gives you crystal clear audio to the very end of the range.

- **Fieldwork tip:** For group hikes, digital mode eliminates the fatigue of constantly listening to airborne noise. Here you either hear your colleague clearly, or it is complete silence (the squelch works perfectly).

7.3. The difference between DN and VW

- **DN (Voice and Data):** This is the "workhorse". Half of the digital stream carries your voice, and the other half carries data (your initial, GPS location, and error correction).

- **VW (Voice Wide):** Uses all the audio capacity. The sound is of higher quality, but you have no error correction and the range may decrease slightly.

Technique: In the field, use **DN**. This allows others to see your distance and azimuth relative to them on their displays – critical if you get lost or part in a dense forest.

7.4. The GM (Group Monitor) function

The **GM** function is a dedicated tool for automatically monitoring the presence of members of your group (up to 24 stations) who are within range of direct radio communication.

Important condition: The function works exclusively in C4FM (DN/VW) digital mode. All stations in the group must be on the same frequency and use the same DG-ID (Digital Group ID) number.

How the Group Monitor works:

- **Automatic "Beep":** When you activate GM, the radio starts sending short digital packets (ID information) periodically.
- **"In Range" status:** If your station receives a package from another member of the group, its initial lights up on the screen. Next to it, you will see its distance and direction (if both stations have active GPS).
- **Signaling: If a** station on the list stops sending packets (goes out of range or goes off), its initial will turn grayed out or an OUT indication will appear.

7.5. What You Need to Know About GM Management

7.5.1. The GM button

- **DG-ID:** Before you release the GM, check that you have set DG-ID TX and DG-ID RX to the same number in the menu (other than 00 if you want a closed group). By default, 00 is used for general groups.
- **GM button:** On the main screen of **FTX-1F,** there is usually a software button **<GM>**. Pressing it switches the radio to a special mode, where the main view changes to a list of stations.
- **Refresh logic:** Don't expect an instant change – the radio makes a query at certain intervals to save battery and not clog the air.

7.5.2. LZ3AI advises: for GM management

Because the button is physical and easy to feel even with gloves, it's perfect for quickly checking "where the others in the group are" without having to enter software menus. To return to the standard frequency display, simply press the **<BACK> button** on the left below the main encoder.

7.5.3. Practice: Digital Telephone World (C4FM/WIRES-X)

1. Enter C4FM (DN) mode and locate an active digital repeater. Short press **<S-DX>** and watch if the white S-DX icon appears in the bar. Wait for the radio to identify the station.
2. Use the **GM** (Group Monitor) function to see if there are other stations operating digitally in your range.
3. Try sending a short text message or seeing the correspondent's coordinates (if they are broadcasting them) on the second screen of the display.

CHAPTER 8: Antennas and the Antenna Tuner (ATU) – The Heart of Fieldwork

8.1. Do we need an ATU?

These are some of the most important knowledge and skills for any outdoor enthusiast. In the case **of FTX-1F**, the antenna and its matching are the bottleneck of the system. Here we don't have 100 watts to "break through" bad SWR/SWR – every lost watt is precious.

In the radio shake at home, we usually have well-tuned antennas. In the mountains or in the field, however, the antenna is often "thrown" on a tree, stretched out in a hurry or mounted on a temporary mast or fishing rod. This is where the FTX-1F's ATU automatic antenna tuner becomes your best friend. Balloons and tuners undoubtedly help, with an antenna analyzer you can also set the field antenna to have an SWR/SWR below 1.5, but if you love your **FTX-1F**, you'll reward it with an ATU. Also, in the field or at the top, every watt counts so that we waste it in heat instead of in the antenna. In one sentence: I recommend getting an ATU.

My experience is with the ATU FC-90, but there is no reason to assume that the way of working with the FC-80 would be different. Both are for a maximum power of 10 W. The FC-90 is separated from the body of the **FTX-1F**, connected to it by two cables - a feeder and a control cable. Its main advantage is that it can set up all kinds of antennas - both symmetrical and asymmetrical, including any long wire. In addition to SO239, there is also

an additional wing nut – a ground terminal. The FC-80 attaches to the body of **the FTX-1F**, and this makes the whole system more compact – this is its main advantage. But the FC-90 does not have the capabilities to set up asymmetrical antennas. You will have to make this difficult choice yourself or buy both ATUs.

In Appendix 3 you will find a comparison table between the two ATUs.

8.2. Turn on and set up

When mounting **the ATU**, the software buttons <ANT TUNER> and <TUNER> become active and you can use them.

<FUNC hold><PAGE1><TUNER><ON>

After that, the specific antenna can be set up operationally from the <ANT TUNE<]> software button>

<FUNC hold><PAGE1><ANT TUNE click>

A short tuning noise is heard and the inscription TUNE lights up in the upper status bar of the display. With an auto tuner and antenna < **ANT TUNE** click> connected, even when **<FUNC** hold><PAGE1><TUNER><OFF> the antenna tuner turns on automatically to <ON> and the antenna is adjusted.

8.3. Automatic ATU tuner – when and how?

FTX-1F**'s ATUs** are designed to be fast and efficient, but they have their limits (they usually match impedances at SWR no worse than 3:1).

8.3.1. LZ3AI advises: to tune the antennas

- You can set one of the programmable microphone buttons for quick tuning. I don't remember if I shared, but I set the <P3> of the microphone for tuning with the antenna tuner.
- A tuner is not a "magic wand" that fixes a bad antenna. His job is to lie to the radio that he sees 50 ohms so that the terminal step protection does not trigger. With a bad SWR, it doesn't change the efficiency of the antenna, or at least not as much as we'd like.

