

# EL-34

# Installation Guide

## VFO Stabilizer for Heathkit SB-104A Transceiver

Required Reference Manual - ELcon FLL VFO-Stabilizer



Figure 1 - SB-104A After Display and EL-34 Modifications

## Installation description

Version 1.0a

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Important! Hints or tips for the correct function of the EL-34.



Watch it! Absolutely observe.

## 1 Introductory remarks

The universal ELcon EL-34 FLL VFO-Stabilizer is based on the well-proven, excellent EL-33 designed specifically for Yeasu FT-301D.

This document describes how to install the EL-34 in a Heathkit SB-104A. My SB-104A was stable for 10 minutes and then drifted 699Hz over 1 hour – not acceptable in 2020.

The EL 34 has two connectors required for installation.

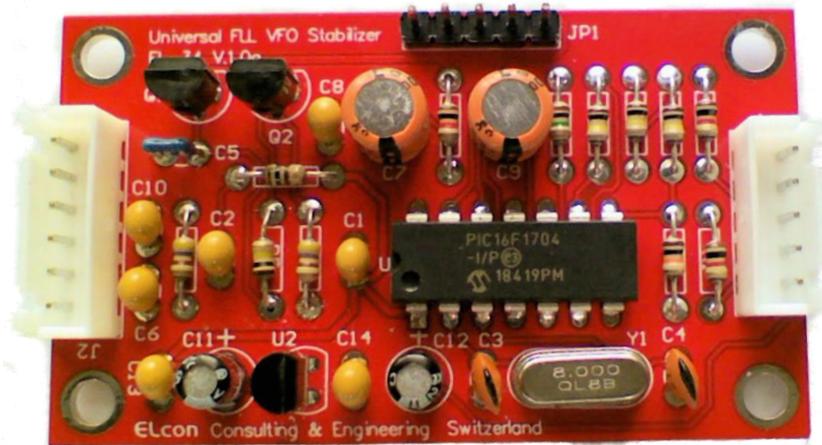


Figure 1

## 2 Installation Summary

- (1) Provide 7-20Vdc to pin 1 of J1 (+).
- (2) Connect chassis ground to pin 2 of J1 (-).
- (3) Install LED to pins 3, 4, 5 on J1 (G LED R) either directly or remote where can be seen through the front panel.
- (4) Provide buffered VFO signal on pin 6 of J2 (RF-IN, max 5Vpp).
- (5) Connect varactor-tuning circuit to pin 4 on J2 (VAR).

The EL-34 uses sophisticated logic in a PIC processor for frequency locked loop operations. It locks the frequency when you are not tuning by sampling the VFO frequency and adjusting the varactor control voltage for 10Hz stability over 24 hours.

Figure 2 illustrates connection points.

