Firmware Version 1.1

# FX-4C SDR Transceiver Manual


## English

# User Manual

v1.1



Edit : BG2BJI

# FX-4C SDR Transceiver Manual

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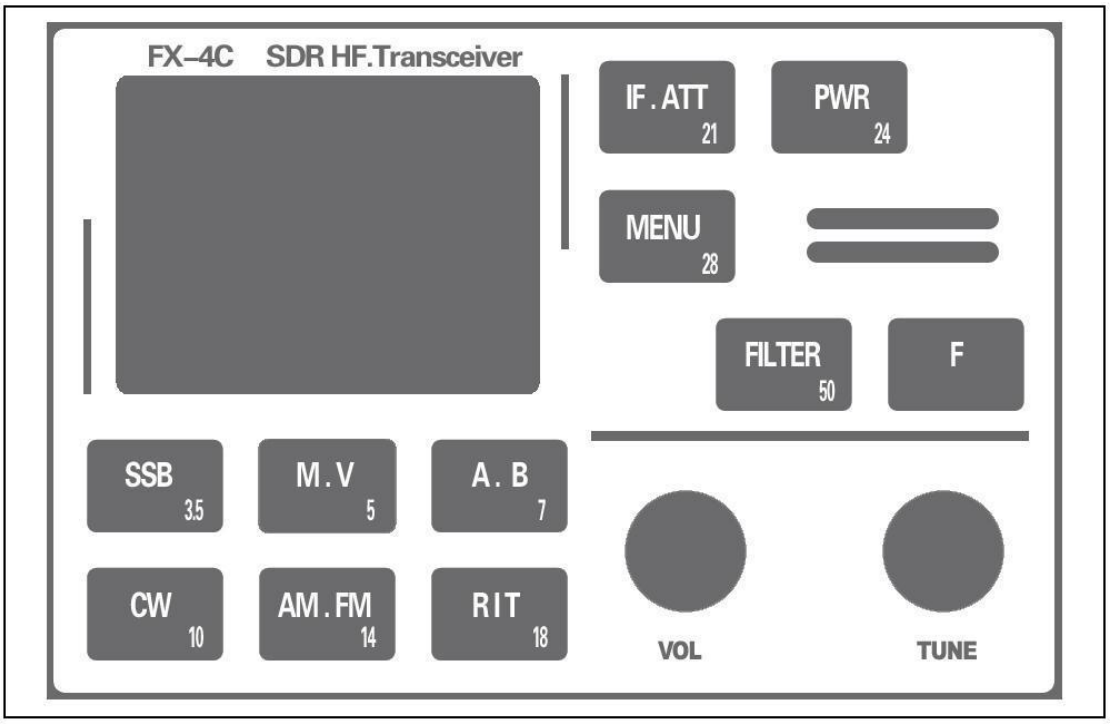
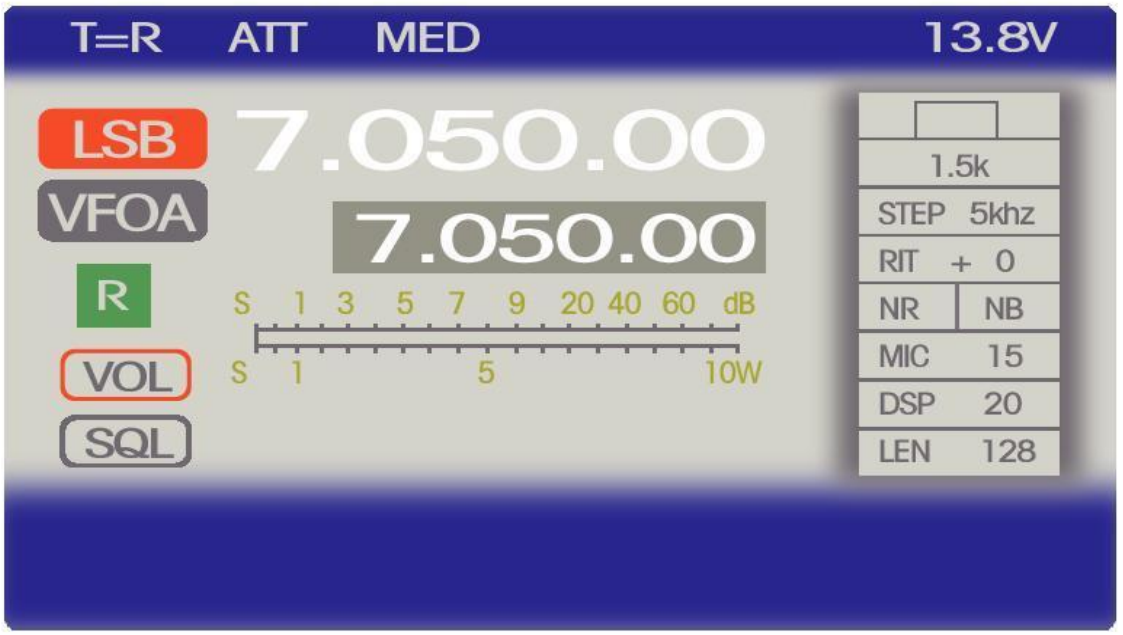


## Ⅰ. Specifications

Transmission frequency range: 3.5 - 29 MHz frequency range of amateur radio
Receiving frequency range: 465 kHz - 50 MHz
Operating Modes: USB, LSB, CW, AM, FM
Frequency Steps: 10 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 100 kHz, 1 MHz
Antenna impedance: 50 Ohm
Operating temperature range: -20 - +40℃
Voltage range: DC 9 V - 18 V (please keep the maximum voltage below +16 V for long-term operation: About 14 V is recommended)
Power Consumption:
Transmit: (maximum power) ~ 2 A;
Receive: ~ 220 mA.
Overall size: length 107 mm, width 65 mm, height 43 mm
Weight: (radio only) 0.46 kg
Filter Bandwidth:
SSB: 1.5 kHz, 1.8 kHz, 2.1 kHz, 2.4 kHz, 2.7 kHz, 3 kHz
CW: 50 Hz, 100 Hz, 200 Hz, 300 Hz, 500 Hz, 800Hz
FM: 5 kHz, 10 kHz
AM: 6 kHz, 9 kHz
Power range: 0.1-10 W continuously adjustable
Spurious emission suppression: -43 dB
Carrier suppression: -50 dB
Microphone impedance: 2.2 k Ohm
Audio output power: 1 W
Receiving sensitivity: -120 dBm

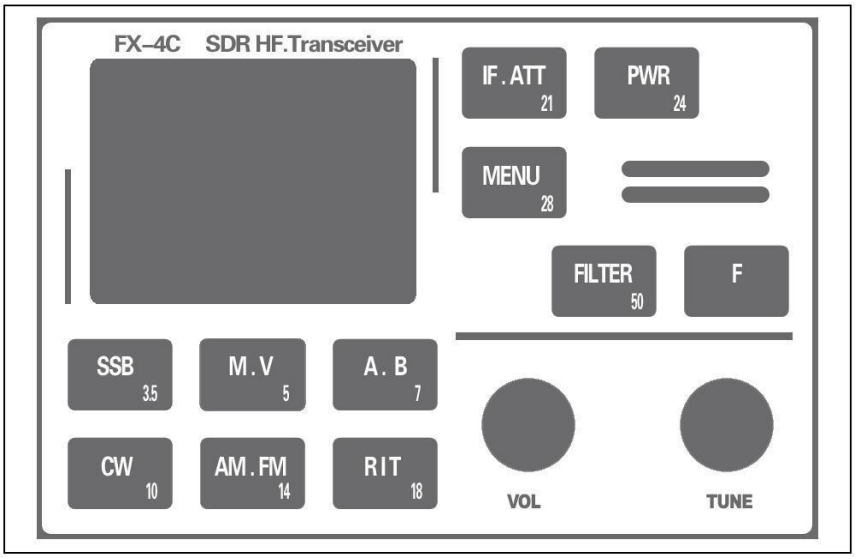
## Functional Characteristics:

☆ 2.0″TFT display screen
☆ Spectrum display and waterfall plot
☆ Dual VFO operation (VFO A and B) with split mode operation
☆ Internal USB sound card with serial communication via USB
☆ Adjustable DSP digital noise reduction
☆ Ultra wide input voltage: 9 V - 18 V
☆ Quick switching among various frequency bands and convenient operation
☆ CAT control over USB

## Included Items

1. Transceiver
2. Hand microphone
3. Power cord
4. USB data cable, instruction manual, packing box

## Ⅱ. Transceiver Controls:




| Control | Primary Functions |
|---|---|
| VOL | Turn to adjust volume. Press, then turn to adjust microphone gain, and DSP in SSB mode, and CW keyer speed, side tone volume, and side tone frequency in CW mode. Press and hold, then turn to adjust squelch. |
| TUNE | Turn to adjust frequency. Press and release, or press and turn to adjust tuning step. |
| F | Press to enter band selection mode. Press and hold to lock keypad. |
| FILTER 50 | Press to change filter bandwidth. |
| MENU 28 | Press and hold to enter menu. |
| PWR 24 | Press, then turn VOL to adjust transmit power setting. |
| IF.ATT 21 | Press to change AGC setting. Press and hold to turn on/off the attenuator. |
| RIT 18 | Press to turn on/off RIT. |
| AM.FM 14 | Press to select AM or FM mode. Press and hold to select wide-range receive mode (RX only). |
| CW 10 | Press to select CW keying mode (iambic/straight). Press and hold to reverse paddle “dit” and “dah.” |
| A.B 7 | Press to switch between VFO A and VFO B. Press and hold to enter Split mode. |
| M.V 5 | Press to switch between VFO and Memory mode. Press and hold to turn on Noise Blanker (NB). |
| SSB 3.5 | Press to switch to SSB mode. Press to select LSB or USB. Press and hold in SSB mode to turn on DSP Noise Reduction (NR). Press and hold in CW mode to select upper or lower carrier. |

# IⅡ. Transceiver Operation:

**Power On:**
Connect 9 - 18 V DC to the power jack and switch ON/OFF switch to “ON”

**Volume Adjustment:**
Turn the “VOL” knob to adjust the audio volume. Volume setting from 0~99 will display below the signal meter.

**Band Selection:**
Press F momentarily to enter the band selection menu. Select a band by pressing the button containing the button on the transceiver with the desired band on the lower-right corner of the button, or rotate the “Tune” knob to select the operating band. Press F again to exit the band selection menu. If no keys or knobs are pressed or turned, the transceiver will exit the band selection menu automatically after approximately 8 seconds.

**Frequency Selection:**
Turn the “TUNE” knob to adjust the frequency. Press “TUNE” knob to cycle through 10 Hz, 100 Hz, 1 kHz, 5 kHz, 10 kHz, 100 kHz, or 1 MHz tuning steps, or press and turn to select tuning step increment.
Press is to make stepping adjustment. Hold down and rotating left and right can also adjust the stepping. When pressing「F」to enter the band selection interface, rotate left and right to select the band. Press「F」key to exit. When it is in channel mode, press and rotate to adjust the channel number; Rotate left and right to adjust the corresponding channel frequency; the frequency will be automatically stored in this channel; Cooperate with the menu key to adjust the menu option parameters: (see "MENU" for details).

**Mode Selection and Settings:**
Selected mode is shown on upper-left side of display.

**SSB:** Press SSB momentarily to select SSB mode. Press SSB momentarily in SSB mode to switch between LSB, DIG_L, USB, and DIG_U. Use LSB and USB to operate using phone on lower and upper sideband. Use DIG_L and DIG_U modes for digital mode operation. In DIG_U and DIG_L, the speaker is muted and the filter is set to 3.0 kHz.

**CW:** Press CW momentarily to select CW mode. Press CW momentarily in CW mode to switch between Iambic (automatic keying “CW A”) and Straight Key (manual keying “CW M”) operation. Press and hold CW for 2 seconds to invert “dit” and “dah” paddles. While in CW mode, press and hold SSB to switch between upper and lower carrier operation which can be helpful to avoid interference on nearby frequencies. In CW mode, press “AF” encoder then rotate to adjust keyer speed (KEYSP), press again to adjust sidetone frequency (SITON), and press again to adjust sidetone volume (SIVOL).