Make or get nice antennas and pre-tune them with an antenna analyzer for each amateur radio range.

- Before starting the tuner, try to tune the antenna mechanically (by changing the length, height, tuning coil, if any, capacitive cap, more radials, lifting the radials off the ground, and other tricks). Use the tuner only for the "final polish" of the SWR.
- If you configure any button on your microphone (for example, <P3>), a long press on the button starts the process and you don't need to look for the button from the menu, which is sometimes not easy, especially if you are wearing gloves.
- When running on a battery, each start of the tuner consumes electricity. **The FTX-1F** has a memory for tuner settings by frequency. Once you set the antenna to a certain section of the range, the radio will remember the position of the relays. You don't need to do it often and drain the battery further.
- When you change the frequency within one range, simply short press the button. If the TUNE icon on the top bar of the display is solid, the settings are in memory and the radio is set. If it starts flashing, press the button long to adjust to the new position. If there is no TUNE icon and the tuner turns off after setting up (<TUNER><OFF>), check your antenna connections – you may have forgotten to turn it on.

8.4. Operation with compromise antennas (End-Fed, Random Wire)

8.4.1. An Inevitable Compromise

Almost always, in the field, antennas are compromised because of low weight, dimensions or mobility requirements. Most field operators use end-fed antennas or other easy-to-deploy antennas. They end in 49:1, 64:1, 9:1 or 4:1 (depending on the specific antenna), are usually non-resonant, and thanks to the noise they maintain a relatively low SWR and impedance of 50 ohms on most or all HF amateur radio bands. Vertical antennas can also reach an acceptable SWR and impedance of 50 ohms with the appropriate setup or again with ununs.

8.4.2. LZ3AI advises on compromise antennas

- If the **FTX-1F tuner** fails to match the antenna (the relays click for a long time and the icon disappears), do not persist. This means that the impedance is out of its reach (over 150 ohms). Check first if you have turned on the antenna (in fact, this often happens in the hustle and cranny of the field) Change the length of the wire or add counterweights if you are not (radials, counterpoise). If you have time, you can put counterbalances that are multiples of the wavelength of a resonant antenna or those that do not coincide with any harmonic wave of the emitted if the antenna is to be wide-range.
- Sometimes adding just 2-3 meters of cable to the ground (as a counterweight) allows the built-in tuner to "bite" and bring down the SWR below 1.5. If you have a good system of radials (counterweights), do not spare time and turn them well – this will pay off many times when making connections later.

Note: In some environments, the wire is called a "counterbalance" when it is unique and forms a half-wave vibrator with the antenna, for example, but with one half of the ground. In this text, I use the term radial – no matter whether it is resonant or not, and not one, but more. In practice, it has been established that the optimal (and maximum) number for field work is eight, no more. If you are a manufacturer of copper cables that do not weigh you down, you can also try with 32 or more radials.

8.5. External antennas and connectors

The FTX-1F has a specific back panel. With frequent replacement of antennas in the field, the connectors wear out.

- **Recommendation: Use** a short "pigtail" of a benign cable (e.g. RG-400) that stays permanently on the radio, or at least is much lighter and easier to switch. Thus, the mechanical load from the heavy coaxial cable will fall on the adapter and not on the socket of the transceiver itself.
- **FTX-1F** doesn't just work on HF/50MHz. Bring a VHF/UHF antenna with you, preferably a dual-band one. Even a light car antenna, either homemade or from AliExpress, will do. You can improvise on the terrain and if you need to, you will, but it's easier and better to be prepared in advance. In addition, SOTA/POTA is activated on VHF/UHF. If you do this, in a more remote location, a light directional VHF/UHF antenna will also thank you.

8.6. Low Power Transmission Efficiency (QRP)

8.6.1. Life is too short for QRP (if you're not a master)

Don't be annoyed by this commonly used replica. Life may be short for QRP, but only if you're not a master at the hobby. No one can spare you the pride of a DX connection with 5 watts or less of power. With kilowatts "and grandma knows"!

If you use QRP, you probably know that at 5 W, 6 W, or even 10 W, losses in a bad cable or misaligned antenna can be fatal to the radio connection. QRP radio connections are a great pleasure if you know how to be effective.

8.6.2. Golden rules for high efficiency:

- In the field, every decibel equals "life." If the tuner shows that it has aligned the antenna, but it is too low to the ground, you will be warming the soil, not the ether. Raise the antenna power point as high as possible.
- If you have counterweights, turn them around. If you have a Faraday blanket, unfold it under the antenna and ground it as and where it should. If you can lift the counterweights off the ground, even if it's at an angle – do it. Use the features of the area – if there is an abandoned building with a tin roof at the top – why not use it? The SOTA rules do not prohibit it.

- Get an antenna analyzer such as RigExpert, RigExpert Stick, NanoVNA, DeepVNA or similar. Adjust the antenna with it before turning on the radio. In a new location, double-check the measurements and settings.

8.7. FTX-1F SWR Protection: What Happens When A Problem Occurs?

8.7.1. What affects SWR/SWR?

In the field, the antenna is often not ideal (wind, branches, poor stretching, neighboring buildings, vans or other objects), it itself is often hung on a branch, stretched in a hurry or wet from rain. **FTX-1F** has very smart and fast protection.

- **How it works:** The radio is constantly measuring the reflected power. If the SWR exceeds 2.0:1, the processor starts automatically reducing the output power (ALC protection) to protect the end transistors from overheating.