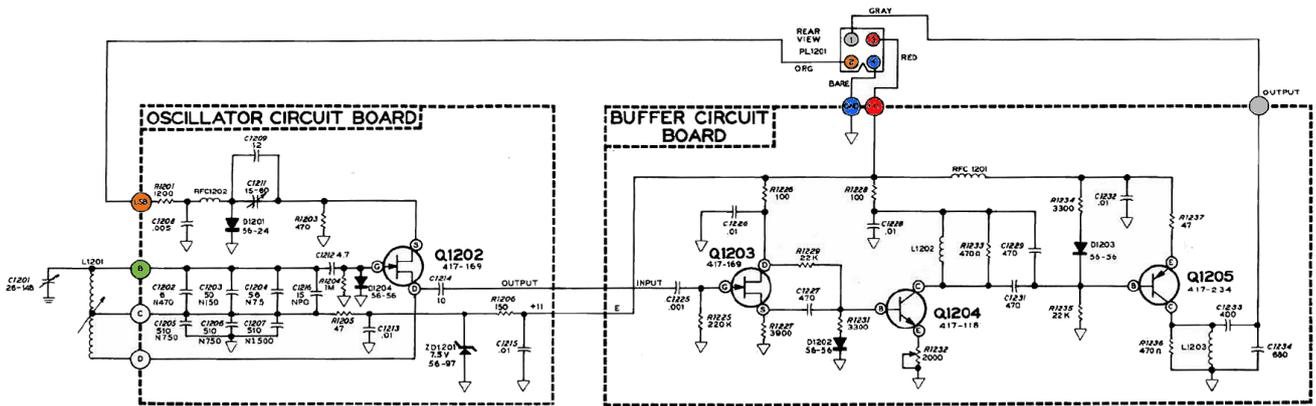


Figure 2- Heathkit VFO Schematic

## 2.1 Installation Steps

- (1) Remove both top and bottom covers.
- (2) Unplug the 4-pin connector on the side of the VFO.
- (3) Remove the tuning knob.
- (4) Remove the outer tuning shaft coupler, see Figure 3 by carefully removing the two screws (save lock washers). Loosen the two shaft set screws and pull forward to remove.

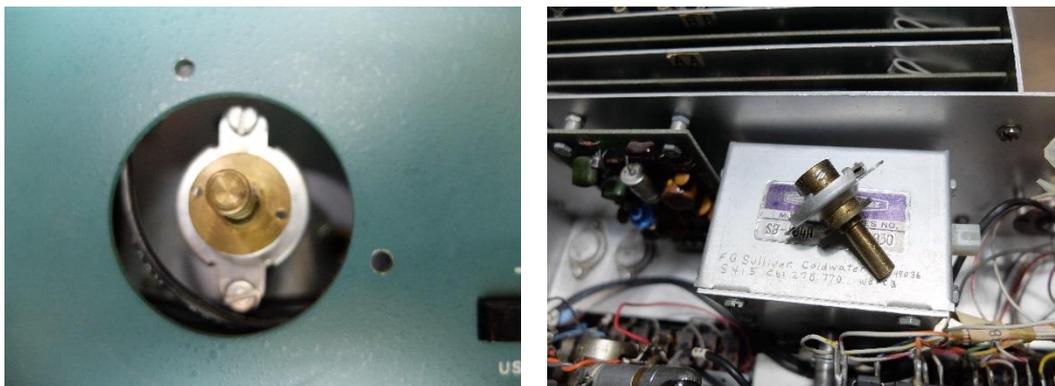


Figure 3 - Outer Shaft Coupler

- (5) Remove the four VFO mounting screws on the bottom of the unit.
- (6) Now you can remove the VFO and then remove its cover. See Figure 4

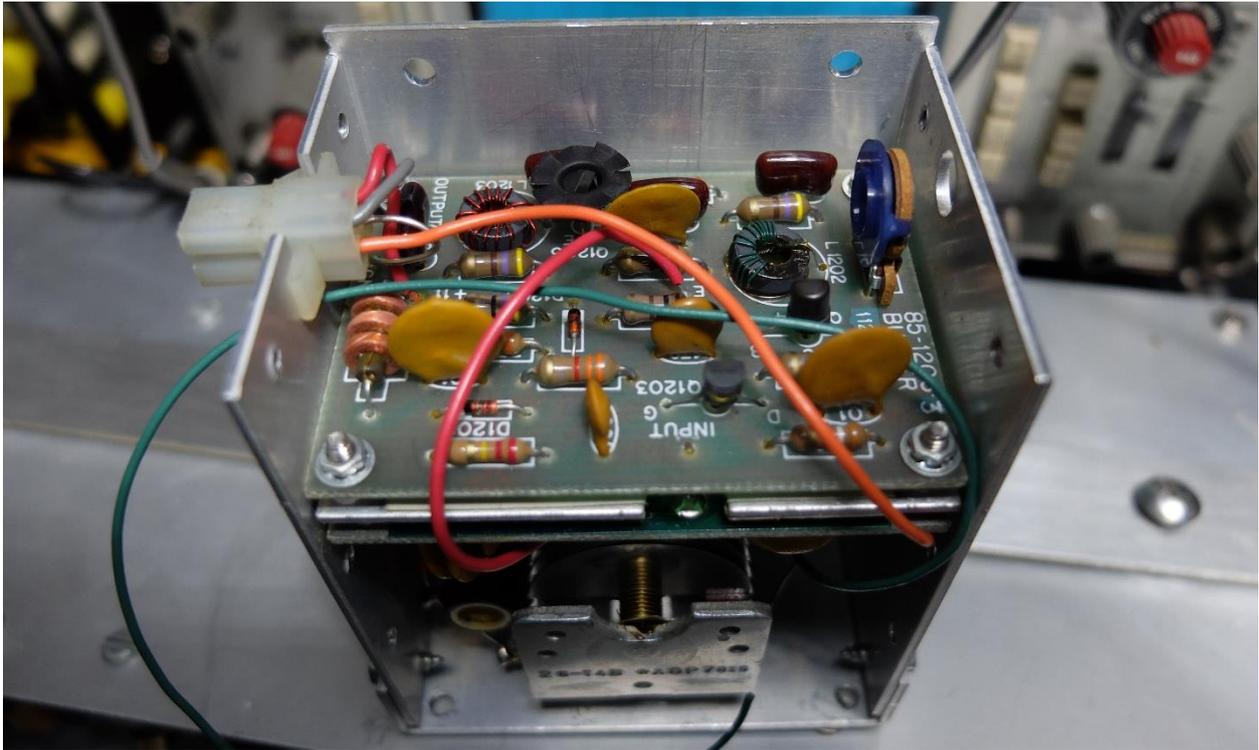


Figure 4 - VFO Cover Off

- (7) Build the varactor circuit as shown in Figure 5 on a small perf board. Use a SB-104A selected value of 6-9pF for the coupling capacitor.

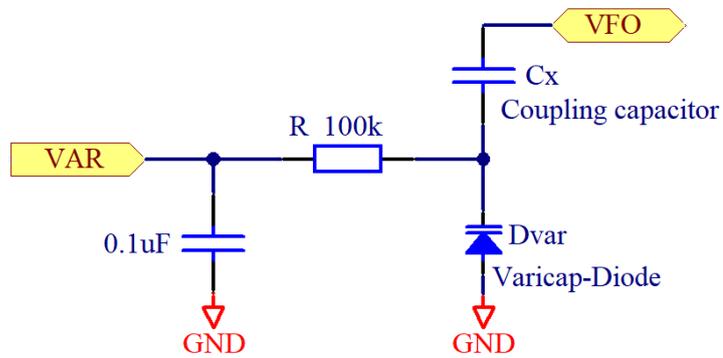


Figure 5 - Varactor Circuit

Figure 6 illustrates the assembled perf board.

