

# Welcome

Welcome to the uv-k5-firmware-custom wiki maintained by [robang74](#).

[!NOTE]

Please note that the experimental firmware fork hosted on [robang74](#) github repository might not completely follow this wiki instruction when it comes with the UV-K5 menu, especially when mods about the menu have been enabled (usually enabled by default).

The initial version of this wiki has been copied from the [armel wiki](#).

## Manual

All the stuff in this wiki can be download in a PDF format as a manual:

- [manual.pdf](#) (2024.11.07)

The manual is not regularly updated but kept aligned about major changes.

However the manual can be created form the last version of this wiki `bash md2pdf.sh`. This script requires two commands: [md2pdf](#) and `pdfunite` which usually is part of the `poppler-utils` and available in the major GNU/Linux distributions.

## Chapters

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# About this firmware

This firmware is a fork of [Egzumer custom firmware](#), who was a merge of [OneOfEleven custom firmware](#) with [fagci spectrum analyzer](#) plus my few changes.

All is a cloned and customized version of DualTachyon's open firmware found [here](#) ... a cool achievement !

[!NOTE]

About Chirp, as many others firmwares, you need to use a dedicated driver available on [this repository](#).

[!WARNING]

THIS FIRMWARE HAS NO REAL BRAIN. PLEASE USE YOUR OWN. Use this firmware at your own risk (entirely). There is absolutely no guarantee that it will work in any way shape or form on your radio(s), it may even brick your radio(s), in which case, you'd need to buy another radio. Anyway, have fun.

[!CAUTION]

I recommend to backup your eeprom with [k5prog](#) before playing with alternative firmwares. It's a good reflex to have.

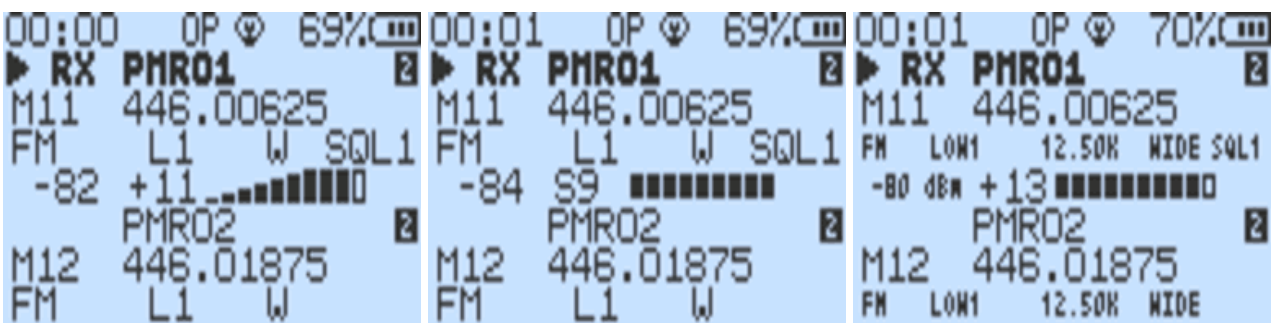
## Additional features

Here's a list of the changes I've made...

- improve default power settings level (Low ~125mW, Mid ~2W and High ~5W),
- improve s-meter (IARU recommendations),
- improve UI:
  - menu index is always visible, even if a menu is selected,
  - s-meter new design (Classic or Tiny),
  - MAIN ONLY screen mode,
  - DUAL and CROSS screen mode,
  - RX blink on VFO RX,
  - RX LED blink,
  - Squelch level and Monitor,
  - Step value,
  - CTCSS or DCS value,
  - KeyLock message,
  - last RX,
  - move `BatTxt` menu from 34/63 to 30/63 (just after `BatSave` menu 29/63),
  - rename `BackLt` to `BLTime`,
  - rename `BltTRX` to `BLTxRx`,
  - and more...
- new menu entries:
  - add `SetLow` menu to set low power (<20mW, 125mW, 250mW, 500mW and 1W),
  - add `SetPtt` menu to set PTT mode (Classic or OnePush),
  - add `SetTot` menu to set TOT alert (Off, Sound, Visual, All),
  - add `SetCtr` menu to set contrast (0 to 15),
  - add `SetInv` menu to set screen in invert mode (Off or On),
  - add `SetEot` menu to set EOT (End Of Transmission) alert (Off, Sound, Visual, All),
  - add `SetMet` menu to set s-meter style (Classic or Tiny),
  - add `SetLck` menu to set what is locked (Keys or Keys + PTT),
  - add `SetGui` menu to set font size on the VFO baseline (Classic or Tiny),
  - rename `BatVol` menu (52/63) to `SysInf`, which displays the firmware version in addition to the battery status,
  - improve `PonMsg` menu,
  - improve `BackLt` menu,
  - improve `TxtOut` menu,

- improve status bar,
  - add SetPtt mode in status bar,
  - change font and bitmaps,
  - move USB icon to left of battery information,
  - add RX and TX timers,
- new actions:
  - SWITCH RxMode,
  - SWITCH PTT,
  - SWITCH WIDE NARROW,
  - 1750Hz,
- new key combinations:
  - add the F + UP or F + DOWN key combination to dynamically change the Squelch level,
  - add the F + Side button 1 or F + Side button 2 key combination to dynamically change the Step,
  - add F + 8 to quickly switch backlight between BLMin and BLMax on demand (this bypass BackLt strategy),
  - add F + 9 to return to BackLt strategy,
  - add long press on MENU button, in \* SCAN mode, to temporarily exclude a memory channel if (not working with \* SCAN ALL).
- many fix:
  - squelch,
  - s-meter,
  - DTMF overlaying,
  - scan list 2 ignored,
  - scan range limit,
  - clean display on startup,
  - and more...
- disabled ENABLEDTMFCALLING,
- disabled SCRAMBLER,
- unlock TX on all bands needs only to be repeat 3 times,
- add PMR 446 F Lock band,
- remove blink and SOS functionality,
- code refactoring and many memory optimization,
- and more...