8.7.2. FTX-1F has a very fast and accurate indication of SWR/SWR.

- **Visualization:** On the display, you will see that the PO (Power Output) scale at a high SWR drops, and the SWR scale goes into the danger zone above 3. When the SWR becomes critical (above 3.0:1), the radio almost stops transmitting (from 10 W the power drops to 1 W and less to protect it from damage). Take this for granted, you don't have to artificially degrade the SWR, to try out what is going on with the radio.

  - **Safe zone** (1 to 1.5): Perfect. Your radio gives its full power.
  - **Acceptable Zone** (1.5 - 2.5): Acceptable, but the transceiver begins to decrease its power to protect itself.
  - **Danger Zone** (above 3.0): STOP! The tuner cannot handle or there is a problem with the cable. You risk damaging the end foot despite the protections.

- **Safety: The FTX-1F** is designed for field work, so it's very difficult to burn it out because of a bad antenna. It's more likely to "fail" to transmit at rated power than to fail.

8.7.3. LZ3AI advises: use counterweights, even if they are improvised.

If you do not have counterweights prepared in advance, use at least 5-10 meters of counterpoise cable thrown to the ground to stabilize the SWR and avoid "burning" fingers from RF voltage during transmission and reduce risks to the radio.

8.7.4. Practice: antenna inspection

1. Select a frequency that is free.

2. Briefly press the <ANT TUNE> button (if you have an external tuner turned on) or transmit a low-power signal in FM or CW mode.

3. Observe the SWR scale. If it "bounces" in the wind, you probably have a loose connection in the antenna or a bad contact in the connector. If the reading is above 3, do not increase the transmit power and look for the reason for this. If you have a VNA, check the SWR.

CHAPTER 9: Tactics for Field Work, Activation (SOTA, POTA) and Contests

Working from the ground requires a different strategy. You are the "game" that everyone hunts. Your goal is to conduct the maximum number of connections in the minimum amount of time, saving valuable battery capacity.

9.1. Frequency selection and "Spotting"

At 6 W or 10 W, it's hard to "shout" the whole world if no one knows you're there. Advertise on social networks (with approximate time, frequency and place) and on specialized sites for SOTA/POTA. If you have access to a repeater or common simplex frequency to call VHF/UHF, advertise there as well.

* Before you start, find free frequency in the recommended segments (e.g. around 14.285 MHz for POTA). After making the first connection, ask the correspondent to "spot" you (announce you in the cluster).
* Use the **<QMB** hold> button. If you find a pure frequency (pre-announced or SOTA/POTA frequency), immediately save it to the fast memory by holding the button, even if you have it saved elsewhere in memory. If you need to escape from a sudden interference (QRM), you will be able to check if your first frequency has been released with just one short press of **<QMB** click>.

9.2. Pile-up control

When you are called by many stations at the same time, you can easily lose control. In such situations, do not try to remember the lyrics of Miro's song "I Lose Control" (there are other things), but think about the rich functionality of **FTX-1F.**

9.2.1. Operation in spaced mode with the <SPLIT> button.

* **SPLIT operation:** The FTX-1F has excellent visual control on both bands. If the crowd gets too large, switch to SPLIT mode (transmit to VFO-A, listen to VFO-B). Announce: "Listening 5 up" or "Listening 5 kHz upwards". Use Screen 2 (horizontal waterfall) to see who is transmitting where above your frequency.

9.2.2. Clearing reception and/or transmission with <CLAR>

- **Clarifier: Often** stations aren't exactly on your frequency. Instead of rotating the main tuning encoder (VFO) and moving your transmitter, activate the clear mode with the <CLAR> button, so you'll tune by ear without having to move from the frequency everyone is looking for you on.

9.3. The display as a tactical advantage

9.3.1. Working with 'dual acceptance' in the field

The FTX-1F supports or contains two independent receivers with separate VFOs. In field work, this is a powerful weapon:

- Keep one VFO at the frequency you are working on (e.g. 14.285 MHz for POTA/SOTA).
- You can use the second VFO for APRS at 144.800 MHz. This will transmit your coordinates while conducting voice connections without losing control of either band. Or use it for a local repeater/simplex channel for a common call and maintain local communication while activating SOTA/POTA or working with DX correspondents.

9.3.2. Waterfalls and scales

- **3DSS (3D Spectrum Stream):** The waterfall is your radar. Look for "holes" in the spectrum. If you see an empty spot near you, that's your chance to be heard.
- **Scale (SPAN):** Set the waterfall scale (<SPAN>) to +/- 25 kHz or 50 kHz. This way you will see not only your correspondent and the nearby spectrum, but also if a "kilowatt" station is preparing to "pinch" you from the side. You have no reason to be angry with him – with your power, he may not have heard you. Consider what measures you can take. It's pointless to struggle with the QRO station, there are other bands as well.

9.4. Fighting for "every watt" (QRP tactics and energy)

When working with 5-10 watts from the top of the mountain, you need to be both short and precise managers of your energy.

9.4.1. Call efficiency

Do not waste time in long explanations about the weather or equipment. When activated, we strive for a fast rhythm in order to "serve" all those waiting. Don't get distracted by talking. There will certainly be people talking to you about the weather and their new antennas, divert them carefully by pointing out the task for which you went out into the field or climbed to the top.

- **Correct technique:** Use a format that clearly states who you are and why you are there.
- **Why?** This saves battery, keeps the crowd interested, and allows more people to "spot" you in real time.