**AM/FM:** Press AM.FM momentarily to select AM mode. Press AM.FM again to select FM mode.

**Filter Bandwidth:**
Press FILTER to change between filter bandwidth options within each mode.
SSB: 1.5 kHz, 1.8 kHz, 2.1 kHz, 2.4 kHz, 2.7 kHz, 3 kHz
CW: 50 Hz, 100 Hz, 200 Hz, 300 Hz, 500 Hz, 800Hz
FM: 5 kHz, 10 kHz
AM: 6 kHz, 9 kHz

**DSP Noise Reduction (NR):**
Press and hold SSB for 2 seconds until “NR” is highlighted in red on the display. Press and hold SSB again to turn of DSP. Adjust DSP strength by pressing “AF” until DSP is highlighted on the display, and turn the knob. NOTE: DSP may be unstable in some scenarios. If the noise reduction system crashes, reset it by powering the

unit off and back on again, then turn DSP back on.

**Noise Blanker (NB):**

Press and hold M.V 5 for 2 seconds until "NB" is highlighted in red on the display. Press and hold M.V 5 again to turn off NB.

**Automatic Gain Control (AGC):**

Press IF.ATT 21 to cycle between "SLOW," "MED," and "FAST" AGC to adjust how quickly the transceiver will adjust to strong received signals. The selected AGC mode is indicated at the top-center of the display.

**Squelch:**

Press and hold "AF" knob until "SQL" is highlighted in red, then turn the "AF" knob to adjust squelch. Wait approximately 4 seconds, or press and hold "AF" knob again to exit squelch adjustment.

**RF Attenuator (ATT):**

Press and hold IF.ATT 21 for 2 seconds to turn on RF signal attenuation. When ATT is turned on, the "ATT" indicator at top of the display is highlighted.

**VFO and Memory Mode:**

Press M.V 5 momentarily to switch between VFO mode and memory channel mode. VFO mode allows tuning across the bands by rotating the "TUNE" knob. In memory mode, press and rotate the "TUNE" knob to select a channel from 1-99. Set the frequency by rotating the "TUNE" knob, and the channel will automatically save to the selected channel.

**VFO A / VFO B:**

Press A.B 7 momentarily to switch between VFO A and VFO B in VFO mode, and to switch CH A and CH B in channel mode.

**Split Mode Operation:**

Press and hold A.B 7 for 2 seconds until "T≠R" appears in the upper left corner of the display to enter split mode. In split mode, the main frequency display indicates the transmit frequency while transmitting and switches to the receive frequency while receiving. The auxiliary frequency indicates the selected transmit frequency while in receive mode, and the selected receive frequency while transmitting. Cross-band operation is possible in split mode. To exit split mode, press and hold A.B 7 for 2 seconds until "T=R" appears in the upper left corner of the display.

**Receiver Incremental Tuning (RIT):**

Press RIT 18 momentarily to turn on RIT. "RIT" will be highlighted in red when active. Rotate the "TUNE" knob to adjust the receiver offset. Press the tune knob to select the frequency step. Press RIT 18 momentarily again to turn off RIT.

**Transmit Power:**

Press PWR 24 momentarily to enter power selection mode. The current power setting will appear on the display surrounded by a red box. Turn the "AF" knob to adjust power setting from 0.1 to 10 W. Press the PWR 24 again to exit, or wait 4 seconds.

**Microphone Gain:**

Press "VOL" knob momentarily to enter microphone gain adjustment mode. "MIC" will be highlighted in red. Turn "VOL" knob to adjust microphone gain. Press "VOL" knob again to exit, or wait 4 seconds.

**Receive-only Mode:**

Press and hold AM.FM for 2 seconds until "RX" appears in the upper-left corner of the display to enter receive-only mode. In this mode, additional receive bands can be selected in the band selection mode, but transmitting is blocked. To return to transceiver mode, press and hold AM.FM for 2 seconds until "T=R" appears in the upper-left corner of the display.

**Key Lock:**

Press and hold F for 2 seconds until "LOCK" appears at the top of the display. In "Lock" mode, only ATT button will function. Other buttons will be locked out. Exit "Lock" mode by pressing and holding F again for 2 seconds until "LOCK" disappears.

**Menu:**

Press and hold MENU to enter the menu. Press the menu button or turn the volume knob to cycle through menu options. Turn the "TUNE" knob to change the selected menu item value. Press and hold MENU again to exit the menu, or wait for the menu to time out and exit automatically.

**Menu Options:**

**0 MENU:** Adjusts the time delay for automatic exit from the menu. 1000 = 20 seconds. 1500 = 30 seconds.
**1 STIF 1:** The frequency setting for the first intermediate frequency. The first intermediate frequency of the device is 90.000000MHz (depending on the center frequency of the selected crystal filter).
**2 STIF 2:** The frequency setting for the second intermediate frequency. The second intermediate frequency of the device is 24.000KHz (the adjustment of this item is invalid)
**3 TCXO:** The actual frequency setting of the temperature compensated crystal oscillator. User may fine tune of this value to calibrate the transceiver frequency. Note default setting prior to adjustment.
**4 CW_DELAY:** Adjusts time delay from CW transmit to receiving after keying in * 10 mS.
**5 AGC_STARE:** This item adjusts the AGC starting threshold: (this adjustment will affect the display accuracy of the signal meter. The signal meter should be calibrated when the value of this item is 33).
**6 AGC_M_A:** Selects Manual or Automatic AGC.

- **0**: Automatic AGC on. Press IF.ATT in this mode to cycle between slow/med/fast.
- **1**: Manual AGC on. Press IF.ATT and rotate AF knob to adjust gain.

**7 IF_GAIN:** Adjusts the IF amplifier gain. Do not adjust.
**8 RITATT_PTT:** Allows use of keypad buttons as PTT to use the transceiver's internal microphone.

- **0**: No keypad PTT.
- **1**: RIT functions as PTT.
- **2**: IF.ATT functions as PTT.

**9 ENCODE_FREQ:** Frequency fast-forward. When on, tuning rate increases when tuning encoder is turned continuously.
**10 ENCODE_EXTI:** "External encoder is on." <Will update when I get a better explanation.>
**11 TX_FILTER:** Adjusts TX bandwidth for SSB operation.

- **0**: 1.5 kHz
- **1**: 1.8 kHz
- **2**: 2.1 kHz
- **3**: 2.4 kHz
- **4**: 2.7 kHz

**12 S_CORRECT:** ?

Menu Options in older firmware versions.