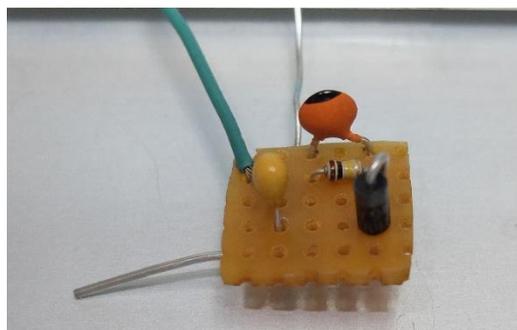


Figure 6 - Varactor Perf Board

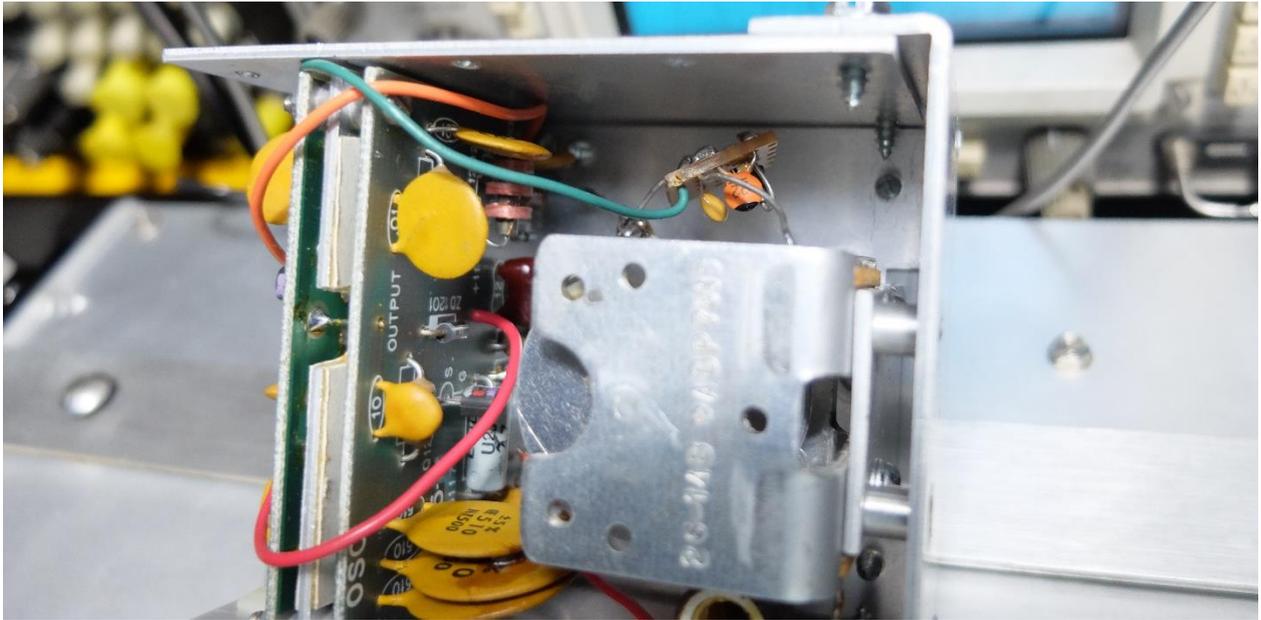


Figure 7- Installed Varactor Circuit Board

- (8) Solder the perf board to the side of VFO tuning capacitor with ground to the lug at the rear of the Tuning capacitor, control wire up to the top and out the space under the 4-pin connector and coupling capacitor to the VFO tuning capacitor unused terminal. This physically challenging but it keeps the leads short.

Figure 7 illustrates an installed perf board.

- (9) Install the VFO case cover.

- (10) Next is building the connections required for J1 and J2.

- a. Remove the 11Vdc (red) and VFO, coax shield and Buffered Out (coax) pins from the 4-pin connector. See Figure 8.

I had to buy some tools on Amazon for this. This provides a convenient way to pick off 11Vdc, VFO out and ground.

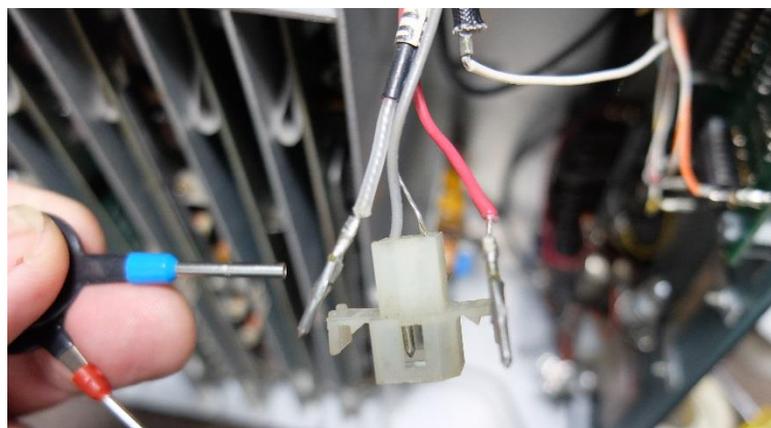


Figure 8 - Pin Removal

- b. Prepare and solder a 4" wire to the red wire pin and crimp and solder to a J1 (pin 1) female provided with kit.
- c. Prepare and solder a 4" wire to ground (coax shield pin) and crimp and solder to a J1 (pin 2) female provided with kit.
- d. Crimp and solder the three LED leads to J1 (pins 3, 4, 5) females provided with the kit to J1. The LED flat spot is the RED and it needs to connect to pin 5.
- e. Prepare and solder a 3" wire to the VFO Buffered Out (coax) pin from the 4-pin connector and crimp and solder to a J2 (pin 6) female provided with kit.
- f. Strip leave a 2" length outside of the case for the varactor control wire and crimp and solder to a J2 (pin 4) female provided with kit.