This is what ideal, "professional" SOTA connections from FTX-1F to telephony and telegraphy would look like. POTA links have a similar structure.

9.4.2. Example of SSB/FM (voice communication – telephony)

From (LZ3AI):

"CQ SOTA, CQ SOTA! Here LZ3AI from Cherni Vrah, LZ/KV-001. I accept!"

Correspondent (LZ3WY):

"LZ3WY (el-zet-three-whiskey-yankee)"

From (LZ3AI):

"LZ3WY (el-zet-three-whiskey-yankee), hello! For you 59 (five-nine). Cinematographer Tony. I am a SOTA from Cherni Vrah LZ/KV-001– by letters: Lima-Zulu-Siera-Oscar-zero-zero-one. How did you know?"

Correspondent (LZ3WY):

"Accepted 100%, 59 (five-nine) and for you, operator Ventsi! Good luck with the activation of Cherni Vrah!"

From (LZ3AI):

"Thank you, 73! Here is LZ3AI (el-zet-tri-alpha-India), QRZ (ku-er-zet)?"

Of course, if the correspondent is a foreigner, the radio call will be conducted in English.

9.4.3. Example for CW (telegraphy)

In telegraphy, 'spelling' is replaced by a repetition of the vertex identifier.

From (LZ3AI):

CQ SOTA DE LZ3AI/P K

(Invitation to SOTA from LZ3AI portable. According to the latest rules, /P is not mandatory, but attracts correspondents)

Correspondent (LZ3WY):

LZ3WY

From (LZ3AI):

LZ3WY GA UR 599 5nn SOTA LZ/SO-001 LZ/SO-001 BK

(GA = Good Afternoon; UR = Your; BK = Back to you break)

Correspondent (LZ3WY):

BK R TU 599 73 BK

(R = Roger/Accepted; TU 599 = To You)

From (LZ3AI):

BK TKS 73 TU DE LZ3AI/P SK TU ..

(Thank You Best Wishes here LZ3AI Portable SK/Full End of Link Greetings bye)

Correspondent (LZ3WY):

TU ..

(Greetings and bye)

9.4.4. LZ3AI advises: to set up FTX-1F

- **On SSB:** Use the international phonetic code (Alpha, Bravo, Charlie...). For the apex identifier (SOTA reference), slow spelling with letters or numbers is mandatory.
- **On the CW: FTX-1F** does not have a built-in decoder for the CW, but you can use a phone app to receive the CW. If you are not sure if the correspondent is transmitting quickly, and if you have nowhere to record what is received on a draft, just glance at the screen to confirm its initial. However, you should still be able to record the conducted QSOs and in a journal, so as soon as possible, do it – the phone screen with your "notes" will disappear soon.
- **Memory buttons: You** can set these buttons on the radio with frequently used messages, but a manual call always sounds more "human" on activations.

9.5. Call Automation (Memory Keyer & Voice)

To preserve your voice and free your hands to journal, use FTX-1F's built-in memories.

A) Telegraph messages (CW Memory)

Ideal for broadcasting "CQ SOTA" without fatigue.

- **Setup:** Go to <FUNC hold><PAGE3><CW SETTING><CW MEMORY>. Here you can program up to 5 messages (e.g. *CH1: CQ SOTA DE LZ3AI/P K*).

- **Broadcast:** Press the **<FUNC** hold> button and scroll to <PAGE2>. There you will find the **<MESSAGE> button**, which opens the five transmission memories.

B) Voice Messages (SSB Voice Memory)

It allows you to record your voice call and play it with a single tap.

- **Record and playback:** Go to <PAGE2> of the function menu (**<FUNC** hold><PAGE2>). There are the **<RECORD>** buttons (to record your message through the microphone) and **<PLAY>** (to broadcast it).
- **Master Hack: In** order for your voice to actually go on the air (and not just hear it in the headphones), the BK-IN (Break-in) function must be turned on (ON).

Why use them?

- **Save energy:** You can set the message to repeat at a certain interval while you calmly survey the waterfall for new stations or enjoy nature.
- **Consistency: Your** initial and apex ID will always be broadcast clearly and error-free, even if you're tired of climbing.

9.5.1. Voltage Management (VDD)

The FTX-1F gives you the ability to see the real status of the power supply to the terminal transistors.

- **The VDD indicator:** Change the display multi-meter (below the S-meter) to VDD mode. This is your "fuel meter".
- **One last line:** Keep an eye on the VDD value during transmission. If you see that when you press PTT, the voltage drops below 11.0V, do not wait for the radio to turn off. Immediately reduce the power to 5W.
- **Result: The** difference in signal strength at the correspondent will be minimal (less than one S-unit), but the current consumption will drop by half, which will prolong your activation significantly and protect the radio from overheating.

9.5.2. Hidden consumers

The large color display of the **FTX-1F** is beautiful, but "thirsty" for electricity.

- **Brightness: If** you are not in direct sunlight, reduce the display brightness (**<FUNC** hold><PAGE1><DIMMER><FUNC rotation>) to a minimum at which you can see well.
- **Contrast: Use** a darker waterfall theme (if available in the menu) to reduce CPU and screen load. Every milliampere saved is another second of transmission time.

CHAPTER 10. LZ3AI advises: to work with FTX-1F in the field

10.1. "Unlocking" the 10 watts

The FTX-1F automatically limits the power to 6W when it senses that it is running from the built-in battery (to avoid overheating and rapid discharge). Software, you can reduce the maximum power to 5W to meet QRP requirements.