**SQL:** Adjusts the squelch threshold.

**CW_VOL:** Adjusts CW sidetone volume.

**CW_SI:** Adjusts CW sidetone pitch in Hz..

**CW_SP:** Adjusts CW automatic keyer speed in words per minute.

**POW:** Adjusts the transmit power setting in tenths of a watt ("15" = 1.5 W).

**AGC_BIAS:** This item is the adjustment of AGC minimum control voltage. The larger the value is, the higher the AGC minimum voltage is, and intermediate frequency gain lowers; (this function is basically not used). Adjusting this item can calibrate the field strength display, which is the main function: (In case that the antenna interface is open or short circuited, adjust this item so that the display bar in the second grid on the left of the field strength table just disappears)

**AGC_ZERO:** This item adjusts the midpoint of AGC detection circuit. This setting is adjusted in calibration, and user adjustment is not recommended.

**MIC_GAIN:** This item is the microphone sensitivity adjustment. Adjustable through the main display by pressing the AF knob until "MIC" is highlighted, then turning the knob.

**NR_STRONG:** This item is the adjustment of DSP noise reduction intensity, with a value of 10~55. The default value is 15; adjust this item carefully. The larger the value is, the more significant the noise reduction will be. There will be large strange sound if the value is too large. It is not used to listen and should be avoided as far as possible; In addition, this item should be used in combination with the following two items. Now adjustable by pressing the AF knob until "DSP" is highlighted and turning the knob.

**NR_BUFLEN:** This item adjusts the length of DSP noise reduction delay array. Now adjustable by pressing AF knob until LEN is highlighted and turning the knob.

**NR_NUMTAPS:** This item adjusts the number of coefficients of DSP noise reduction filter with the default value 96: recommended for DSP noise reduction: NR_BUFLEN (80~96), NR_STRONG (15~25), adjust NR_BUFLEN and stop when the noise is significantly reduced.

**NOT_STRONG:** (To be developed)

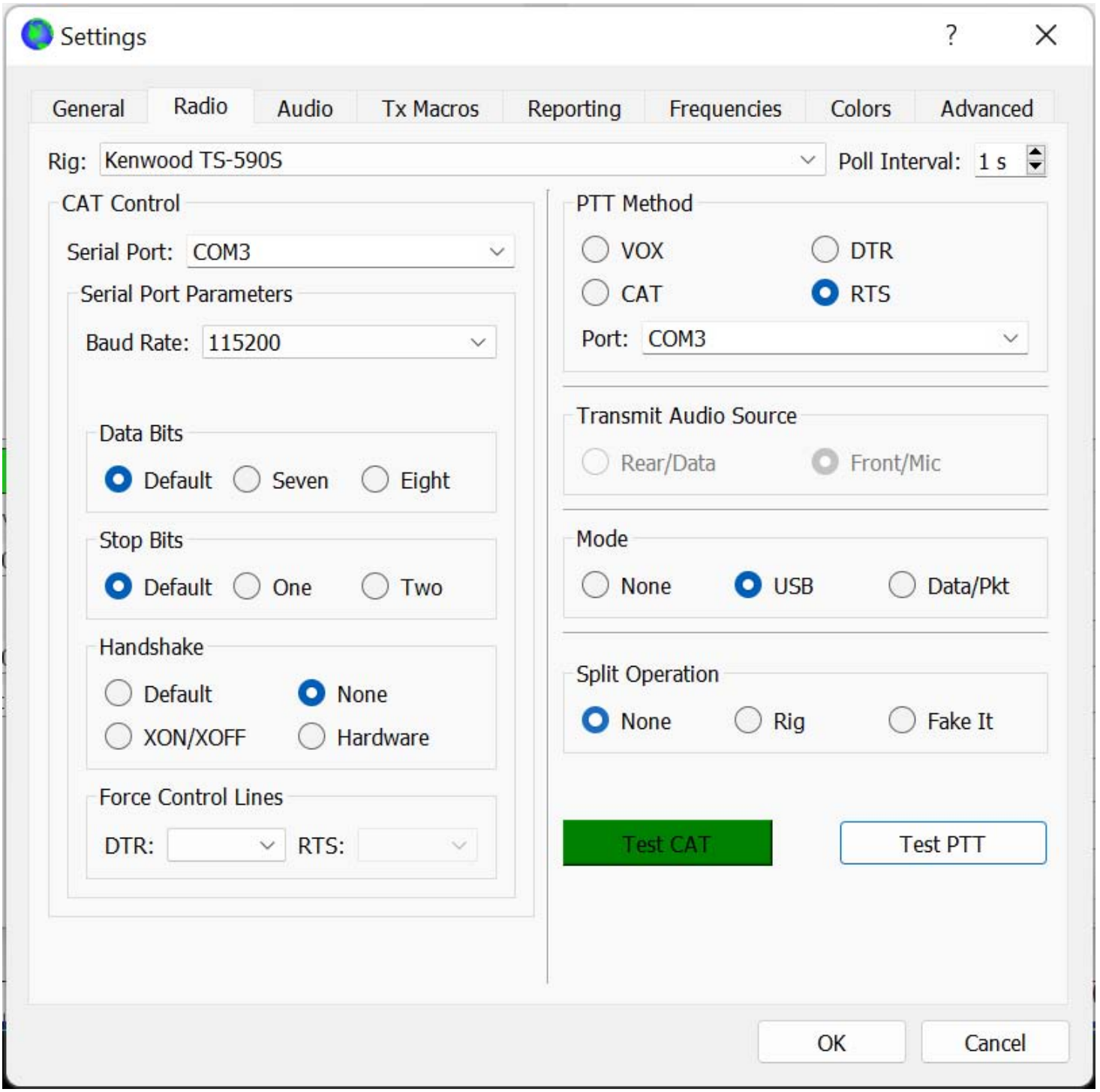
**NOT_BUFLEN:** (To be developed)

**NOT_NUMTAPS:** (To be developed)

**ALC:** Select 0 for ALC on, and 1 for ALC off. ALC automatically controls microphone and input audio gain for best performance.

**CAT Control Settings**

Use the following settings to utilize CAT control.
Rig: Kenwood TS-590S
Baud Rate: 115200
PTT: RTS
If you find you need drivers for the CP2102 USB to UART bridge:
https://www.silabs.com/developers/usb-to-uart-bridge-vcp-drivers?tab=downloads



**Digital Mode Operation (FT8/WSJT-X specific, other modes similar):**

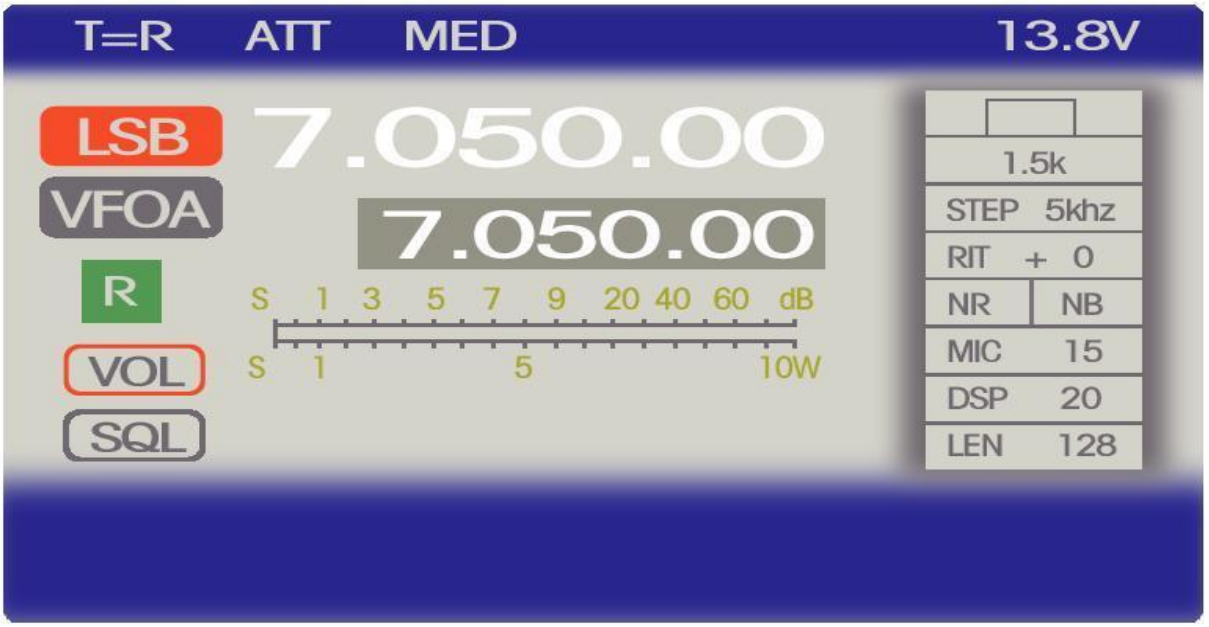
1. Connect USB cable to transceiver and computer and turn on transceiver.
2. Verify computer detects USB cable. Note COM port used by computer.
3. Set rig to preferred band of operation and then change mode by pressing 

until "USB" and "DIG_U" appear at the top of the display. The speaker should mute, and the filter will be set to 3.0 kHz. Tune to the standard frequency for the chosen mode and band.
4. Leave ALC menu item 21 set to 0 (on). Note: You can also manually control microphone gain, but using ALC is much easier and provides more consistent results with the FX-4C.
5. Set computer audio output volume to 50%. Set rig "Volume" to 3 by turning "AF" encoder knob.
5. Open digital mode software and adjust settings. If using WSJT-X go to File->Settings->Radio. Select "None" for "rig". Select the correct COM port for the USB connection. Choose "RTS" mode for PTT and test PTT . CAT control does not work at this time.
6. Open "Audio" settings and select the USB audio sources for input and output under "Soundcard" settings. Exit WSJT-X settings.
7. Monitor WSJT-X waterfall to verify FT8 signals are visible. If WSJT-X is not decoding successfully, check computer time sychronization. Check received audio strength using the dB meter at the lower left of the main WSJT-X display. Adjust "AF" knob until it reads approximately 60 dB.
8. Select an open frequency on the band to transmit, and begin transmitting. Monitor power meter while transmitting. Adjust mic gain to achieve power output close to selected power setting in power menu. Make note of mic gain and power settings for each band for easy setup next time.

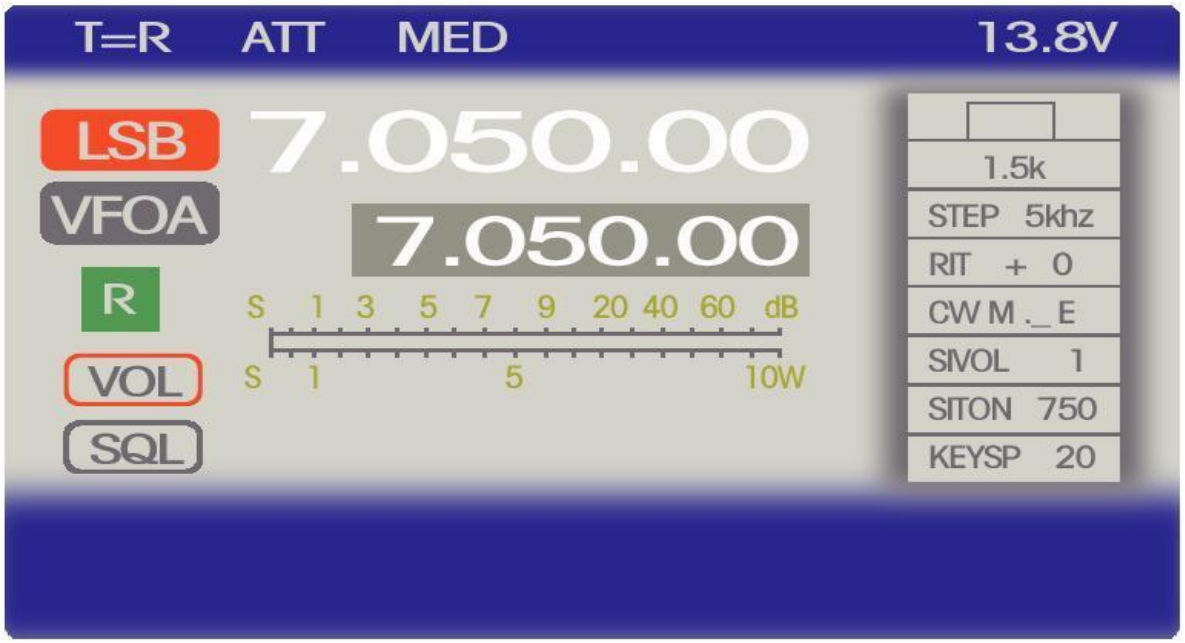
Have fun and make lots of contacts!

CAUTION: Monitor SWR and power output when operating digital modes, particularly when running higher power supply voltages. Running higher power settings with elevated SWR can damage the radio, particularly when running high duty-cycle digital modes.

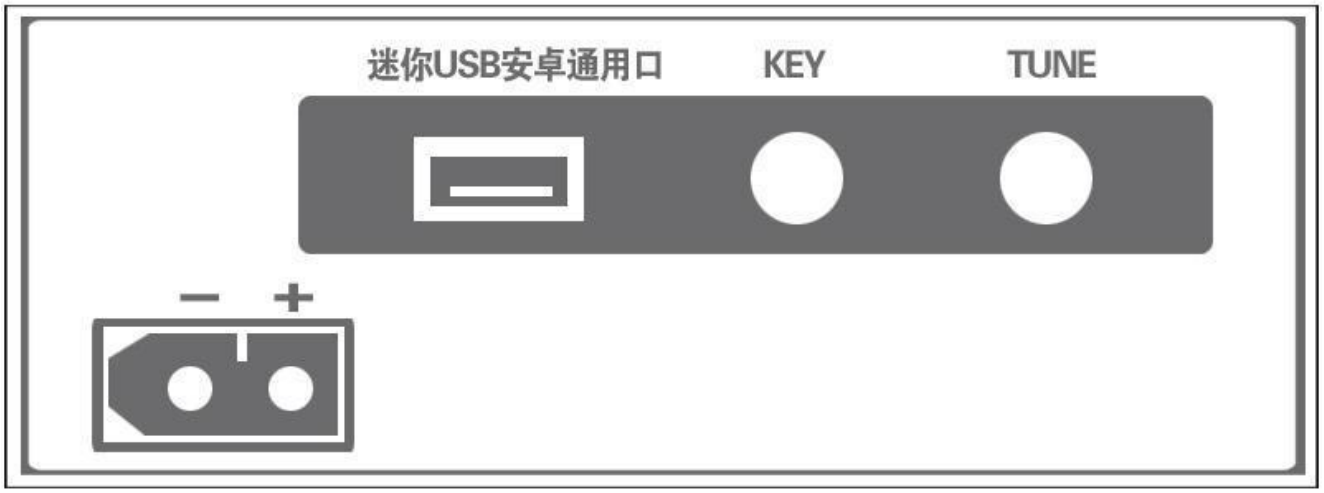
## IV Display Interface



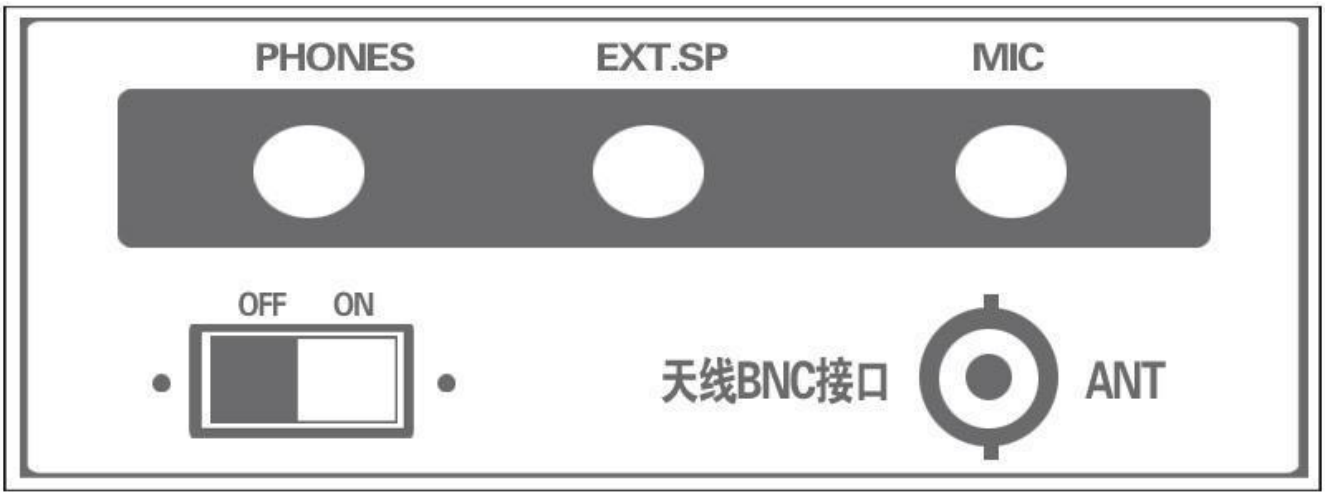

| | | |
|---|---|---|
| **"T=R"**: TX=Transmission: RX=Receiving | **"ATT"**: receiving attenuation | **"MED"**: AGC speed |
| **"13.8V"**: Display of current voltage | **"LSB"**: Current mode | **"R"**: Transmission indication |
| **"AF"**: Volume | **"SQL"**: Squelch | **"1.5K**: Current bandwidth display |
| **"STEP 5khz"**: Current stepping frequency | **"RIT+0"**: RIT frequency shift | **"NR"**: Digital noise reduction |
| **"NB"**: Elimination of spark pulse interference (not available temporarily) | **"MIC"**: Mcrophone gain | **"CW M"**: Selection of automatic and manual key |
| **"SIVOL"**: CW sidetone: volume | **"SITON"**: CW sidetone: volume | **"KEYSP"**: Automatic key: key speed |
| **"DSP**: Digital noise reduction: depth | **"LEN"**: Noise reduction array length | |



## V Interface of Panel at Two Sides




**"mini USB"** Mini USB Android universal interface
**"KEY"** CW key connecting interface (support automatic key and manual key)
**"TUNE"** Tuning interface for external optical-electricity encoder
**" DC "** XT60H type power interface



