ENCLOSURE KIT

for the CalQRP Club “Retro VFO” PCB

Version 1.0 N2APB

I was positively thrilled to be able to obtain one of the CalQRP Club’s latest monthly kits – the Retro VFO. This design by Yin Shih (N9YS) is based of the original work of a Japanese ham (JF3HZB) who developed a novel and very attractive software method for displaying an “analog frequency dial” on a digital LCD screen, thus enabling hams all over the world to develop modern projects with a ‘retro’ look. Yin and CalQRP collaborated to design a pcb-based kit with such a display that can work well in many of our homebrew projects.

But being a pcb-based project begs for an enclosure to contain it, and the associated electronics with which we intend to integrate it! While 3D-printed cases are being vogue, I decided to take another path to merge a convenient ‘partial’ form-factor I have on-hand, with a new capability that I brought online in my own ‘maker shop’.

First, the form-factor is roughly a 4-inch cube clamshell used in another project. But the front and rear panels of this clamshell were very dedicated to that special project (read: the controls and labels were hard-cut into the aluminum). But what if I could easily replace those dedicated panels with easily replaceable and customizable ones in order to continue using the clamshell design? This was *“Ah Ha Moment #1”.*

Next, the new technology brought online in my shop was a 40-watt CO2 laser etcher/cutter that I had been experimenting with over at the Knoxville Maker Club for several months. Thinking of what I could do with this as applied to ham projects got me considering materials that I could use as a ‘front panel’. I can’t cut aluminum but I can do plastic. Then I found an acrylic material that was very similar to what’s used to make common name badges, whereby a machine grinds partway through the top black layer to expose a white layer beneath. This was *“Ah Ha Moment #2”*

So in short, this kit is created by using a laser etcher to cut-and-etch two 4”x4” panels with labels and cutouts that fit to the Reto VFO PCB, and attach to an aluminum base plate, with a black powder coated clamshell fitting over the top!

What to do with all that space inside? Man, the ideas for this can be literally endless … add buffer circuits to make a good standalone VFO (for modern or tube radios); add circuits and ovens to make a good signal generator; add the guts of a DC or superhet radio; add a battery inside; add a Softrock; turn it into an SDR; what else can you think of?

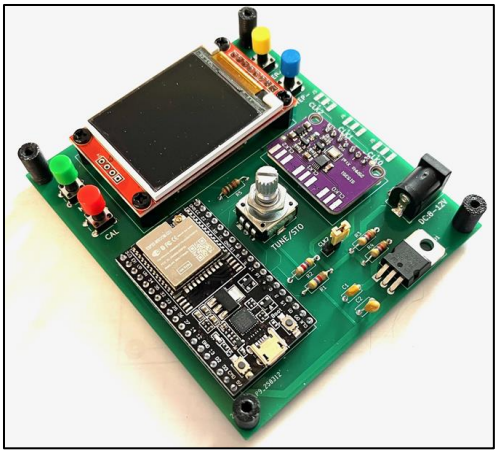
73, George N2APB
n2apb@midnightdesignsolutions.com
https://n2apb.com/retrovfocase.htm

ASSEMBLY INSTRUCTIONS

1) Kit Contents:
    1) Front & Rear acrylic panels, pre-etched with cutouts and labels as depicted in the photos
    2) Top aluminum u-shell & bottom aluminum base plate
    3) Case screws:
        - Four 4-40 v-head machine screws for shell-to-base
        - Four #4 round-head sheet metal screws for shell-to-panels
        - Four 4-40 round machine screws for panels-thru-base-to-PCB
    4) Plastic PCB Spacers:
        - Two longer spacers for attaching the TOP of front panel
        - Two shorter spacers for attaching the BOTTOM of front panel
    5) Four plastic buttons for tactile pushbuttons on PCB (colors may vary)
    6) Dial knob
    7) Rubber Feet
        - Two short, round stick-on feet for the rear of the base plate
        - Two taller, round screw-on feet for the front of the base plate, with associated zinc-plated sheet metal screws and washers.
    8) Rear Panel connectors
        - BNC for “RF”
        - 3.5mm ‘audio’ jack for “COM”
        - 2.1/2.5mm DC power jack for “PWR”
        - 15-pin ‘D-Style’ jack for “AUX”, plus mating zinc-plated #4 screws/nuts.

2) PCB Prep – Just one thing! You need to carefully remove the SMA connectors (if already installed) from the side of the PCB to allow the top cover of the Enclosure to fit down over the top base plate. One of our beta builders described doing this connector removal as “pretty easy”. He said: *“The SMA connector was removed by using a 1/8" chisel tip with temp set to 450C. I flooded the tip with solder and placed it against the center pin and one of the ground legs of the SMA. The SMA fell off after about 10 seconds time w/o any damage to the pcb.”*

3) Attach the four plastic spacers to the front panel using 4-40 machine screws as shown in the photos. Be sure the two **shorter** ones are located at the bottom of the board. (NOTE: The screws may be ‘tight’, as the spacers are custom 3D printed.)



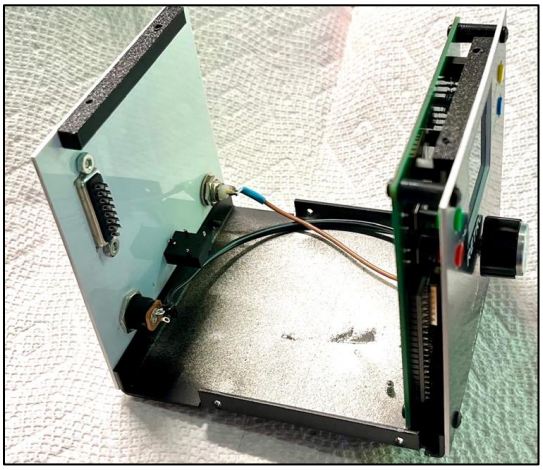
4) Orient the bottom plate such that side mounting flanges are biased toward the rear. *(The photo below incorrectly shows them biased toward the front.)* Carefully hold the Front Panel over the VFO board and slide the lip of the bottom plate in between the panel and the spacer, as shown below. Use two 4-40 machine screws to secure these three pieces: through the front panel, through the hole in the base plate, and finally threaded into the plastic spacer that was just attached to the VFO board in #3 above. Before tightening the screws, align the board so it is even with the bottom and biased 'upward'.

5) Attach the acrylic panel to the top of the VFO board using 4-40 machine screws.

6) Attach connectors to the rear panel according to the rear panel photo.

7) Attach the rear panel to the Enclosure Base plate by threading two #4 machine screws into the base plate holes. Similarly, before tightening the screws, align the board so it is even with the bottom and biased 'upward'.

8) Wire the connectors on the rear panel as-desired to locations on the VFO board. Minimally/ideally, this would include 12V DC and VFO output, as indicated in the photo.



NOTE: The photo above shows the base plate's side mounting flange as being biased 'toward the front'. Users should bias theirs 'toward the rear' of the enclosure.

9) Slide the top u-shell of the Enclosure over the assembly and attach to the corresponding four threaded holes in the side of the base plate using 4-40 v-head machine screws. Be sure not to strip the threaded holes by forcing mis-alignment. *(NOTE: The prototype shown in the photos show the four holes of the base plate being 'biased' to the front, whereas yours will be biased to the back.)*

10) Gently screw the four remaining black #4 screws (sheet metal ones) through the holes in the top of the u-shell case such that they engage with the holes beneath them in the plastic bars attached to the top of the front and rear panels. You may need to slightly push/pull the panel into place to get the holes to line up (they will, *as each case is custom made for the panels*), and ever-so gently screw them into place so as to not strip out the soft plastic of the retaining bar. Once in place, the panels should be perpendicular and nicely positioned with respect to the cover.

11) Lightly drop the colored button caps onto the tactile pushbuttons, as-desired, and push for a tight fit. If they do not stay in place, add a very small drop of SuperGlue™ (or equiv) to the top of the switch post before pressing the cap in place … wait a bit and it'll hold nicely.

12) Attach the knob the VFO rotary encoder. Before securing it tightly with the set screw, position the knob slightly elevated on the shaft above the front panel to allow room for the control to be pressed enough for its pushbutton to be actuated.

13) Attach the four rubber feet to the bottom plate. The smaller, peel-off feet should be attached to the rear of the baseplate over the small holes closest to where the plate's side mounting flanges are biased. The taller rubber feet should be attached to the holes toward the front of the baseplate in the remaining holes using the 1/" sheet-metal screws and flat washers. The photos below show suggested orientation of the feet for optimum usability of the VFO on the bench.

ENJOY!

Any problems? Contact me …
George Heron, N2APB
n2apb@verizon.net