- **How it works:** If you want to have a full 10 W in the field, you need to supply an external power supply (13.8V) through the charging port. If your goal is to raise the power for a short time, use a small external LiFePO4 battery, even if it has a small capacity (the transceiver does not know this). Of course, a better option is to include, for example, a car battery or a high-capacity lithium-ion battery and a DC-DC booster for 13-13.8 V. The radio "sees" a voltage above 13 V and automatically unlocks the 10W option in the power menu. Keep in mind that if the additional power supply is not of high capacity, the main battery will drain quickly.
- **Attention:** Always monitor the temperature on the back of the radio when working at **10 W** for a long time (for example, in a contest). Also think about your priorities – whether it is more important for you to have a full 10 W or whether it is more important to be on the air longer, albeit with 6 W (or 5 W).

10.2. The "cold back" when working in the sun

When working in the field in the sun, the black body of the **FTX-1F** absorbs quite a bit of heat.

- **How to protect yourself:** Never leave the radio directly on hot ground/rock or on a black surface in sunny weather. Use aluminum foil or a light piece of cloth underneath. Even a little lifting of the radio (and even better on a small photographic tripod) improves cooling and protects the end transistors.

10.3. "Emergency charging" from the sun

If your battery runs out in the field and you have a solar panel that gives a variable constant voltage (DC**),** you should consider the following:

- **What it does: The FTX-1F** has a built-in charging controller. You can charge the battery even while running on reception, as long as the external source provides a stable 13-14V.
- **Solar panel requirements:**
  - Rated voltage: 13.8 V DC (constant voltage).
  - Operating range: 10.5 V to 15.8 V DC.
  - Consumption: up to 15 A is enough. At maximum transmit power, the solar panel should provide at least 10-20W according to the power model.

- DC-DC booster for 13.8 V or even better solar controller (MPPT or PWM): It will maintain a stable 13.8 V and protect the battery from overcharging. Keep in mind that cheap solar controllers often generate RF noise. If you hear a "pop" every second, it's probably due to poor filtration on your controller.
- **What not to do:** Never connect the panel directly: the voltage from a "12 V" panel can jump above 20 V in strong sun, which will activate the protections or damage the radio. And be sure to observe the polarity when powered by a solar panel!

10.4. Fusion hack - efficiency with a weak battery

While digital mode may seem complicated, it often allows for better intelligibility at low power (e.g. 2.5W or 5W) than analog FM. If you're saving battery, try low power in C4FM.

10.5. Fusion hack - distance indicator

In DN mode, while your interlocutor is talking, your display shows the distance. Use this to assess whether you need to climb to a higher location to maintain the connection if you see that the distance increases rapidly.

10.6. Fusion Hack - GM

In GM mode, you can also send short text messages or images to the entire group at the same time. This is invaluable in rescue operations or SOTA activations in a team, when voice communication is difficult, but the digital packet still manages to "break through" the noise.

10.7. For better preservation

If you work on CW (telegraphy), reducing the power to 5 W is even more efficient, since in this mode the transmitter calmly provides 100% load during the broadcast of the characters. The combination of 5W + narrow APF filter will make the radio connection much longer and understandable than 10W with an empty battery.

10.8. Protection of equipment in extreme conditions

Although with a solid body, **the FTX-1F** is not certified as fully waterproof.

- **Moisture and condensation:** Always carry a transparent zippered bag. The **FTX-1F touchscreen** reacts through the foil. I don't think it makes practical sense to look for an additional touch protector; it would be more effective and protective if you use a touchscreen stylus. If you use a large zippered plastic bag, you can let the cables come out through the slightly open zipper underneath, protecting the front panel and the entire radio from direct rain or snow. When you get home, it's good practice to clean the screen of greasy stains with touch screen foam.

- **Cooling: In** direct sunlight, the black body of the radio can heat up quickly. Use the folding stand of the radio to provide air flow under the rear panel, where the cooling fins of the end stage are.
- **Reduce battery consumption: The FTX-1F** is economical, but display lighting and waterfall are still significant consumers. Reduce screen brightness when battery is low in SOTA/POTA activations and emergency/crisis activities.

10.9. You make the difference! The mastery is in you and in your preparation!

The craftsmanship in the field is not in the expensive equipment, but in the ability to adapt the settings of your **FTX-1F** to the changing environment. Every button we set up, every filter we understood, has one goal: to turn the mountain into a Ham Shak. The craftsmanship is in you and in your preparation – not just theoretical, but also for the specific outing.

Preliminary preparation: Before you go, recall the settings after the **<FUNC hold>** button. Make sure you can quickly find <MIC GAIN>, <RF POWER> and other frequently used parameters for your preferred work, as well as on which page they are located. touch menus.

Fast grounding: Static electricity in the mountains can "kill" your receiver. Good grounding of the radials increases their efficiency many times over.

- Carry a small metal tent peg and a piece of wire. Before turning on the antenna, ground the radio housing. This also reduces the level of reception noise.

Diary: If you keep a paper diary "on your knee", the wind is your enemy.

- Use a small magnet or clip to attach the sheet to the metal part of an object at hand. If you use an electronic diary on your phone, reduce the brightness of the phone's display to a minimum – it is more important to keep the radio (and in this case, the phone) lit up than Facebook posts.

Antennas: If you are going to an unknown place and you have the opportunity, carry several different antennas – it is not certain which one will be most convenient for a particular place. For example, if it is a bare tip, and you only carry an end-fed antenna, it will be difficult to find a way to raise at least one of its ends. For this case, a vertical antenna, for example, Rybakov, GP or JPC-12 will be more convenient. it's also good to carry a VNA, RigExpert or other antenna analyzer that you have – in many situations it is invaluable – without it you are like blind to the efficiency of the antenna.