## Some screenshots



Dual Watch / Classic Smeter

Dual Watch / Tiny Smeter

Dual Watch / Tiny Smeter & GUI



Dual Watch / ScanRange

Main Only / Classic Smeter

FM Broadcast

# Button Functions

Buttons have functions assigned to them, these functions can be activated by either pressing **F #** button first, then the function button (I will call it **F+** call). The other method is by long pressing the function button alone without **F #**. Most buttons replicate the **F+** with long press, but some buttons might have assigned different functions for **F+** and long press.

## Front keypad

### M

- short press - enter menu
- short press while channel/frequency scanning - last found channel is preserved on the screen
- long press while channel scanning - temporarily exclude a memory channel (not working with \* SCAN ALL)
- long press - user programmable in the menu: **M Long**

### EXIT

- short press - exits current menu/function, deletes one digit in an input box
- long press - deletes all input, exits DTMF input box, exits monitor mode, exits **ScnRng**

### UP and DOWN

- Move Upward/Downward in Menu, Frequency, Settings, etc.
- **F+** - increases or decreases the Squelch value.

### 1 BAND

- **F+**
  - in **frequency mode** - switches frequency bands 1-7, there is also band 7+ for >1GHz frequencies
  - in **channel mode** - channel settings are copied to frequency mode
- long press - same

### 2 A/B

- **F+** - switches main VFO upper/lower (marked by **▶**)
- long press - same

### 3 VFO/MR

- **F+** - switch between frequency and channel mode
- long press - same

### 4 FC

- **F+** - turns on frequency and CTCSS copy mode, turn the scan on and start transmitting with the other radio, the frequency and CTCSS code will be detected, you can save those setting with **M** button
- long press - same

### 5 NOAA

- **F+** - turns on spectrum analyzer
- long press
  - in **channel mode** - toggles scan lists that the selected channel is assigned to. You will see **I** and **II** symbols changing on the right side of the channel label
  - in **frequency mode** - activates [scan range function](#)

### 6 H/M/L

- **F+** - toggles power levels for current channel

- long press - same

## 7 VOX

- F+ - turns on/off VOX mode
- long press - same

## 8 R

- F+ - enables the manual backlight management and switches the backlight on or off
- long press - turns on reverse mode for channel that have frequency offset set. It will replace TX frequency with RX frequency.

## 9 Call

- F+ - disables the manual backlight management
- long press - switches current channel to the 1-Call channel set in the radio.

## 0 FM

- F+ - turns on FM radio
- long press - same

## \* SCAN

- short press - enters DTMF input mode
- F+ - turns on CTCSS scanner for current frequency
- long press
  - in **channel mode** - turns on channel scanner
  - in **frequency mode** - turns on frequency scanner (can use [scan range feature](#)).
- When pressed while channel scan is in progress toggles scan lists 1/2/ALL

## F #

- short press - toggles function option
- long press - turns on/off key lock all the keys of the Front keypad

## Side buttons

### PTT

- Push To Talk button. Note that, there are 2 modes : CLASSIC and ONEPUSH (take a look at menu SetPtt 56/63)
  - CLASSIC - PTT works as usual. Press the PTT to start transmitting and release it to stop.
  - ONEPUSH - PTT works like a switch. Press the PTT to start transmitting, and release it whenever you like. The transmission is still active ! Press the PTT again, when you want and release it to stop transmitting. It works like on OpenGD77 (if you know it). No more cramps.
- when this button is used to stop channel/frequency scanning, last found channel is preserved on the screen
- held together with **Function button II** transmits tone 1750Hz
- held together with any of the front keypad buttons transmits DTMF codes

### Side button **1**

- short press - user programmable in the menu: **F1Shrt**
- long press - user programmable in the menu: **F1Long**
- F+ - increases the Step value in VFO mode

## Side button 2

- short press - user programmable in the menu: F2Shrt
- long press - user programmable in the menu: F2Long
- this button can also be used to send tone 1750Hz by holding it together with PTT button
- F+ - decreases the Step value in VFO mode

## External key/microphone

### PTT

- Push To Talk button.
- The PTT on the external microphone works differently than the internal PTT (side) button.
  - When pressing the PTT, the TX waits until no RX signal is received (*observed with Radio-PCB revision V1.4 and OK with V1.6*). Works well when pressing the *internal PTT*.
  - A DTMF-tone (key-press) or 1750Hz-tone (function button) is cut off within a second. Works well when pressing the *internal PTT*.