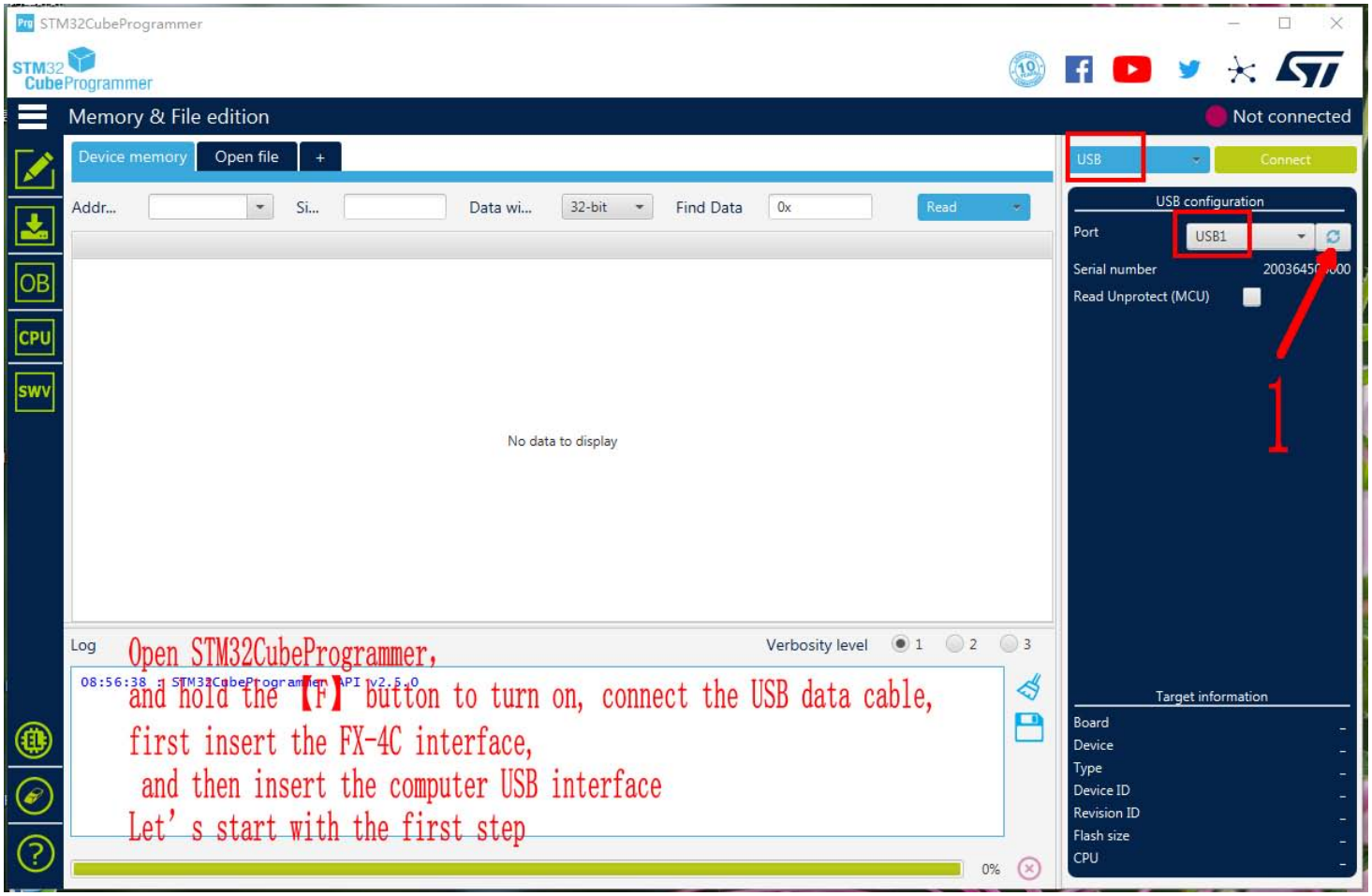

**"PHONES"** Earphone port
**"EXT.SP"** External speaker
**"MIC"** Interface of hand-held microphone (hand microphone)
**" ANT "** BNC specification: Antenna interface
**" OFF \ ON"** Power switch

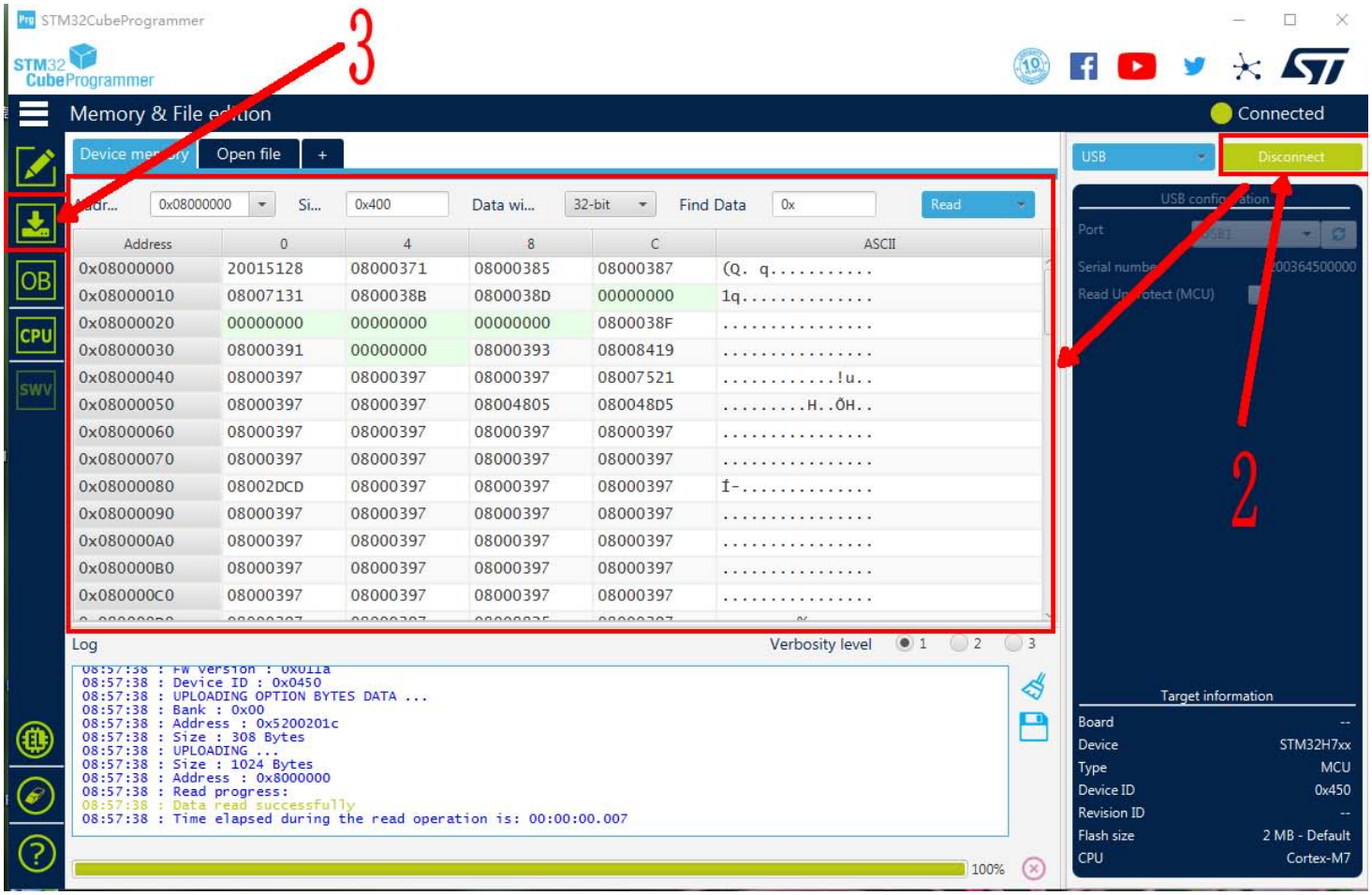
**Thank you for your support and purchase**