Thank you for your shared passion! See you on the air!

73 and good luck!

Tony, LZ3AI

Sofia, 2026
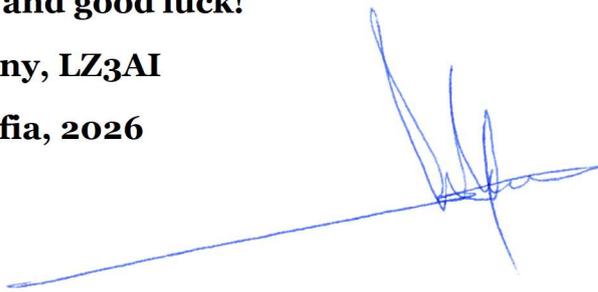
https://www.qrz.com/db/LZ3AI

https://www.linkedin.com/in/lz3ai

https://www.galanto.com

Frequently Asked Questions (FAQs)

This section contains the answers to the questions that arise in a real field setting when theory meets practice.

Q01: Why does the radio only show 6W and I want 10W?

- *About: FTX-1F limits power when powered by the built-in battery. Plug an external source above 13V into the DC-IN port.*

Q02: Do I need an external tuner for an End-Fed antenna?

- *A: The built-in tuner is excellent (3:1), but for antennas with very high impedance (Random Wire), you will need an external 9:1 balun or tuner with a larger range. It is recommended that for any new antenna or old antenna in a new location, you first use an antenna analyzer to adjust it to 50 ohms, or at least find out the parameters of the new antenna (new location)*

Q03: Can I charge the radio from USB?

- *A: No, the USB port is for data and CAT control. Only use the DC-IN port for charging. If you only have a Type-C charger, remove the battery from the radio and charge it only separately.*

Q04: Is there a difference between IPO and AMP OFF?

- *A: In short: No. Technically, both modes mean that the signal bypasses the RF/IF preamps and goes directly to the receiver. Yaesu uses the term IPO to emphasize that radio is optimized for high immunity to interference. On VHF/UHF, AMP OFF is used, because there the "normal" state is for the amplifier to work.*

Q05: Why does the spectrum (<S-DX>) help my hearing?

- *A: <S-DX> isn't just about beauty. When the algorithm clears out the visual noise of the waterfall, it helps the operator to tune precisely to the center of the signal. This visual focus allows your brain and DNR filters to isolate the helpful voice much more effectively.*

Q06: When should I use the 12 dB attenuator (ATT)?

- *A: Only when the correspondent is so close to you that their signal begins to "curve" in the headset or the S-meter is constantly in the far-right position. In the mountains, away from nearby transmitters, the ATT should almost always be OFF.*

Q07: Why is DN better than VW for SOTA/POTA?

- *A: In DN (Digital Narrow) mode, the radio sends voice and data at the same time. This allows others to automatically see your GPS coordinates and distance to you. VW (Voice Wide) mode gives better voice quality, but it takes up the entire channel and you lose telemetry, which is critical in emergencies or field orientation.*

Q08: How do I know if my battery is enough for CW Memory or Voice Memory?

o   **A: These** *functions do not consume more power than normal transmission in the corresponding mode. On the contrary – short and concise, precisely programmed messages save time on the air (albeit a little), and therefore a charge. If the radio broadcasts at 5W without restarting the display, the memories will work flawlessly.*

Q09: Why does my S-meter show S9 noise and how do I know how loud the correspondent is?

o   **A: S9** *noise is really over-the-air noise. Don't try to "reset" the scale. Use the combination of RF and AF gain to detect the noise at the audibility threshold. This will only hear the signals that are louder than it – i.e. you will improve the signal-to-noise ratio. If the arrow bounces above the noise level you set, this is the real power of the station. There is no universal advice on the combination of RF and AF gain – in one setting it may be better to maximize AF gain and use RF for the level of the payload, in another – maximum or high RF gain and use AF to adjust the level of the useful signal.*

Q10: Can I burn the radio if my antenna at the top is poorly tuned?

o   **A: Almost** *impossible, but I don't recommend testing whether I'm right or wrong. The **FTX-1F** has automatic protection, which, at high SWR (above 2.0), instantly "reduces the throttle". If you see that your power output drops on its own, check the antenna and cable first – the radio is just trying to save itself.*

Q11: Why does my radio only stop scanning in scan mode in PMS?

o   **A: Check** *that you have not selected HOLD in SCAN RESUME. If you want it to continue only after the end of the call, select BUSY."*

Q12: What does the SPLIT MEMORY software button mean in the memory manager and how is it used?

o   **A: This** *button indicates that two different frequencies have been recorded in the given cell, one for receiving (RX) and one for transmitting (TX).*

- **When it** *appears: It is automatically activated if you record a frequency in memory while the radio is in Split mode in VFO.*
- **Manual use**: *You can also enable it manually in the memory manager (<V/**M(MW)**>) to add or adjust the transmit rate (TX) for an already existing channel without changing the reception frequency.*
- **Benefit**: *This is the safest way to work through non-standard offset repeaters or on DX connections, as the settings are "fixed" in memory and there is no danger of accidentally changing them through the main encoder.*

Q13: What is the purpose of the first physical button <GM> located at the top of the case (above the display)?

