Translation in English of the article “Décodage numérique avec un Quansheng UV-K1 - Installation d’une sortie discriminateur”, published on the website www.F1LVT.com.

Signal Decoding with a Quansheng UV-K1
Installation of a Discriminator Output

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The QUANSHENG UV-K1 now replaces the UV-K5. It is smaller, more compact, with a significantly more powerful processor (PY32F071) and much more memory (Photo 1) [1].

The UV-K5 had already conquered a large market, thanks in particular to its remarkable performance, low cost, and the possibility of modifying the firmware. The "IJV 3.60" version (for the first version of the UV-K5) was particularly well-suited to amateur radio use [2]. For ADRASEC, it allowed both AM reception and 406 beacon decoding [3]. All of this is now possible with the UV-K1.

Photo 1: The QUANSHENG UV-K1 with firmware "IJV 4.0"

The team around IU0IJV, led by Fabrizio Palumbo, is working very actively on a new firmware for the Quansheng UV-K1, called "IJV 4.0". Initial tests of this software are giving excellent results, with an unfiltered BYP output (By-Pass), very well suited to digital decoding and in particular to decoding 406 beacons.

Photo 2: The UV-K1 screen on 406.028 MHz and BYP demodulation

Photo 2 shows the UV-K1 screen receiving on 406.028 MHz, with the "IJV 4.0" firmware. BYP demodulation allows the signals to be output directly without filtering. It is designed for decoding digital signals.

Just as we did for the UV-K5 [4], we have installed a "discriminator" output in the Quansheng UV-K1 [5]. This output allows direct access to the received signals, bypassing the volume potentiometer and the audio amplifier. With this output, the output level is independent of the volume setting. This constant-level output stays compatible with the use of the audio output in parallel to listen to the received signals.

Installing the "discriminator" output

Photo 3: To open the UV-K1, remove the two Torx screws in the lower part, then lift the board along with its shielding.

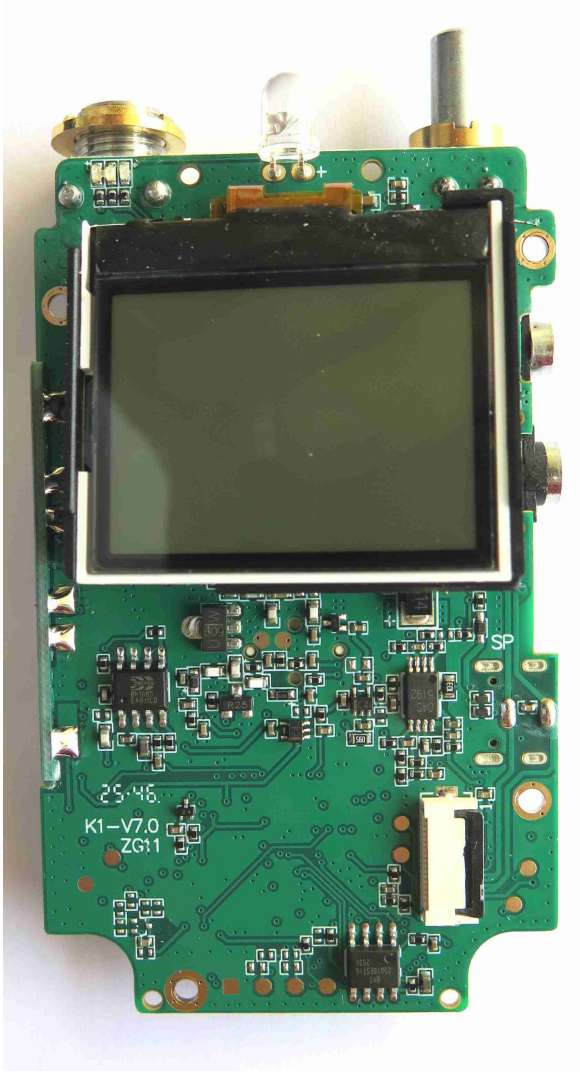

Photo 4: UV-K1 circuit board, with the display

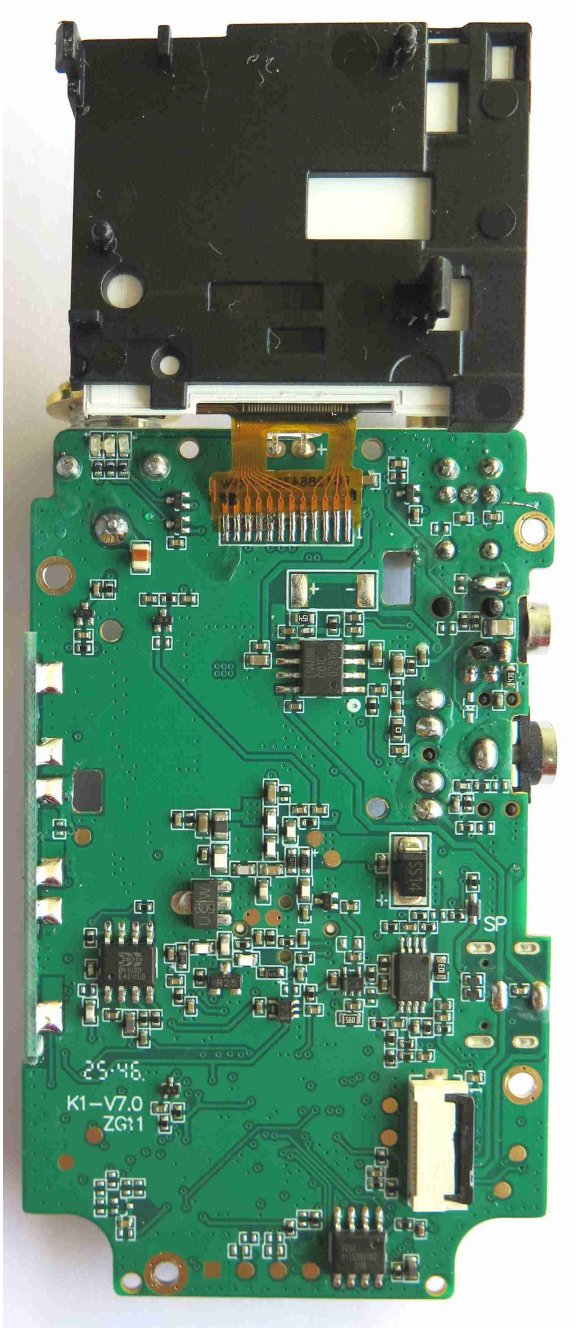

Photo 5: Lifting the screen provides access to the solder points for the 3.5 mm jack and the volume potentiometer

First, the UV-K1 must be opened. To do this, simply remove the two Torx screws in the lower section. Then, remove the circuit board by inserting a flat object, just as you would for a UV-K5. Be careful with the flat ribbon cable, which must be disconnected with care.

Photo 4 shows the UV-K1 circuit board. The solder points for the potentiometer and the 3.5 mm stereo jack are located under the display. The metal shielding piece, held in place by four screws, must be removed to lift the display. Photo 5 shows the same board with the display tilted.

Although some main components differ from the UV-K5, the circuits around the 3.5 mm stereo jack are quite similar. As with the UV-K5 [4], the 10 Ω series resistor connected to the tip of the 3.5 mm jack must be removed to isolate it (Photos 6 and 7).

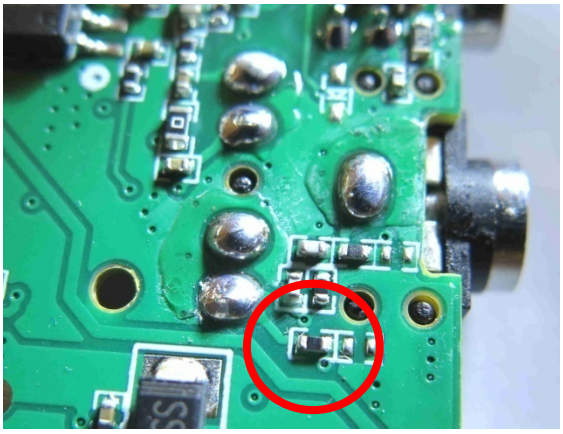

Photo 6: Location of the 10 Ω resistor to be removed

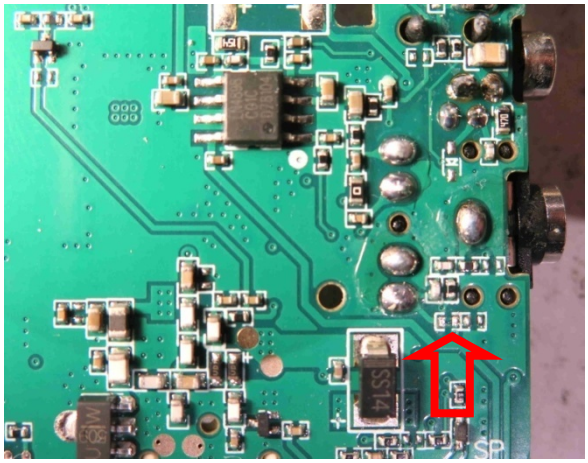

Photo 7: The tip of the 3.5 mm jack is isolated

The signal must then be routed from the volume potentiometer to the 3.5 mm stereo jack by inserting a 10 kΩ series resistor and a 100 nF capacitor. The resistor limits the output current to prevent interference, and the capacitor blocks the DC component. These additional components will be placed under the display, between the screen and the circuit board. There is a gap of approximately 2 millimeters under the display. The added components must not exceed this thickness.

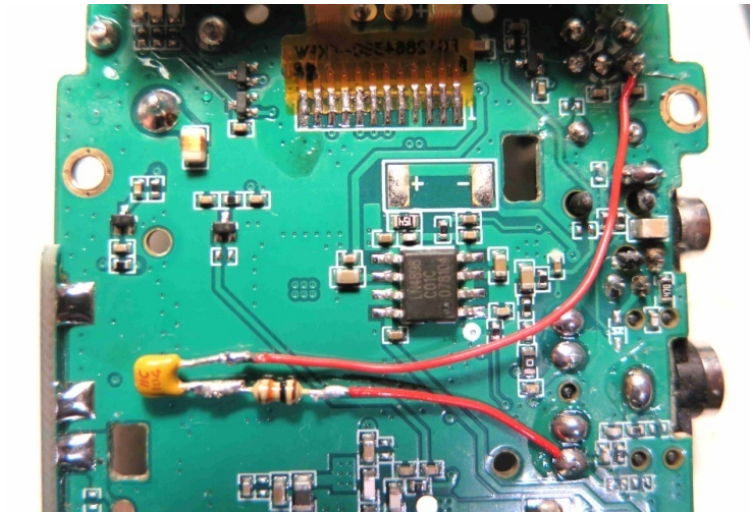

Photo 8: The connection between the potentiometer and the tip of the 3.5 mm stereo jack.

Photo 8 shows the added components, with their connecting wires. The thickness (< 2.0 mm) was carefully checked before assembly and soldering. The insulated printed circuit board assembly is located under the display (Photo 9). When the display is reinstalled, it completely hides these additional components.

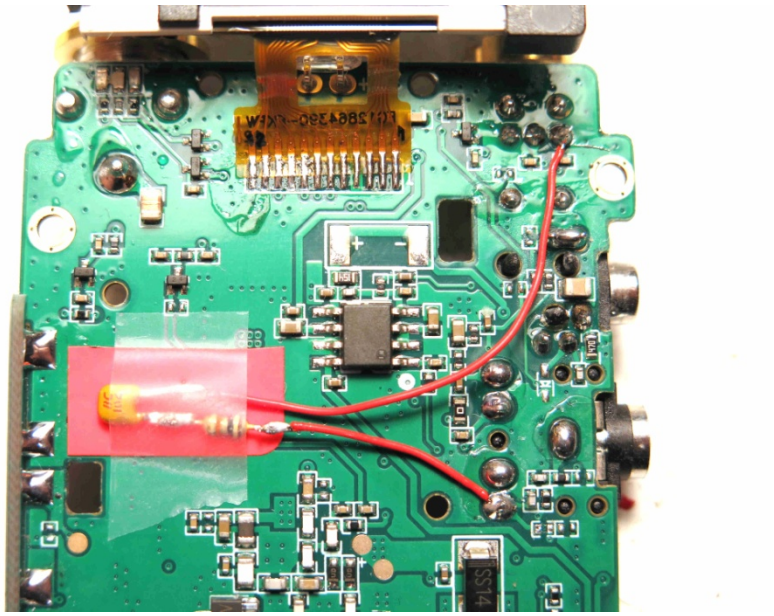

Photo 9: The isolated assembly is located under the display.
When the screen is replaced, nothing is visible.

406 Decoding Tests

Just as with the UV-K5, the signals are output between the tip of the 3.5 mm stereo jack and the central ring. This central ring acts as a virtual ground for small signals (Photo 10). A full K-type connector is not required; a simple 3.5 mm stereo jack is sufficient.

Photo 10: On the UV-K1's K-type connector, the output is on the tip (D) and the virtual ground is on the ring (E). A simple 3.5 mm jack cable is all that's needed to connect the UV-K1 to the decoder (Credit Photo A F6GVH).

For decoding, connect the 3.5 mm jack cable to each end, one on the UV-K1 and one on the decoder, and it works perfectly on the first try with very high sensitivity and efficiency. You can hear the signals passing through the receiver's audio output, with the level adjustable via the volume potentiometer. However, the BYP output level is completely independent of this setting (Photo 11).

Photo 11: 406 decoding tests: everything works perfectly.
First line: Country code "501", that's very rare!

The Quansheng UV-K1, with its firmware modified to version "IJV 4.0", is particularly well-suited for our applications: VHF-UHF transmissions, VHF-Air monitoring, and 406 decoding.

Références

[1] Website dedicated to the UV-K1
https://uv-k1.com/

[2] Quansheng UV-K5 in version « IJV 3.60 »
https://www.f1lvt.com/files/343-UV-K5-en-decodage-406.294.pdf
https://www.f1lvt.com/files/343b-Qs-UV-K5-en-Decodage-406.295.pdf

[3] Discriminator output addition and sensitivity measurement
https://www.f1lvt.com/files/343ce_UV-K5_discri_for_406_decoding_Eng.305.pdf
https://www.f1lvt.com/files/343c_Discri_UV-K5_decodage_406.296.pdf
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https://www.f1lvt.com/files/351a-Pret_pour_un_SATER.302.pdf

[4] Discriminator output for the UV-K5
https://www.f1lvt.com/files/343c_Discri_UV-K5_decodage_406.296.pdf
https://www.f1lvt.com/files/343ce_UV-K5_discri_for_406_decoding_Eng.305.pdf

[5] Discriminator output for the UV-K1
https://www.f1lvt.com/files/347-Discri_UV-K1.308.pdf