

# QROlle II - Users manual

*Incl. CPU programming and rig control*



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## 1 Introduction

The QRolle II is a home-brew 6 band shortwave QRP-transceiver.

The bands covered are 17, 20, 30, 40, 80 and 160 meters. Transverter use is possible for other bands.

The modes are CW and SSB with output power of 10W.

The rig is controlled by a CPU and can also be controlled remotely through a serial RS232 and/or USB interface. The CPU is an ATMEL ARM processor with software that can be updated on the board through JTAG or the serial interfaces.

The designer of the analogue part is SM6DJH Olof Holmstrand and for the digital part SM5DEH Nils Söderman. Work has been under way starting around 2007 after the closing down of the first QRolle-project.

The project is the result of close cooperation between SM0JZT Tilman D. Thulesius and the designers.

SM4DHN Lars-Bertil Karlsson and SM4OUX Lars Olsson provide shipments of kits.

The Analogue part is on two separate boards (called A and B) that are sandwiched together around an aluminium sheet that doubles as a cooling media for the voltage regulator and RF output transistor. A separate board called C consists of the DDS circuit and interfacing circuitry between the analogue and digital boards.

Finally the digital board (called D) is mounted behind the front panel and holds the CPU, supporting circuitry, digital LCD display, various buttons and a knob for the user interface.

All of the electronics mentioned above are described in separate documentation, so only mentioned briefly here.

## 2 Front panel

The front panel is the main users interface. The QROlle II is controlled by a microprocessor that sits behind the front panel. The user interface is a LCD-display and a number of buttons, all controlled by software. So the user interface may be changed with the software.



### 2.1 LCD Display information

The display used is a 20 x 2 character backlit standard component. Information given is presented, fully software controlled.

#### 2.1.1 Frequency

Alternative	Standard display	Split	RIT
First row	<b>A 7000.00 (rx/tx)</b>	<b>A 7000.00 (rx)</b>	<b>A 7000.00</b>
Second row	<b>B 7010.00</b>	<b>S 7010.00 (tx)</b>	<b>Rit +/- .102Hz</b>

The displayed frequency is given in the alternatives above.

The standard display show the set frequency for the VFO:s A and B. Here it is always the VFO in the first row that is the one used for reception and transmission.

When the rig is set in “Split mode” the frequency given in first row is for reception and the one in second row for transmission.

When the rig is in “RIT mode” the offset (+ or -) is given in the second row.

#### 2.1.2 Settings display

Up in the right hand corner S-meter level and power output is given in a bar graph.

In the right hand part of the second row status settings are given for:

- Filter used – **W**ide or **N**arrow
- Pre Amplifier – **P** on or off
- Mode setting – **L**SB, **U**SB or **C**W
- Speech Compressor - **C** on or off

## 2.2 Buttons and controls

The front panel as 8 push buttons and one encoder dial with a push button function.

To the right of the LCD display there is a dual colour LED to display reception and transmission status:

Green for reception and red for transmission

A yellowish colour indicates a CPU error.

The push buttons, having dual functions, controls the software.

A quick press of a button will function given above the buttons.

A longer press, more than half a second, of a button will give the function given below the buttons.

### 2.2.1 Main functions - left to right

- **FLTR** – Toggle of filter used. The one used is presented in display with **Wide** or **Narrow**
- **PRE** – Toggle on and off of the pre amplifier. Status given in display with a **P** when on.
- **MD** – Used to toggle between modes. Shown in display as **Lsb**, **UsB** or **CW**.
- **RIT** – Toggles on and off of the RIT function. Status and setting shown in display on second row. Setting of offset is done with main dial.
- **A/B** – Toggles between usage of VFO A or B as being used as main VFO.
- **B DOWN** – selects next band down in round robin function.
- **STEP** – Selects between step rate of VFO dial. A cursor below the 100Hz or 10Hz digit indicates the step rate.
- **B UP** – Selects next band up in round robin function.

### 2.2.2 Sub functions - left to right

- **VOLT IN** – Displays the input voltage to the rig during 10 seconds up on the left hand side in the LCD display.
- **COMP** – Toggles usage of the speech compressor. Status given in display with a **C**.
- **MENU** – Opens the configuration menu of the rig. Functionality described in X.
- **TF-SET** – The frequency of the VFO selected for transmission in split mode is set with this button and the main dial. When setting the frequency the VFO is temporarily used for receptions. This so that the operator can listen in on the frequency where transmission is going to be done. Very handy to fine-tune in split mode.
- **SPLIT** – When activating split mode, the frequency in the current VFO for reception is copied in the VFO for transmission. The VFO frequency for transmission is shown on the second row starting with a “S” for “Split”. See Function “TF-SET” that is used to set the transmission frequency.
- **RF PWR** – This button is used together with the main dial to set the output power level from 1 to 10 watts. The bar graph up on the right hand side in the display indicates the level.
- **AF GAIN** – This button is used together with the main dial to set the AF gain. The bar graph up on the right hand side in the display indicates the level.
- **BUG SPEED** – This button is used together with the main dial to set the bug speed of the built in bug. The speed is shown in B/Second up on the right hand side in the display.

### 2.2.3 Main dial

The main dial used primarily to change the frequency of the rig. By pushing the dial and at the same time turning it the frequency is changed in 10kHz increments. A cursor below the 10kHz character indicates.

The main dial is also used for changing various levels like RF Power, AF gain and BUG speed. In menu mode the navigations and setting changes are done with the main dial.

## 2.3 Menu mode

In the menu mode, various settings can be undertaken that are not used that often. Starting the menu mode is done by enabling the sub function “MENU” with the third button from left.

Navigating through the menu items is done using either the main dial or pressing the buttons “pre” for up and “RIT” for down. When pressing “A/B” you are able to change setting.

Settings are changed with the main dial. Pressing the main dial is done to confirm a setting.

The menu items are the following:

- **CW Break-in Delay** – Is used to change the CW break in delay. Variable setting in ms.
- **DDS Reference Freqv.** – This is for to calibrate the rig, by giving the DDS reference oscillator frequency given by doing a accurate measurement. Changing the frequency is done with the main dial.
- **DVM value adjust** – Used to calibrate the “VOLT IN” display.
- **Keying mode** – Iambic mode A or B, normal bug and straight key can be selected. The key input connector on the back is used for all options.
- **Program compiled** – Gives information of the currently installed software. Version and date.
- **Reset memory to QROlle factory default** – Used to reset all setting memory.
- **Smeter Calibration** – Set value for S9
- **Smeter display** – Set the graphic mode to graphic or for numerical value.
- **Set Bug polarity** - Is used to swap polarity for the manipulator depending of left or right hand use of manipulator.
- **Set Baud rate** – Is used to set baud rate for rig the RS232 interface.
- **Set button sound** – Is used to change ton pitch for the sound.
- **Voltages** – Gives measured voltages given by the internal voltage regulators for 9, 5 and 3.3V.

## 3 Back panel

All the back connectors are on the back panel. Main reason is that all the connectors are analogue and to eliminate interference from the digital board they are all on the aback close to the analogue boards.



### 3.1 Pin out of the connectors

From top left:

**PTT:** 3.5mm Connector used for a separate PTT-keyer.

**MIC.** 3.5mm. Tip to be connected to mic and ring for PTT. You can parallel-connect the PTT. Connect a switching-diode to the PTT -wire if you use a mic from a stereo-headphone set so that you do not disable the mic-signal when hitting the PTT.

**Phone.** 3.5mm stereo with switch to connect a external speaker rather than the internal speaker. Tip and ring connected together in parallel so that connect a headset.

**ON/OFF.** On off switch for the QROlle II

**13.5V.** Power connector 5.5mm with 2.5 mm pin. Use external fuse to protect the power supply/rig. The rig has a diode built in to protect for polarity failure (See schematics)

**ANT:** BNC for antenna

**KEY:** 3.5mm stereo. Here you can connect your manipulator or straight key. Choose the type of key function from the menu.

**ACC:** 9 pole D-sub. Here you can connect accessories like a transverter. See the schematics for pins available for transverter.

## 4 Serial interfacing to QROlle II

The QROlle has three serial interfaces to the outside world. There are two RS232 interfaces and one USB interface.

One of the RS232-interfaces is used to control the QROlle using CAT-commands for remote control. The other can be used to download software to the QROlle.

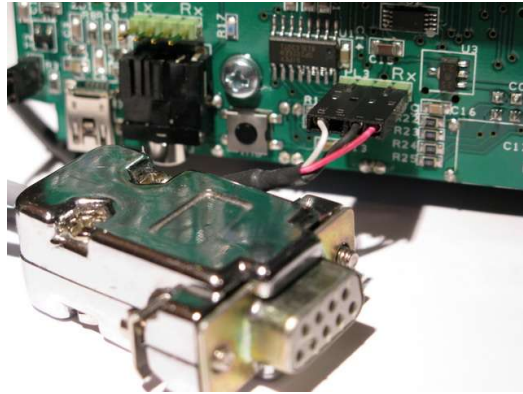
The USB-interface is an alternative and faster interface for CAT-control.

### 4.1 Software upload to CPU - Serial

It is possible to install new software to your QROlle using a serial RS232-interface. This is suitable if you have not or do not want to install the USB definition files for programming.

The load of software is done using a RS232 serial cable. The cable is connected between the PC and the Serial interface on the QROlle D-card. The following is needed for the software upload:

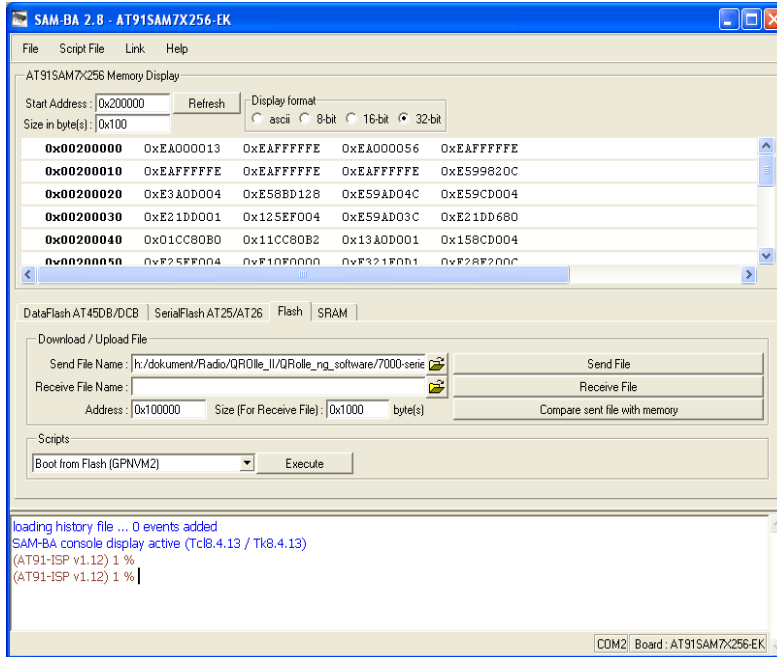
1. Suitable serial-cable. In the picture to the right you can see that a “audio-cable” from a PC:s CD-ROM-drive has been used. The red and white wires have been connected to a 9 pin D-sub-connector. TX to pin 2, RX to pin 3 and ground wire connected to pin 5 on the D-sub connector.
2. The Software “SAM-BA” installed in PC
3. The installation file is named “Install AT91\_ISP v1.12.exe” and can be downloaded from the ATMEL homepage ([www.atmel.com](http://www.atmel.com)).
4. The software file to upload to the QROlle SMART front
5. The name of the file is typically something like “main 7S017.bin”. Put the file in a place on your PC:s hard drive where you can easily find it later on in the installation process. Preferably on your PC:s “desktop”.



#### 4.1.1 Installation process - serial

1. To install the software on to your Smart-Front CPU, the CPU needs to be put in “boot loader-mode”. This is done with the rig powered on, by pressing the “Erase button” on the board next to the 3.5mm jack serial interface for about one second.
2. Have the serial cable connected between the Smart front and your pc.
3. Restart your QROlle, you will now see a display with rectangular “characters” written on the upper row.
4. NOW, start the software SAM-BA
5. A small windows appears (See right), herein you are to chose the following items: “COM2” This is the serial interface to used for programming (can be different in your PC) . And AT91SAM7X256-EK (256 in the end, is for the memory size in the CPU, can also be 128).
6. Click “Connect” so that the software sets up communication to the CPU and a new window appears. (See below) BEFORE you hit the “Send File” button you have to tell the SAM-BA software what file to send. Open the map-icon to the left of the “Send File” button and navigate to the file (You probably have it on your PC:s desktop).