- *A: **This** is the button for the Group Monitor function. Its location in the hardware panel (formerly <S-DX> and <PMG**(PW)**>) indicates that it is an essential tool for group coordination, but as such only works in C4FM mode.*

  - *Main Feature: Allows you to see a real-time list of your colleagues' initials that are within the same frequency range.*
  - *Digital mode: It is important to know that this button activates functions that are only available in digital mode (C4FM). If you press it while in analog (FM) mode, the radio will automatically switch to digital mode to start tracking the group.*
  - *Preview: When the button is pressed, the display changes and shows a list of stations ("In Range" / "Out of Range"), the distance to them and their direction (via the built-in GPS).*

Q14: Why is no one answering me, and the S-meter hardly moves?"

- *A: **Check** that you have not forgotten <ATT><ON> and at the same time <IPO><ON> (or <AMP><OFF>), the attenuation is so great that it is possible that nothing can be heard. I hope you check if you have turned on the antenna and without reading this tip in the FAQ (it happens, for example, that you use an antenna switch, which must have power supplied to turn on the antenna – in power saving mode, you may have missed to power it.*

Q15: Why can't I see how many decibels my attenuator (ATT) is?

- *A: **The** design of the **FTX-1F** is optimized for fast ground orientation. Instead of confusing you with numbers, the radio gives you a clear status: <ON> (protection on) or <OFF> (maximum sensitivity). If you see <ATT><ON>, know that you hear the signals one level weaker, but with much less distortion than powerful neighboring transmitters. For fans of pedantry, at <ATT><ON> the attenuation is 12 dB.*

Q16: I pressed the <S-DX> button, but it didn't light up. How do I know if the feature is working?

- *A: **With the FTX-1 F**, the confirmation is entirely software. Look at the thin status bar at the top of the display – a white S-DX icon should appear there. If the icon is there, the radio is already in S-DX mode. To turn off the feature and hide the icon, press the <S-DX click> button again.*

Q19: What exactly is DIGIPATH in APRS and why do we write WIDE1-1, WIDE2-1 in the settings?

- *A: **Imagine** that your APRS package is a letter, and DIGIPATH is the instructions to the postmen (digipeaters – digital repeaters) how many times and in what way to forward it to get to the Internet portal (IGate).*

  - ***WIDE1-1 (First Jump)**: This is an instruction to the small, homemade Fill-in Digipeaters who are near you. They take your weak signal from the portable*

radio and transmit it at higher power. The number "-1" means "make 1 jump". Once they do, they erase that part of the road.

- ***WIDE2-1 (The Second Jump):*** *This is an instruction to large, high-altitude digipeaters (on peaks and TV towers). They "listen" for packets that have already passed through a small digipeater and retransmit them once more over a long distance for an Internet gateway to hear them.*

Q20: Why don't I just write WIDE7-7 to be heard in the neighboring country?

- o **A: This** *is the biggest mistake! In the APRS network, this is considered "digital spam". If you set too many hops, your packet will be retransmitted dozens of times, taking up valuable frequency time and interfering with others. The WIDE1-1, WIDE2-1 standard is the "golden rule" – it provides a total of two hops, which is quite enough for your package to reach the Internet from almost anywhere in Bulgaria.*

Q21: When should I use a shorter path?

- o **A: If** *you are on a high peak with direct visibility to a large city, you can only use WIDE2-1 or even not set a path. Your signal will be heard directly from the IGate portal without engaging other digipeaters.*

Q22: Why does my standing wave coefficient SWR change when I get close to the radio?

- o **A: When** *working with portable antennas (such as "Long Wire" or telescopic rods without good grounding), the operator's body or radio itself becomes part of the antenna (the so-called counterweight).*

Applications

Appendix 1: Quick Guide (Cheat Sheet) for FTX-1F

Mode	IPO/AMP	DNR	WIDTH	Compressor	EQ
SSB (DX/QRP)	IPO/AMP1	Level 4-6	2.1 kHz	ON (High)	High-Pitch
SSB (Chat)	AMP1	Level 2-3	2.4 kHz	OFF/Low	Natural
CW (Normal)	IPO	Level 3	250 Hz	N/A	APF ON
CW (Contest)	THAT	OFF	50-100 Hz	N/A	APF ON
FT8/FT4/FT2	IPO	OFF	3.0 kHz	OFF	OFF

Appendix 2: Quick Diagnosis: When things don't go digitally

If JTDX/WSJT-X does not "see" the radio or does not emit a signal, check these 5 critical points:

Problems	Probable cause	Quick Solution
Rig Control Error	Wrong COM port or speed	Check in Device Manager if you are using the Enhanced port. The speed in the radio and PC should be 38400.
Radio does not transmit (no PTT)	Wrong PTT or CAT Blocking Method	Check if the CAT RTS is on ENABLE in the menu. In JTDX, set PTT Method: CAT.
The waterfall is "black" or empty	Low level of incoming audio	Increase the USB OUT LEVEL from the RADIO SETTING menu or lift the slider to Windows Sound (Recording).
I pass it on, but no one hears me	Out of sync time	Check your computer's clock. Even a 2-second difference makes the FT8 impossible to decode.
CAT connection "gets stuck" at TX	RF Feedback	Check the ferrite clips on the USB cable. Reduce the power to 5W per sample.