- (11) Mount the EL-34 under the 4-pin connector on the side of the VFO case. I used 3M Velcro with J2 up. See Figure 9.

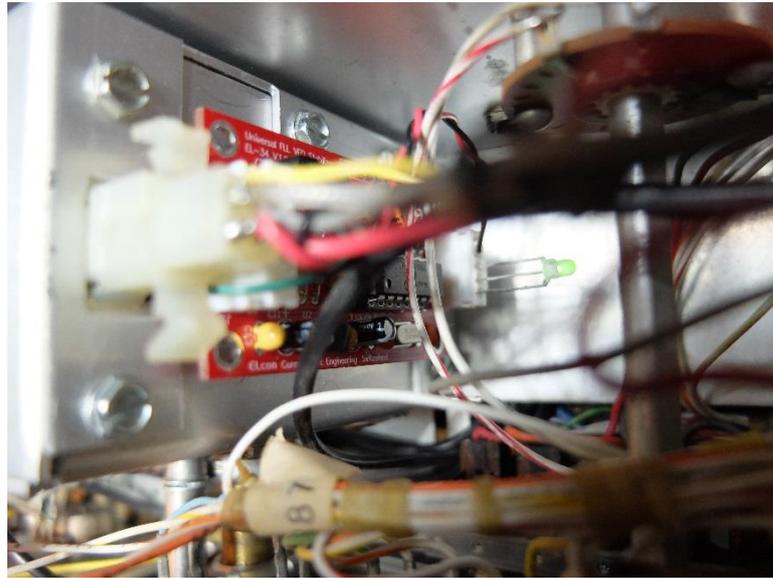


Figure 9 - EL-34 Mounted

- (12) Now insert the pins into the 4-pin shell, J1 and J2 connectors
- a. 11vdc into J1 pin 1
  - b. GND into J1 pin 2
  - c. VFO out to J2 pin 6
  - d. Varactor control to J2 pin 4
  - e. Insert the 4-pin connector into the VFO and J1 and J2 into the EL-34.
- (13) Check all your work and test using the EL-34 manual suggested steps.

## 2.2 Final Step



The connection directly to the VFO tuning capacitor requires that you follow the adjustment procedure on page 2-7 in the Heathkit Operations manual and re-sync USB and LSB.

- (1) Set the full CCW end stop frequency to 3475kHz using the bottom hole behind the tuning knob using a small screwdriver
- (2) Re-sync USB and LSB frequencies using the upper left-hand hole behind the tuning knob. Note the frequency in USB then adjust trimmer to match in LSB.

Figure 10 is the final top view showing EL-34 mounted to the side of the VFO case. There is plenty of room for this.