## Custom button functions

These 3 buttons can have its function changed. To change the function go to menu:

- F1Shrt - side button 1, short press
- F1Long - side button 1, long press
- F2Shrt - side button 2, short press
- F2Long - side button 2, long press
- M Long - menu button, long press

Available functions to link to the above button/presses:

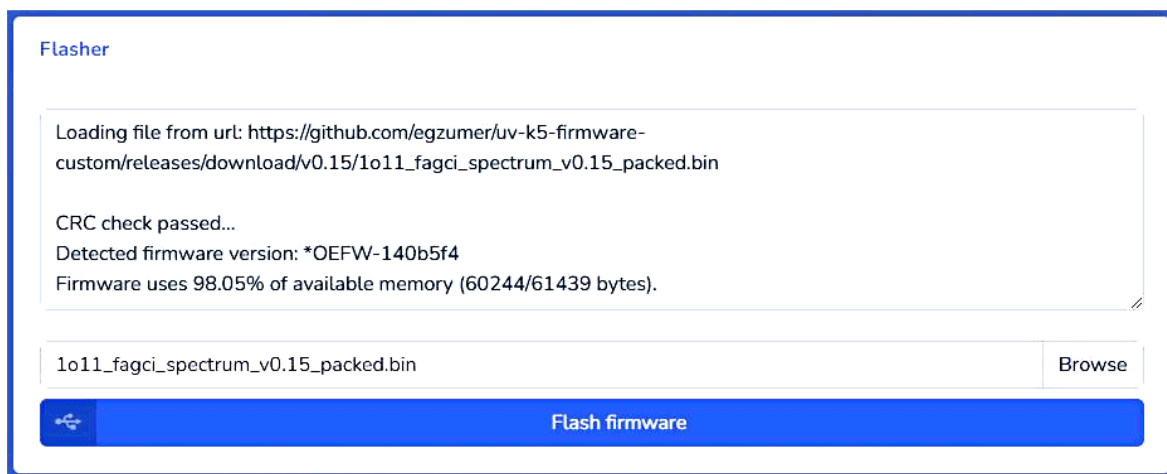
- NONE - no action
- FLASH LIGHT - switch to the next flashlight function: ON / OFF
- POWER - switch radio output power: L (Low) / M (Medium) / H (High)
- MONITOR - switch monitor mode ON / OFF
- SCAN - start channels/frequency scanning
- VOX - turn voice activation function ON / OFF
- FM RADIO - turn FM radio ON / OFF
- 1750Hz - send 1750Hz toneburst
- LOCK KEYPAD - lock / unlock the keypad
- VFO A VFO B - change main VFO to upper/lower
- VFO MEM - change current VFO mode, frequency mode or memory channel mode
- MODE - switch to the next demodulation mode FM / AM / USB
- RX MODE - switch display mode DW / DWR / XB / MO
- MAIN ONLY - switch display mode between [DW / DWR / XB] and MO
- PTT - switch PTT mode CLASSIC / ONEPUSH
- WIDE NARROW - switch between WIDE and NARROW

# Flashing firmware

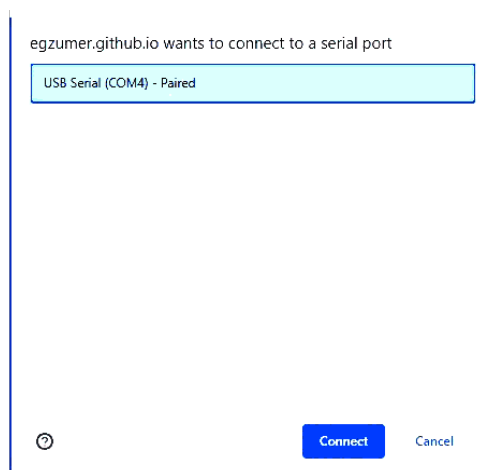
Flashing firmware is possible with a separate program, but can now be done much more easily from your web browser (Only Chromium based browsers such as Chrome, Edge, Opera).

Just goto the page with official released [f4hwn firmware releases](#).

- Use a Baofeng/Kenwood-like USB-2-Serial-cable and connect it to your computer.
- Switch off UV-K5
- Put the UV-K5 into programming mode (press and hold the **PTT** button and turn on the UV-K5, check that the flashlight lights up).
- Then press the programming cable *firmly* into the radio
- Select the latest/desired firmware and look for **FLASH WITH A BROWSER** and the build-in *UV-mod-programming-page* start. Just wait a moment and the firmware is loaded, or select a different file from your PC.



- Press flash firmware and a screen pops-up.
- Select the COM port where the programming-interface is connected.



- Press Connect and the firmware programming starts (White LED starts flashing) and view the progress in the browser-screen
- Just wait ... until

Flashing... 100%  
Successfully flashed firmware.

When finished, disconnect the programming interface and *enjoy a new release version* ;-)

# FM broadcast receiver

The radio is capable of receiving broadcast FM from 76 to 108 MHz. For this it uses a separate chip (BK1080). RDS is not supported. During broadcast reception the active VFO still has priority. This means that any reception on the active VFO will temporarily disable broadcast reception and the radio switches to VFO reception.



At the end of VFO reception the radio switches back to broadcast.

## Basic operations

- **F + 0** **FM** or long press **0** **FM** or [custom button function](#) starts broadcast reception
- **Exit** or using above start command, when radio is in FM radio mode, ends broadcast reception
- **F + VFO/MR** or long press **VFO/MR** changes between VFO or memory channels (VFO-MR-mode)

## Set a frequency in FM-VFO mode

Simply typing a frequency sets it to receive. Resolution is 100 kHz so entering 929 would tune to 92.9 MHz. Use arrow keys to change in 100 kHz steps.

## Store in memory from FM-VFO mode

Pressing **M** in VFO mode allows to store the current frequency in a memory channel. Use arrow keys to select memory, confirm with **M**. There are 20 memories available.

## Select a memory

In MR-mode entering **01.. 20** selects a memory channel. Use **UP/DOWN** to step a memory channel up or down.

## Delete a stored memory

In MR-mode pressing **M** allows to delete that memory channel.

## Scanning for stations from FM-VFO

### Auto scan

Start with **F + \* Scan** or long press **\* Scan**. The radio scans for stations and stores the first 20 stations in memory. Scanning starts at the low side of the band. Initiating auto-scan will delete previously stored channels. **Exit** ends autoscan.

### Manual scan

Short press **\* Scan** starts manual scan. The radio scans from the current frequency up until a station is received. You can continue scanning in any direction using arrow keys. **Exit** stops scanmode.



### 3 Button functions

- 1 BAND - switch bands (frequency ranges)
- 3 VFO/MR - switch frequency/memory mode
- \* SCAN
  - short press - start single scan
  - long press - start auto scan (all memory channels will be deleted and replaced with scan result)

# Menu operation

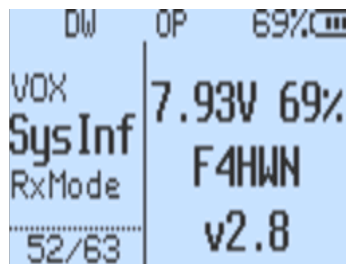
The menu can be accessed with the **M** button (*short press*).

Once in the main menu, the menu items will be displayed on the left-hand side of the screen. The currently selected menu item will be highlighted and current value for that menu item will be shown on the right. Also, at the bottom left side a number of the menu item will be shown, ranging from 01 to the highest number.

To find the menu item to access, the **UP** and **DOWN** arrow buttons may be used, or the **menu item number** (see lists below) may be entered on the numeric keypad. For instance, to access the **SysInf** settings, a number 52 can be entered on the keypad.

Once the desired menu item is highlighted, pressing the **M** button will enter into that menu item.

Once the menu item is selected, pressing the **UP** and **DOWN** arrow buttons will adjust the setting for that menu item. To confirm the selection, press the **M** button. To cancel the selection, press the **EXIT** key.



## Main menu

[!NOTE]

Not all these function are available on all the firmwares. In fact, each of any firmware available is a subset of these list.

The number in front of the menu-item-description is a **menu item number** that can be used for quick selection

1. **Step** - step of the frequency (in kHz), **UP** and **DOWN** buttons change frequency by this value, also you can only set a frequency that is multiple of half of this value.
2. **Power** - radio output power (LOW 1 / LOW 2 / LOW 3 / LOW 4 / LOW 5 / MID / HIGH / USER). Note that USER power can be tune via the SetPwr menu (57/66).
3. **RxDcs** - receiver Digital-Coded Squelch, if you enable this, squelch will only unlock if this code is being received. You can start a DCS/CTCSS scan while you are in this menu option by pressing **\* SCAN** button
4. **RxCTCS** - receiver Continuous Tone-Coded Squelch System, squelch will only unlock if this code is being received. You can start a DCS/CTCSS scan while you are in this menu option by pressing **\* SCAN** button
5. **TxDcs** - transmitter Digital-Coded Squelch, radio will send given code while transmitting
6. **TxCTCS** - transmitter Continuous Tone-Coded Squelch System, radio will send given code while transmitting
7. **TxODir** - transmitter frequency offset direction
8. **TxOffs** - transmitter frequency offset value
9. **W/N** - bandwidth used by transceiver
  - **WIDE** - 25kHz
  - **NARROW** - 12.5kHz
10. **BusyCL** - busy channel lockout, blocks radio from transmitting when signal is being received
11. **Compnd** - compander (compressor / expander), allows signals with a large dynamic range to be transmitted over facilities that have a smaller dynamic range capability, improves audio quality, both radios should use this option
12. **Mode** - demodulation mode, default is FM, AM / USB can be used for listening only
13. **TXLock** - enable or disable the channel's transmit mode (if it is not covered by the FLock plan)
14. **ScAdd1** - add channel to scan list 1
15. **ScAdd2** - add channel to scan list 2
16. **ScAdd3** - add channel to scan list 3
17. **ChSave** - save current setting to a memory channel
18. **ChDele** - delete memory channel

19. **ChName** - modify memory channel name
  - Use **UP** and **DOWN** buttons to select a channel to edit
  - Press the **M** button again to enter edit name mode
  - Use **UP** and **DOWN** buttons or digits (0 ~ 9) to cycle the letters etc.
  - Press the **M** button to move to the next character position
  - Repeat above two steps till you reach the end
  - When "Sure?" pops up, press **M** button to save, or Exit to cancel
  - Press Exit at any time to cancel the edit and return to main menu.
20. **SList** - selects which channel is used by memory channel scanner
21. **SList1** - channels assigned to scan list 1
22. **SList2** - channels assigned to scan list 2
23. **SList3** - channels assigned to scan list 3
24. **ScnRev** - scan resume mode
  - **CARRIER** - after signal disappears, pause for [250 milliseconds to 20 seconds] before resuming scanning
  - **STOP** - after receiving a signal, stop the scan
  - **TIMEOUT** - resuming scanning after [5 seconds to 2 minutes] pause
25. **F1Shrt** - **SIDE BUTTON 1** short press function
26. **F1Long** - **SIDE BUTTON 1** long press function
27. **F2Shrt** - **SIDE BUTTON 2** short press function
28. **F2Long** - **SIDE BUTTON 2** long press function
29. **M Long** - **M** button long press function
30. **KeyLck** - auto keypad lock option (OFF or 15 seconds to 10 minutes before automatic keypad locking)
31. **TxTOut** - max transmission time limit
32. **BatSav** - battery save option, a rate between active time and sleep time (OFF, 1:1 to 1:5)
33. **BatTxt** - additional battery value on the status bar in % or volts
34. **Mic** - microphone sensitivity
35. **MicBar** - microphone bar that appears while transmitting
36. **ChDisp** - channel display style
37. **POnMsg** - power on message
38. **BLTime** - backlight duration
39. **BLMin** - minimal backlight brightness, when the screen backlight turns OFF it will go dim to this value
40. **BLMax** - maximal backlight brightness, when the screen backlight turns ON it will turn bright to this value
41. **BLTxRx** - backlight activation on TX or RX
42. **Beep** - keypad press beep sound
43. **Roger** - roger beep at the end of transmission
44. **STE** - squelch tail eliminator, eliminates noise at the end of a transmission
45. **RP STE** - repeater squelch tail eliminator
46. **1 Call** - one key call channel, lets you quickly switch to the channel with **9 Call** button
47. **UPCode** - DTMF code that is sent at the beginning of transmission
48. **DWCode** - DTMF code that is sent at the end of a transmission
49. **PTT ID** - sets if **UPCode** and/or **DWCode** should be transmitted
50. **D ST** - DTMF side tone switch, lets you hear transmitted tones in the radio speaker
51. **D PreL** - DTMF pre-load time
52. **D Live** - displays DTMF codes received by radio in the middle of the screen
53. **VOX** - voice TX activation sensitivity level VOX Setting
54. **SysInf** - battery voltage and percentage
55. **RxMode** - sets how the upper and lower frequency is used
  - **MAIN ONLY** - always transmits and listens on the main frequency (**MO**)
  - **DUAL RX RESPOND** - listens to both frequencies, if signal is received on the secondary frequency it locks to it for a couple of seconds so you can respond to the call (**DWR**)
  - **CROSS BAND** - always transmits on the primary and listens on the secondary frequency (**XB**)
  - **MAIN TX DUAL RX** - always transmits on the primary, listens to both (**DW**)
56. **SqL** - squelch sensitivity level
57. **SetPower** - sets USER Power
  - **LOW 1** (< ~20mW)
  - **LOW 2** (~125 mW)
  - **LOW 3** (~250 mW)
  - **LOW 4** (~500 mW, upper limit under PMR band...)

- LOW 5 (~1W)
  - MID (~2W)
  - HIGH (~5W)
58. SetPTT - sets PTT usage
    - CLASSIC
    - ONEPUSH
  59. SetTOT - sets TOT alert
    - OFF
    - SOUND
    - VISUAL
    - ALL (*VISUAL + SOUND*)
  60. SetEOT - sets EOT alert (useful for pauses between 2 transmissions)
    - OFF
    - SOUND
    - VISUAL
    - ALL (*VISUAL + SOUND*)
  61. SetCtr - sets LCD contrast
  62. SetInv - sets LCD inverted (best for night vision)
  63. SetLck - sets keyboard lock usage
    - KEYS
    - KEYS + PTT (to prevent accidental transmission)
  64. SetMet - sets S-Meter design
    - CLASSIC
    - TINY (as on the Yeasu FT4 or FT-65, for example)
  65. SetGUI - sets GUI design
    - CLASSIC (big font, less informations)
    - TINY (small font, more informations)
  66. SetTmr - sets if RX and TX timers are displayed or not
  67. SetOff - sets the delay before the transceiver goes into deep sleep (OFF or 1 minute to 2 hours)
  68. SetNFM - sets Narrow FM to Narrow or Narrower

## Hidden menu

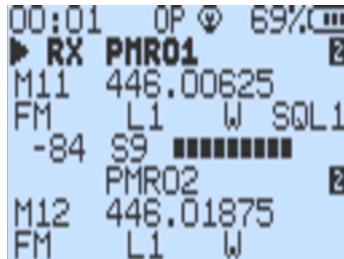
Hidden menu is activated by holding PTT + SIDE BUTTON 1 while turning on the radio and than Release All Keys.

1. F Lock - sets the TX frequency band plan.
  - DEFAULT+ (137-174, 400-470) - allows TX on default bands, plus options Tx 200, Tx 350, Tx 500
  - FCC HAM (144-148, 420-450)
  - CA HAM (144-148, 430-450)
  - CE HAM (144-146, 430-440)
  - GB HAM (144-148, 430-440)
  - (137-174, 400-430)
  - (137-174, 400-438)
  - DISABLE ALL - disables TX on all frequencies
  - UNLOCK ALL - enables TX on all bands (it has additional lock, read a wiki on [how to turn that on](#))
2. 350 En - enables RX on 350MHz
3. BatCal - battery calibration, measure the voltage on the back of the radio, and adjust the value in the menu accordingly
4. BatTyp - battery type, 1600mAh, 2200mAh and 3500mAh battery has very different discharge curve, this is used to calculate battery level percentage
5. Reset - resets radio configuration settings
  - VFO - removes only channel settings
  - ALL - resets all radio settings

# Radio operation

Radio display is split into upper VFO and lower VFO. You can change upper/lower selection by pressing **F + 2 A/B** (or by long press **2 A/B**).

Each VFO can operate independently of each other function in either frequency or channel mode. To switch modes select the desired VFO and press **F + 3 VFO/MR** (or long press **3 VFO/MR**).



In the **frequency mode** you manually type in the frequency with the keypad. You can also switch different options for that VFO in the menu (first 13 menu entries). If you setup the VFO, the settings can be saved to a memory channel by going into the menu **ChSave** and choosing the memory channel the VFO should be saved into.

In the **channel mode** you can switch between saved memory channels. Memory channels can be added manually as mentioned before or with a computer with **CHIRP**.



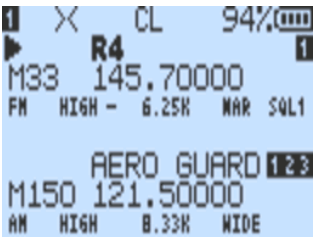

[WARNING]

Do not use Quansheng CPS it overwrites custom settings.

## Status bar

At the top of the screen, on the first line, appears the status bar. It displays many information. Here are some examples:

Screenshot	Description
	<p>PS means PowerSave is activated, DW means RxMode is set to MAIN TX / DUAL RX, UX means Vox is activated, OP means PTT is set to ONEPUSH, the lock icon means the keypad is locked and you see the battery percentage.</p>
	<p>PS means PowerSave is activated, DW means RxMode is set to MAIN TX / DUAL RX, UX means Vox is activated, CL means PTT is set to CLASSIC, the lock icon means the keypad is locked and you see the battery voltage.</p>
	<p>PS means PowerSave is activated, MO means RxMode is set to MAIN ONLY, OP means PTT is set to ONEPUSH, the F icon in reverse video means the F function key is activated and you see the battery percentage.</p>

Screenshot	Description
	MO means RxMode is set to MAIN ONLY, OP means PTT is set to ONEPUSH, the Light icon means the manual Backlight control is activated, and you see the battery percentage.
	The RX timer on the left indicates how long it has been since you received a signal, OP means PTT is set to ONEPUSH, the Light icon means the manual Backlight control is activated and you see the battery percentage.
	The small 1 in reverse video and >< means you're currently scanning LIST 1, OP means PTT is set to ONEPUSH, the Light icon means the manual Backlight control is activated, and you see the battery percentage.
	The infinit icon means you're currently scanning ALL channels, MO means RxMode is set to MAIN ONLY, OP means PTT is set to ONEPUSH, the Light icon means the manual Backlight control is activated and you see the battery percentage.

[!NOTE]

About RxMode, MO means MAIN ONLY, DW means MAIN TX / DUAL RX, DWR means DUAL RX RESPOND and XB means CROSS BAND.

## F Lock and TXLock menus

In the past, there were a few band plans in the F Lock menu to meet various requests: PMR 446, FRS/GMRS/MURS, etc. However, adding new F Lock options always took up a lot of memory: new options in the F Lock menu, storing frequencies (for specialists, these are uint32\_t each time, so they are very memory-consuming), etc.

Now, it must be recognized that it was complicated, if not impossible, to offer band plans that could cover and meet all expectations. There are too many variations from one country to another. Additionally, nothing is planned for combining multiple frequency plans from the F Lock menu. For example, opening both the PMR 446 and LPD bands. In summary, F Lock is too limited and not scalable.

Here is the solution:

1. Select the most suitable band plan from the F Lock menu. For example, if you have a callsign and live in Europe, select CE HAM. If you don't have a callsign and are just an SWL, select DISABLE ALL, which is safer.
2. If you still want to transmit on a memory channel that isn't open by the band plan (e.g., PMR 446, FRS/GMRS/MURS, Freenet, etc.), go to the TXLock menu and choose OFF. This will create an exception and allow you to transmit on this channel.

In a nutshell :

- In memory channel or VFO mode, if the frequency is inside the band plan selected in FLock, you can transmit.
- In memory channel or VFO mode, if the frequency is outside the band plan selected in FLock,
  - you can transmit only if TXLock is OFF
  - you cannot transmit if TXLock is ON

Note that if a memory channel or VFO is outside the band plan and TXLock is ON, there will be a small padlock to the left of the name.

## SetOff menu

The SetOff menu allows you to configure a timeout before your radio enters sleep mode. This delay can be set between 1 minute and 2 hours. If the SetOff option is set to OFF, the sleep mode will be disabled.

For example, if you set the delay to 5 minutes and during this time there is:

- no reception,
- no transmission,
- no button press,

then your radio will automatically enter sleep mode. You will be notified 30 seconds before, with a screen blinking.

Note that sleep mode will be activated, even if you are in the scanning phase (without any reception, of course).

Once in sleep mode:

- the screen will be completely off,
- the red LED at the base of the antenna will blink,
- the BK4819 module will go into deep sleep mode, waking up periodically every:
  - 2 seconds if BatSav is set to 1:1
  - 4 seconds if BatSav is set to 1:2
  - 6 seconds if BatSav is set to 1:3
  - 8 seconds if BatSav is set to 1:4
  - 10 seconds if BatSav is set to 1:5

To exit sleep mode, you simply need to:

- receive a signal during the BK4819 periodic wake-up phase,
- initiate a transmission by pressing the PTT button,
- or press any other button.

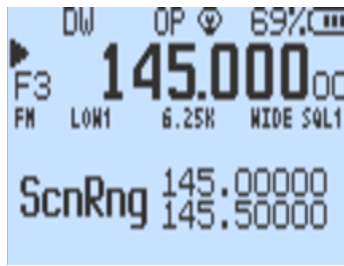
As an example, I tested the sleep mode on two K5(8) radios with calibrated and fully charged batteries, using the same settings, frequencies, mode (DWR) and BatSav set to 1:5. The only difference was that one of the radios had sleep mode activated, while the other did not. After 36 hours of operation, the radio without sleep mode had only 20% battery remaining, while the one with sleep mode still had 60% battery.

## Frequency scanning

To start a frequency scan switch a VFO in frequency mode. Set a start frequency. Set a frequency step (menu [Step](#)). Start scanning with [custom button scan function](#) or by long pressing the [\\* Scan](#) button.

### Scan frequency range function

- switch to frequency mode
- set upper and lower VFO frequencies to scan range boundaries
- long-press [5 NOAA](#), [ScnRng](#) label should show up
- start scan with long-press [\\* Scan](#)
- it will scan between given boundaries
- long-press [5 NOAA](#) or [EXIT](#), or switch VFOs to exit [ScnRng](#) mode



ScnRng function is also supported by spectrum analyzer. If you activated the function just start [spectrum analyzer](#).

## Memory channels scanning

To scan channels saved in the radio memory switch the VFO to Memory mode.

The radio has 3 scanning lists. Each memory-channel can belong to 0, 1, 2 or 3 lists. To add / delete a channel to / from a list switch current VFO to desired channel and go to a menu ScAdd1, ScAdd2 or ScAdd3, alternatively you can long press 5 NOAA button, you will see icons 1, 2, 12, 3, 13, 23, 123, 0 toggling on and off on the right side of the channel label.

If you set up the scanning lists you can start scanning by using [custom button scan function](#) or by long pressing \* Scan button. If you press the function button or long press \* Scan while scanning, the scanning list will be switched, you will see corresponding icon on the top left of the screen: 0, 1, 2, 3, 123 or ALL. Active scanning list can also be changed with menu SList. You can view scan lists and its channels by going to menu: SList1, SList2 and SList3.

Note that, during scan, you can change scan list by toggle key 0 (List 0), 1 (List 1), 2 (List 2), 3 (List 3), 4 (List 123), 5 (ALL).

Finally, you can exclude a memory channel during the scan with a long press on M button.

## Common frequency

### Channel scanning features

You can change the scan direction while scanning with UP and DOWN buttons.

The scan can be stopped with the EXIT button, the search result will be ignored and frequency / channel will return to the one that was set before scan begun. Alternatively you can stop the scan with PTT or MENU button in which case the frequency / channel will be set to the last channel where transmission was found.

## Single frequency scanning

### Frequency copy, DCS/CTCSS

This function will allow you to find out and copy frequency and coding settings. The frequency search will only work for strong signals. The transmitting radio has to be close. To start a frequency copy (FC) function use 4 FC function button. Scanner screen will open. Push and hold a PTT button on the other radio. Wait couple of seconds until frequency and code (if used) appears on the screen. The settings can be saved with the MENU button. The settings will be save either to a channel or the main VFO, depending in which mode you started the scan.

You can also search only the DCS / CTCSS code for a frequency set on the main VFO. Choose desired frequency or channel and press F + \* SCAN. The same screen will appear, but the frequency search will be omitted, instead the frequency of the main VFO will be used. Wait for a signal to appear or press the PTT on the other radio. It takes 1-2sec for the code to be found. The save procedure is the same as above.

There is another option of DCS / CTCSS code scanning. Choose desired frequency or a channel. Go to the menu RxDCS or RxCTCS. Enter the menu option and press \* SCAN button. A SCAN label will appear. Wait for a radio signal or press the PTT button on the other radio. When code is found the SCAN label will disappear, to save confirm the option with the MENU button. It doesn't matter on which of the two menu items you start the scan. Both DCS and CTCSS will always be found, and the menu entry will be changed to the correct one.



## 1750 Hz toneburst for repeater access

When the PTT is pressed, the 1750 Hz can be activated by pressing [Side button 2](#).

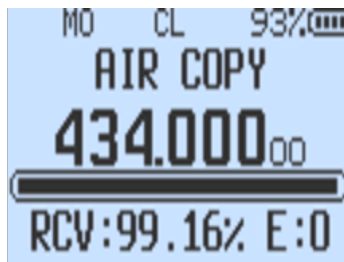
## Air Copy

Air Copy is activated by holding PTT + SIDE BUTTON [2](#) while turning on the radio and then Release All Keys.

This feature allows you to reproduce memory channels from one radio (source) to another (target) using FSK modulation. By default, transmission takes place on the LPD band (434.000 MHz) at very low power (a few milliwatts).

On the target radio, press [EXIT](#) key to start reception. On the source radio, press the [M](#) key to start transmission.

Wait for 120 packets to be sent from the source to the target. You may see a few packets lost, but this is not really important. Even if you lose 3 packets, that's a 2.5% loss. Out of 200 memory channels, this means that 195 will have been replicated correctly. It's often enough to repeat the operation a second time to have 100% of the channels replicated.



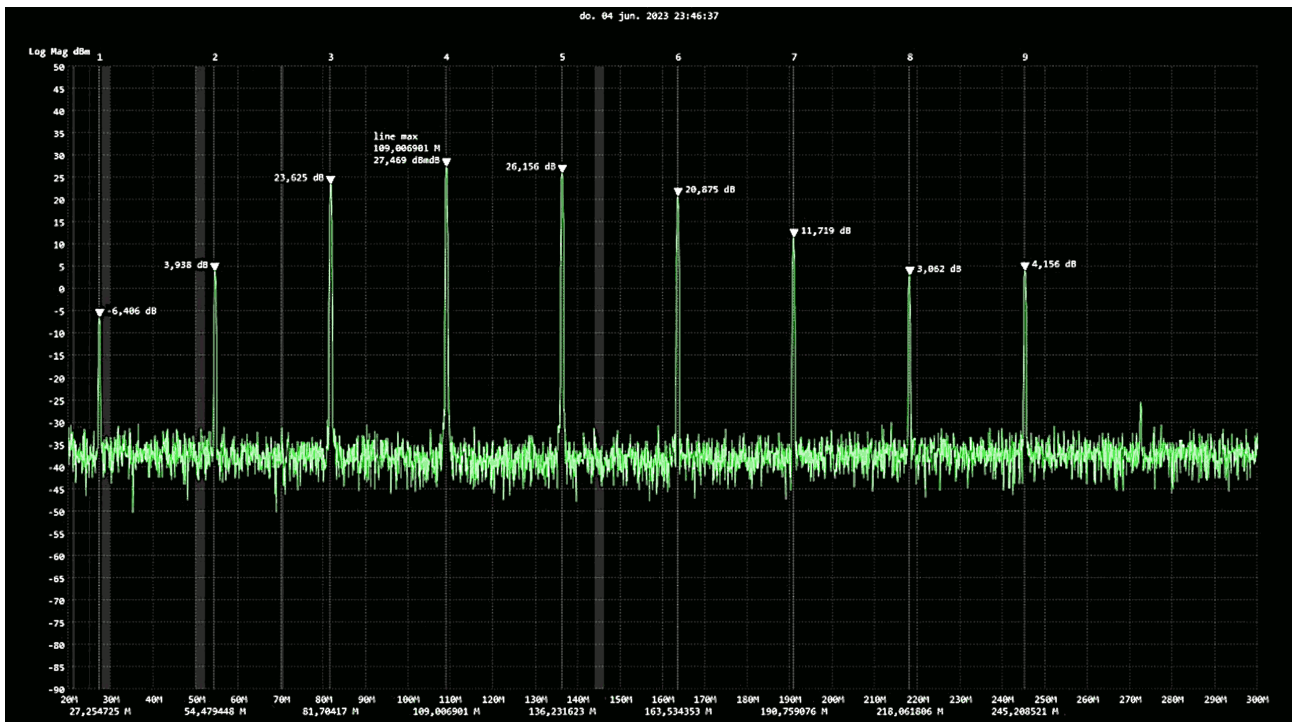
## TX on all bands

[!WARNING]

This modification is UNTESTED and is for RESEARCH PURPOSES ONLY, to explore the capabilities of the device and its chipset. DO NOT transmit on illegal frequencies. DO use a dummy load. The author(s) and contributor(s) of this repository are NOT liable for any damages, litigation, or other consequences of the misuse of this research firmware and do not accept any culpability. By installing any firmware from this repository, you accept full responsibility for any consequences that may arise and waive the right to pursue legal action against the author(s).

This option won't give you ability to transmit in any other modulation than FM, this is a hardware limitation. Switching to AM or SSB only switches AF audio output mode of a RF IC. It doesn't switch the whole IC into AM / SSB mode. This is for listening only. This firmware is also built with additional lock that blocks TX when AM or SSB is on.

As an example against using this for actual communications, consider the following chart for transmission power for a transmission at 27.254MHz:



#	Frequency	Power	dB (*)
1	27.254 MHz	228 uW	-7
2	54 Mhz	2.4 mW	5
3	81 Mhz	230 mW	24
4	109 Mhz	558 mW	27
5	136 Mhz	412 mW	25
6	163 Mhz	122 mW	20
7	190 Mhz	14.8 mW	11
8	218 Mhz	2 mW	4
9	245 Mhz	2.6 mW	3
10	272 Mhz	--	-25

Source: [Tunas1337](https://tunas1337.com)

[!NOTE]

(\*) Amplification and attenuation approximately reported using the scale on the image, **not** from the author of the measures.

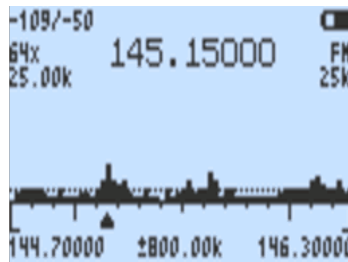
## How to unlock TX on all bands

1. Go to [hidden menu](#)
2. Enter menu F-Lock
3. Choose option UNLOCK ALL
4. Repeat steps 2-3 **3 times**. Do it carefully, if you confirm any other option in the process counter will get zeroed and you will have to repeat that **3 times** more.

## Spectrum analyzer

Press **F + 5 NOAA** to turn on the **Spectrum analyzer**.

The current **VF0**/Memory frequency will be the **center frequency** of the spectrum sweep



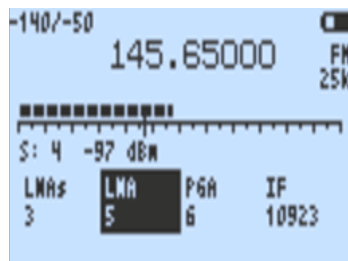
Spectrum analyzer can also be used with [ScnRng mode](#)

[!NOTE] in this mode blacklist is limited to 15 frequencies

## Button functions

- **1 / 7** - increases/decreases frequency step between consecutive bars
- **4** - toggles the number of bars (channels) in the graph
- **2 / 8** - increases/decreases frequency step size by which the graph is scrolled with UP/DOWN buttons
- **5** - shows a frequency input box for lower sweep frequency (value in **MHz**, \* - decimal point)
- **3 / 9** - increases/decreases maximum dB value (vertical scale)
- **6** - toggles receiver bandwidth
- **\* / F** - increases/decreases squelch level
- **0** - toggles modulation type (FM / AM / USB)
- Side button **1** - excludes current frequency from the spectrum scan
- Side button **2** - toggles backlight
- **EXIT** - exits to a previous screen/function
- **PTT** - switches screen to **detail monitoring** of last received frequency (*see below*)

## Detail Monitor screen



## Button functions

- **M** - Scrolls through the parameters displayed at the bottom of the screen which can be adjusted with **UP** and **DOWN** buttons
  - **LNA**s - Short Low Noise Amplifier
  - **LNA** - Low Noise Amplifier
  - **PGA** - Programmable Gain Amplifier
  - **IF** - Intermediate Frequency
- **EXIT** - exits to the previous screen of the spectrum analyzer

## Documentation

Instruction for the spectrum analyzer:

- [spectrum-analyzer-guide.pdf](#)

Source: [egzumer](#)