7. Now, you click the “Send File” button.

8. The question “Do you want to lock... “ is to be answered with “No”.



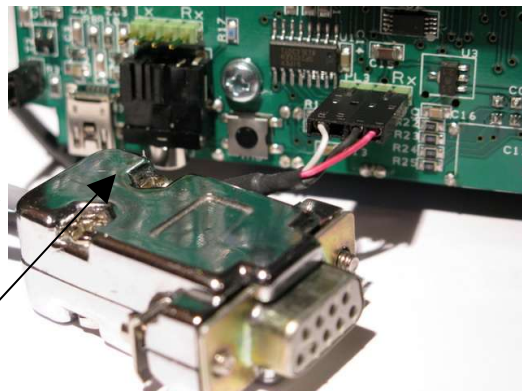
9. When the “**(AT91-ISP v1.12) 1 %**”-prompt is back you are to click the “Execute”-button to run the “**Boot from Flash (GPNVM2)**” -script at CPU restart. Wait for “**-I- GPNVM2 set**” to show at the prompt before closing the SAM-BA software.

10. If there are no error messages and you have followed the steps, the software should now have been transferred to your QROlle ready for use. All you have to do is to restart the QROlle. On the QROlle display bottom line you will find the software version information.

## 4.2 RS232-port for control of QROlle

To the right of the USB-port you have a RS232 connector (3.5mm connector) that can be used to remote control with a ordinary RS232-interface. The baud rate of the interface is set in the rig menu.

Above the 3.5 connector there is a 4 pin connector-list that provides same signals as in the 3.5 mm connector.

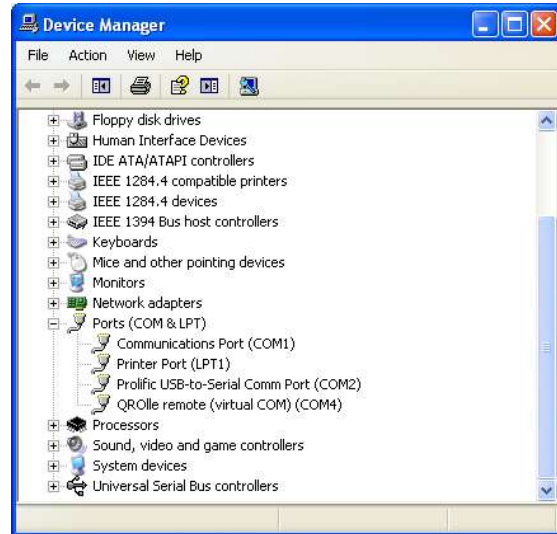


*Right behind the D-sub-connector the 3.5 mm connector that interfaces RS232 for remote controlling the rig. Above you see a 4 pin list with signals in parallel to the 3.5mm connector.*

### 4.3 Using the USB-interface for a PC Virtual COM port

The USB-interface can be used to control the rig with for example Ham Radio Deluxe installed on to a PC.

1. A .inf-file needs to be “installed” on the PC so that a virtual COM-port is built. The file can be downloaded from the homepage [www.grolle.se](http://www.grolle.se) and is named “QROlle\_atm6125\_virtualserial.inf”. Put it in a known place on your PC for future retrieval.
2. Install the USB-cable and when being asked for the definition file, point to it and let the computer install it. Don’t worry about the file not being certified, Just continue and soon you have the “QROlle remote (virtual COM)” appearing.



Now Ham Radio Deluxe can be interfaced. The COM4 interface is taken as a example.

## 5 Transverter interfacing

The QROlle is built to be interfaced to a external transverter. All of the interfacing is undertaken trough a 9 pin D-sub connector (ACC) on the back of the rig. Signal lines include T/R-switching and low level RF signal (1mW) from rig. The IF used is 14Mhz so a suitable design of the transverter is needed. Look in the schematics for pin details,