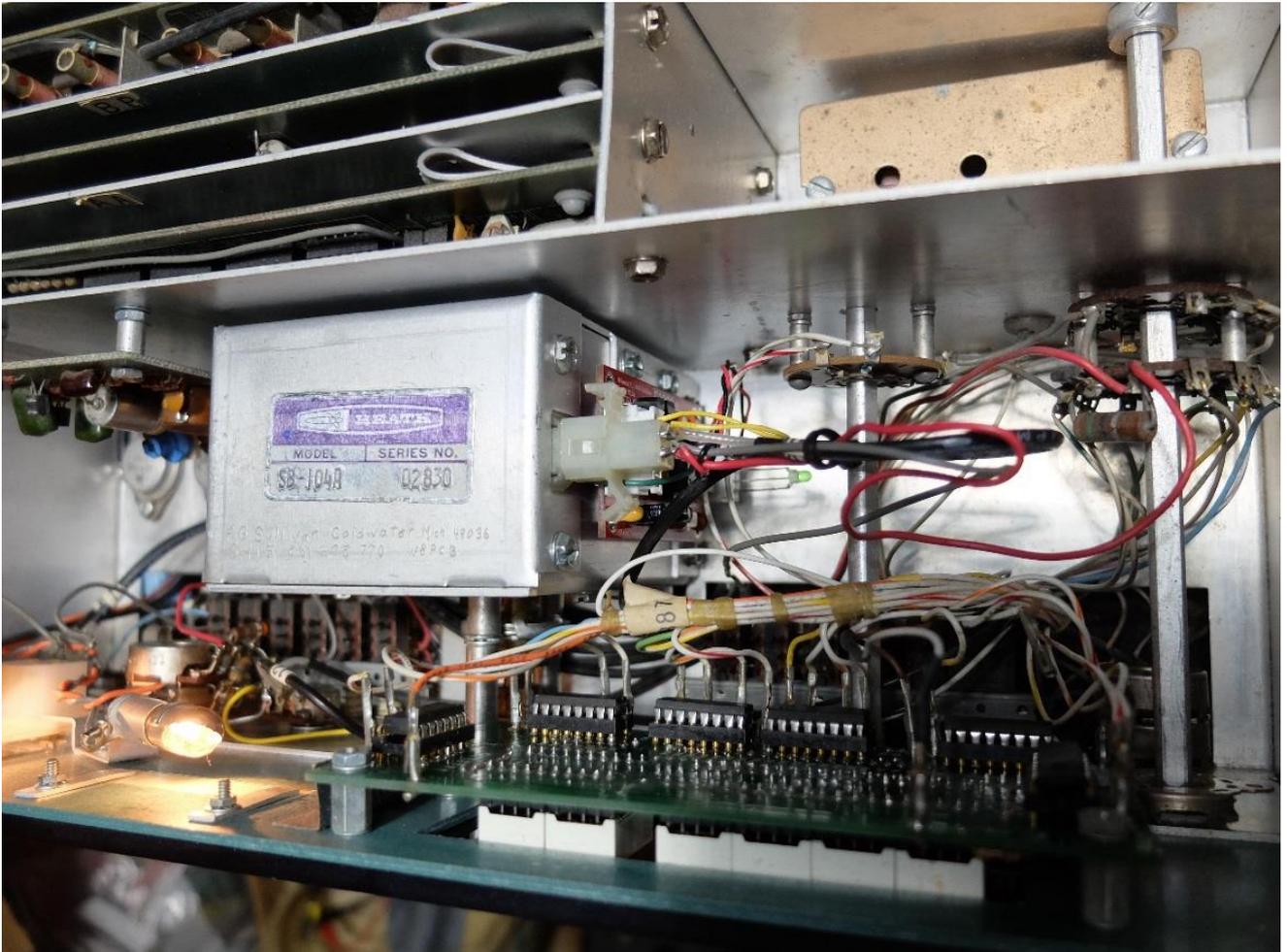


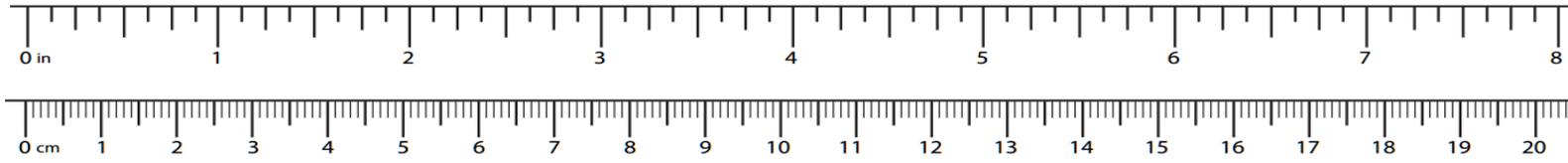
Figure 10 - Completed Top View

### 2.3 Display Drift Note

Don't confuse digital display and counter drift with VFO stability. It takes my unit 10 minutes to fully stabilize the counter frequency whilst the VFO is rock stable from power on. This can cause a misconception.

## 3 Appendix

### 3.1 Ruler



### 3.2 Disclaimer of liability

Any actions based on the information contained in this document are taken at the user's own responsibility. Any liability is excluded, both for direct and indirect damages and consequential damages that may arise in connection with the use of the information contained in this document.