Annex 3: Comparison table for FC-90 vs FC-80 tuners

Characteristics	FC-90 (External)	FC-80 (Desktop/Portable)
Installation	External (IPX4 moisture protection)	Direct to the back of the radio
Scope (Impedance)	16.7 Ω – 150 Ω (3:1 SWR)	16.7 Ω – 150 Ω (3:1 SWR)
Antenna type	Coaxial, Long Wire, Dipoles	Mainly coaxial and resonant
Grounding	Special terminal (critical for LW and other unbalanced antennas)	Through the housing and coaxial cable
Zahrahvane	Through the control cable from FTX-1F	Through the control cable from FTX-1F

Glossary of terms and abbreviations used

- **2D –** Two-dimensional, two-dimensional waterfall
- **3D –** tri-dimension
- **3DSS** – Tridimensional Waterfall
- **AGC** – Automatic Gain Control – Automatic Gain Control (AGC)
- **ALC** – Automatic Level Control – Automatic Level Control
- **AM** – amplitude modulation
- **APF** – Audio Peak Filter – Sound Peak Filter
- **ATT –** attenuator (attenuator)
- **AUTO –** automatic
- **BWTH –** bandwidth
- **CLAR (CLARIFIER) –** purifier, purifier
- **CLAR RX –** Acceptance Purifier
- **CLAR TX –** Transmission Purifier
- **COMP** – compression meter, compressor level (speech processor)
- **CONT (CONTOUR) –** loop (a type of filter that changes the bandwidth loop)
- **CONTEST –** competition
- **CONTOUR LEVEL –** CONTOUR filter level
- **The CW –** Continues Wave – Morse Code Telegraphy
- **CW PITCH –** pitch of telegraph signs
- **CW WEIGHTING** – character weight, hyphen-dot ratio.
- **CW INDICATOR –** Telegraph Signal Indicator
- **CW-L –** Lower Sideband Telegraphy
- **CW-U –** Upper Sideband Telegraphy
- **DATA –** data, modes with data transmission
- **DNF** – Digital Notch Filter – Digital Notch Filter (Automatic)
- **DNR** – Digital Noise Reduction
- **DSP –** Digital Signal Processing
- **DX –** Far Country, Far Sides
- **EQ –** Equalizer
- **FAST** – fast
- **FM –** frequency modulation
- **FREQ –** frequency
- **FUNC –** function button designation **<FUNC>**
- **HAM –** radio amateur
- **Hi-Fi –** High Fidelity – High Quality (Precision) in Sound Reproduction
- **IF –** intermediate frequency
- **IPO –** Interception Point Optimization
- **KEYER –** automatic telegraph manipulator
- **LEVEL –** level
- **LiFePO4 –** Lithium Iron Phosphate Battery – The preferred source for field works due to the stable voltage.
- **LSB –** Lower Sidebar

- **MIC** – Microphone
- **MIC EQ** – Equalizer on Microphone
- **MIC GAIN** – Microphone Boost
- **MONI** – monitor – "monitoring" of the transmitted signal
- **NB – Noise Blanker** – Noise Silencer
- **NOTCH** – notch filter
- **OM** – respectful address to a fellow radio amateur
- **P PRMTRC** – short for Parametric Equalizer – equalizer when the compressor is off
- **PILE-UP – a** crowd of correspondents on the same frequency, trying to connect to a station valuable to them

- **POTA (Parks on the Air):** Activation of national parks and reserves.

- **PRMTRC** – abbreviation for Processor Parametric Equalizer – equalizer when the compressor is on
- **PROC** – Compressor (Voice Processor)
- **PSK** – Phase Pulse Modulation
- **QRM** – interference from other services and devices
- **QRN** – Atmospheric Embarrassment

- **QRP** – Low power operation (usually up to 5W CW or 10W SSB).

- **QSK** – I hear you between my signals; you can interrupt me – Allows the operator to hear other stations between the dots (dits) and dashes (dahs) of the signal being sent, resulting in a more conversational style of communication.
- **R.FIL** – roofing filter
- **RECORD**
- **RF GAIN** – RF Gain
- **RTTY** – radio-teletype
- **SDR** – Software-Defined Radio – Software-Defined Radio
- **SLOW** – slow

- **SOTA (Summits on the Air)** – International Mountain Peak Activation Program.

- **SPAN** – the full scope of something from end to end; the space that something covers
- **SQL** – abbreviation for squelch (noise suppressor)
- **SQUELCH** – squelch (noise suppressor)
- **SSB** – Single Side Band – Single Band Modulation
- **S-METER** – signal strength meter
- **TFT** – Thin-Film-Transistor technology – screen technology
- **TX CLARIFIER** – Transmission Purifier
- **UP** – up
- **USB** – top sidebar
- **WIDE**
- **ZIN** – Zero-In – zero beat setting (precise wear tuning)
- **ZIN/SPOT** – Precision Setting Button Designation

- **AGC –** automatic gain control
- **Encoder** – a converter of mechanical movement (rotation or linear) into digital or analog electrical signals, in a transceiver it is most often a knob with unlimited rotation, which creates control pulses.
- **MF** – intermediate frequency, intermediate frequency
- **HAMSHAK** – the "den" of the radio amateur – the room from which he works and where all or most of his equipment is located

Sources and literature used

Manufacturer's technical documentation:

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- **ARRL** – *The ARRL Antenna Book* (Section: Portable Antennas for Field Work and Matching).
- **RSGB (Radio Society of Great Britain)** – *The International QRP Pocketbook* .
- **SOTA/POTA Official Handbooks** – Technical requirements and operational ethical standards for working from protected areas.

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Methodology and author's analyses:

- **LZ3AI** – *FTDX10 Masterclass* (Conceptual Framework for Filtering and Hybrid SDR Design).
- **LZ3AI** – *Field Radio Mastery* (Personal archive of field tests and comparative analyses of HF/VHF/UHF pass).

Personal notes: