

DESKTOP OPTICAL VFO & SPEAKER MK1

CONSTRUCTION NOTES FOR KIT

SEP 6, 2026



INTRODUCTION – REQUIRES GOOD ELECTRONICS SOLDERING SKILL LEVEL

The Desktop VFO & Speaker with smooth tuning optical encoder is designed to work with the Spectrum DSP M4 model. It can also be used with any device with a TTL AB signal encoder connection. The VFO unit is 2 ½ inches wide (64mm),

The kit is designed to deliver an excellent fine tuning experience, with a free spinning dial without indents (clicks) like many low-cost radios.

The Spectrum M4 allows the tuning speed to be set using the lower left Speed button, and by touching the lower 3 digits of frequency display, the lower frequency clears to 000 or 500Hz if pressed again. The frequency can also be locked by pressing the lower LOCK FREQ button.

Included parts: Carbon fibre case, Optical encoder, 3 x hex screws (2mm Allen key required), 2.5w 1 ¾" wide (40mm) speaker, audio cable with jack plug, heat shrink tube, 2x8 IDE plug, 30mm of shrink tube, tuning dial.

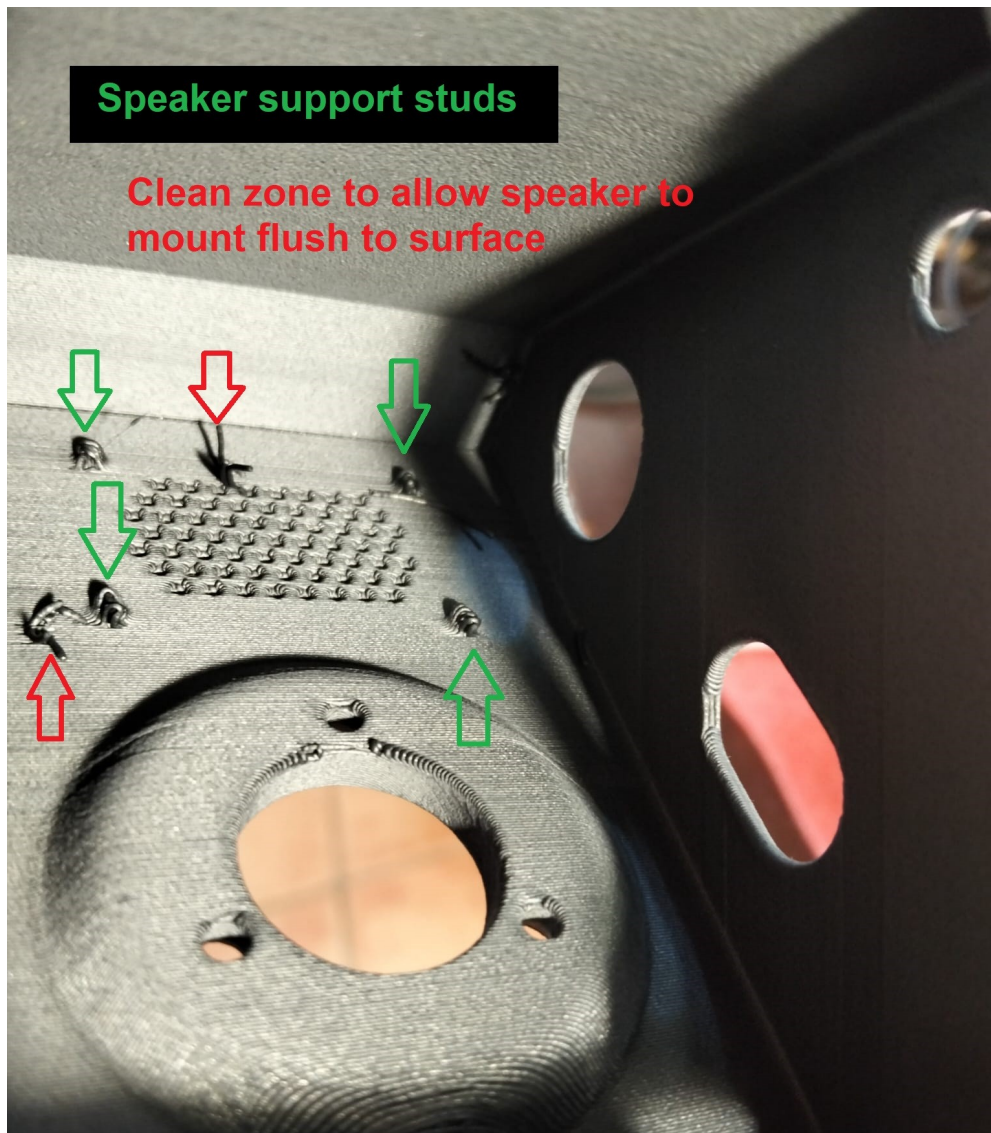
Needed: Contact adhesive for speaker, 2mm Allen key, Insulating tape, soldering iron, tweezers.

Step 1

Take your time, reread the instructions before starting, and [email](#) us if you have any questions.

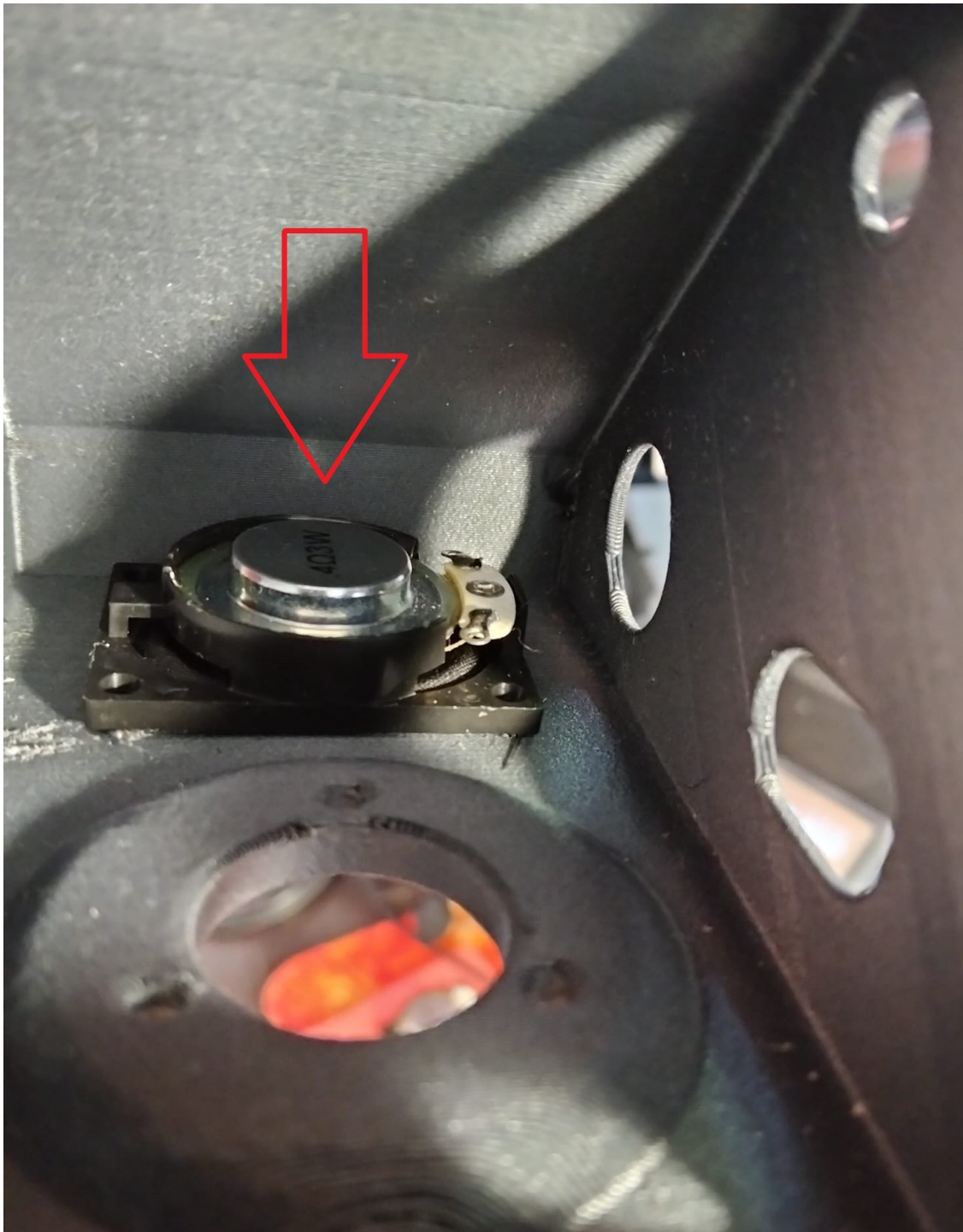
Remove the encoder unit by unscrewing the 3 fixing screws (2mm hex screws) on the front panel, and place to the side.

Using a bright light and a suitable knife, cut away any excess material inside the case around the four speaker studs. The speaker studs usually need to be trimmed so that the speaker unit sits on top of them cleanly, with the sides of the speaker flush to the case.



Step 2

Ensure the speaker fits cleanly in place onto the studs. Use tweezers through the round side holes to adjust the speaker position. Remove the speaker, next we will install the audio cable.



Step 3

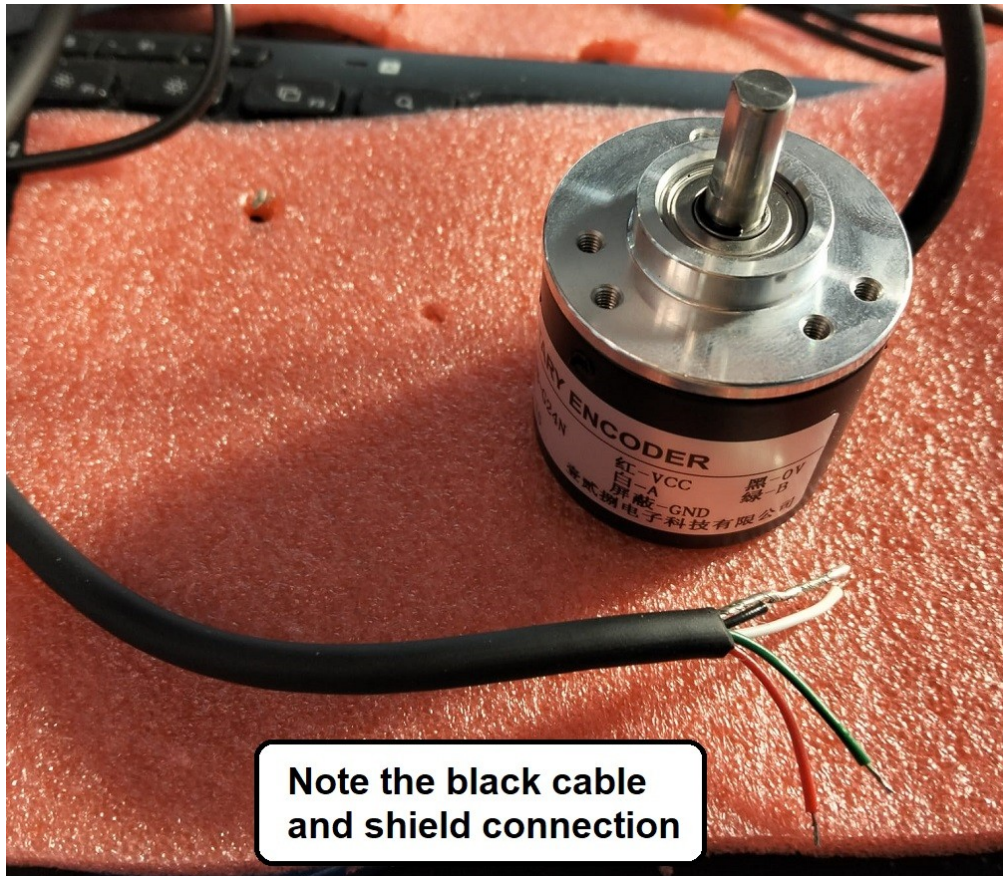
Install the audio cable with jack as shown below. Making sure that there is enough cable to reach the speaker, tie a knot in the cable which will protect the solder connection if the cable is pulled. Strip and solder the wires to the speaker as shown below. Then apply contact adhesive around the 4 studs inside the case, and the corners of the speaker making sure to keep glue off the speaker diaphragm. Wait the required time and then carefully fit the speaker onto the four studs, using tweezers through the side holes to align, and pressing down firmly. Allow time to dry.



Step 4

Refit the encoder so that it is positioned as shown below using the 3 hex screws. Do not overtighten or you can damage the case.

Rotate the encoder until the correct set of holes align.



Step 5

Cut the encoder cable to a length of 18 inches / 40 cm. This has been tested to work well with eh M4. You can try a longer cable, but there will be an increased risk of noise pickup, although the cable is screened.

Feed the cable around the encoder so that it is fully inside the case, rotate the cable gently if it protrudes, and fit into the exit slot as shown below.



Step 6

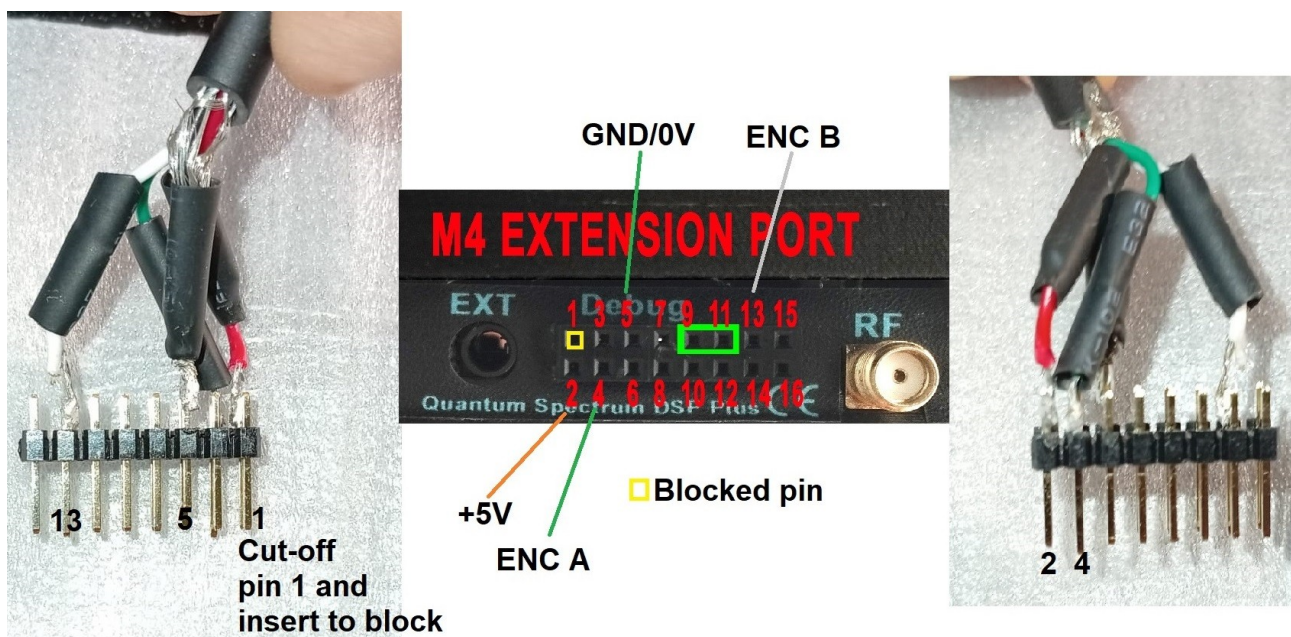
Once you have cut the cable to the required length, carefully strip the cable and cut the small heat shrink tube into 4 x 1/5th inch (5mm) sections, fitting to each wire before soldering to the pins shown below.

Remember to fit the larger heat shrink tube (see Step 6 – red tube) onto the cable before soldering the wires!

Note: Keep the heat shrink tube away from the soldering point or you will not be able to slide them into place later. DO NOT OVERHEAT THE PINS of the 8x2 plug or the pins will become loose. It is IMPORTANT that the soldering is done quickly. You can put the plug into the M4 extension port to hold it in place while soldering, with the power disconnected from the M4.

The braid should be twisted together with the black wire, which should be stripped back further to allow a good connection to the screen, then tin the tip and trim.

Red wire	5v DC – pin 2
Black wire + shield	Ground – pin 5
Green wire	Encoder A – pin 4
White wire	Encoder B – pin 13



Step 6

With the connections made and checked for shorts, cut off pin 1 from the plug, insert the cut-off pin into pin 1 of the Extension port to polarise it. This will prevent incorrect plug connection which might DAMAGE THE M4.

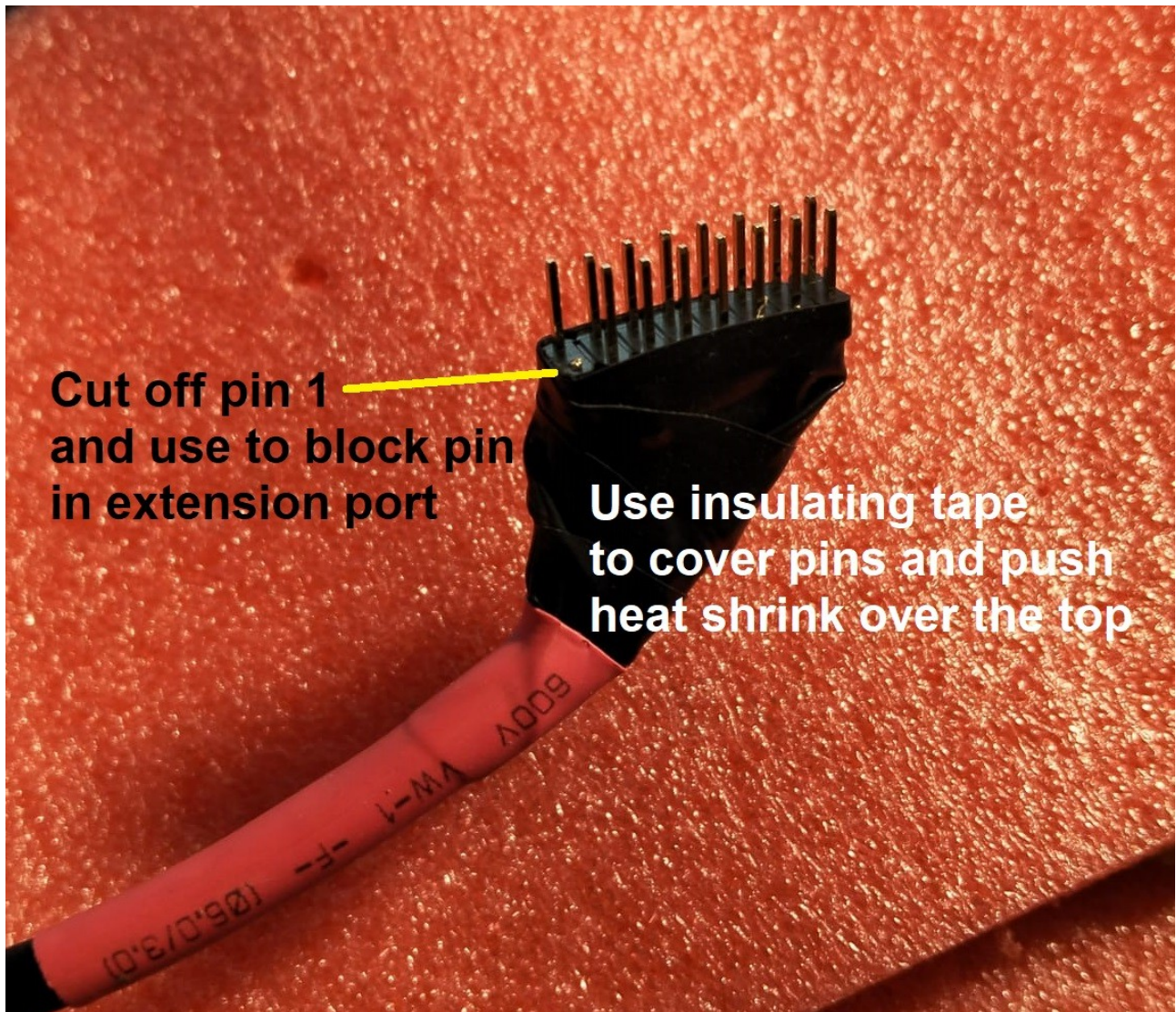
Complete step 7 next to make sure your connections work, then return here to complete the cable as shown below.

Once you have completed step 7, return here.

Use a hot air gun to shrink the 4 shrink tubes fitted to the connection earlier.

Then use electrical insulation tape (not supplied) and carefully wrap around the plastic body of the 2x8 pin connection as shown below.

Bend over the tape corners and tape to the cable as shown, and when complete slide it down over the larger heat shrink (red) and apply hot air or the upper side of a clean soldering to shrink the tube.



Step 7

Connect the encoder cable and speaker cable to the M4 (power NOT connected).
The audio jack goes into the lowest socket below the Extension connection.

Connect power to the M4, open the Display and touch menu and page down to the last page where you should see a line to enable the encoder. Enable it and press the save button (long-press).
If the menu item does not list, you will need to request a firmware update via email to info@quantumsdr.com.

With the menu item enabled, the encoder should work. If not, power off the M4, check you cables, rectify any problems, and repeat, checking the menu has the encoder enabled.

If you have the correct connections this will work.

Now go back to step 6 and complete the plug!

Finally fit the 4 adhesive rubber feet to the bottom corners of the VFO case.

Congratulations, you have completed your VFO build!

Don't forget to post photos of your built VFO and Spectrum DSP in the group's [Facebook](#) page!

INLINE FILTERS

You can slide the VFO over the inline filter fitted to the M4+, or use 4-5 inches (10-15cm) or miniature 50 ohm coax to connect from the M4 SMA antenna connector to the inline resonant filter feeding the coax through the VFO.

You can also place the VFO at a distance from the M4 allowed by the length of the cable.

This is a **community radio project** so please **send us your feedback and ideas!**

[QuantumSDR](#) Team

www.QuantumSDR.com