After-sale mailbox: 147178430@qq.com
Pocket elf (technology) QQ group: 830528222
Edit: Snow Wolf / BG2BJI

## V. Firmware Update:

1. Download latest firmware from BG2FX.
2. Download STM32Cube programming software:
https://www.st.com/en/development-tools/stm32cubeprog.html.
3. Run STM32Cube.
4. Hold down [F] and turn on FX-4C. Release [F] and screen should remain blank.
5. Plug USB cable into FX-4C, then into computer.
6. Select “USB” in menu at upper-right of STM32 Cube application. Click the “reload” button if necessary, and select port: “USB1.”
7. Click “Connect.”
8. Click “Download” to begin programming.
9. Click “Browse” and select .HEX file for latest firmware.
10. Click “Start Programming” and wait for programming to finish.
11. Once programming is complete, click “Disconnect.”
12. Turn rig power off, then back on again to complete update.




STM32CubeProgrammer
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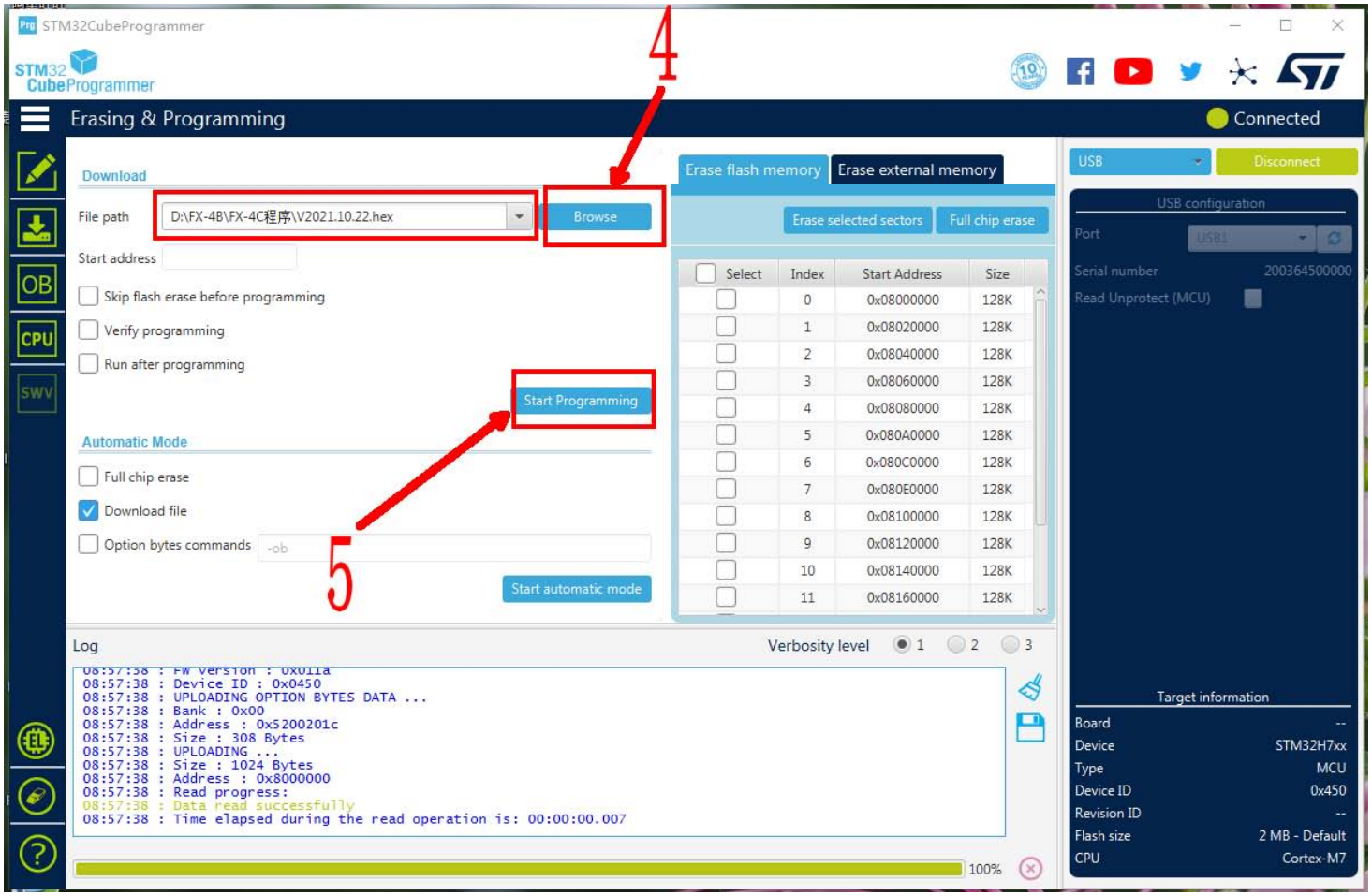
ASCII
USB
Disconnect
Target information
Log
Verbosity level
100%
3
2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Browse
Start address
Skip flash erase before programming
Verify programming
Run after programming
Start Programming
Automatic Mode
Full chip erase
Download file
Option bytes commands
Start automatic mode
Erase flash memory
Erase external memory
Erase selected sectors
Full chip erase
Select
Index
Start Address
Size
USB
Disconnect
Target information
Log
Verbosity level
100%
4
5



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