

CW Zero Beat Detector - Jerry Henshaw, KR5L

I designed this little CW Zero Beat Detector to help those of us who are tonally challenged to actually zero in on a target CW station. I know the K2 has a Spot feature and it works great if you have decent tone pitch... which I don't. The circuit uses the popular NE567 PLL Tone Decoder IC. The schematic and PC artwork were crafted by Tom Hammond (NØSS). Tom has done an outstanding job in laying out the PC board. Thanks again Tom for all your help, encouragement, and assistance.

The 567 will work with supply voltages between 4.75 and 10 volts. I used the 8A circuit in the K2 to power my unit. The circuit draws about 20ma while "listening" and about 27ma when the lock LED is turned on. I have just received a low power CMOS version of the 567 from National Semiconductor and I will post my findings using this chip as soon as I have time to finish the design.

The 2.2K resistor, 5K 10-turn pot, and .47uf capacitor determine the center frequency of the PLL (your CW offset tone). With the values chosen, the center frequency can be adjusted from about 350Hz to over 1Khz. It is very important to use a good stable capacitor in this circuit... not a ceramic disk please. I found that the frequency stability of the unit is amazingly good plus or minus 1 Hz over several days. The best way to adjust the center frequency is to put a frequency counter on pin 5 of the 567 and adjust the 5 K pot to match your CW offset frequency. NOTE: DO NOT apply any audio to the circuit while adjusting the center frequency.

An easy way to test the circuit before installing in your K2 is to simply apply audio from the K2 headphone jack and 8 volts to the circuit and watch the LED blink as it finds a CW signal. The bandpass is nice and tight which means it only takes a few degrees of rotation on the tuning knob to go in an out of Lock. The 10uf and 22uf capacitors determine the bandpass of the PLL. I used electrolytic capacitors from the NORCAL capacitor kit for the loop filters as well as the 100uf audio input coupling capacitor. Just be careful to install the electrolytics with the proper polarity.

Mounting Inside the K2

Now comes the fun part... how do you mount this circuit inside the K2? Glad you asked. I mounted the Lock indicator LED in the key cap of the Rate/Lock switch. I purchased an extra Rate/Lock key cap from Digikey (EG1885-ND 16 cents each). I drilled a .07" hole in the center of the spare key cap. Turn the key cap upside down and you will notice two small slots on the little plastic cylinder that snaps on top of the switch. You must extend these slots all the way to the bottom of the cylinder. This can be done with an Exacto knife... just be careful and take your time... little by little. Once the slots have been extended, drop in a subminiature LED (Mouser # 606-CMD64B - this is a Green one). The little LED seems to have been made to fit inside the key cap. Bend the legs down and flare them out after you snap the cap back on the switch. Just make sure the little bubble side of the LED is showing through the key cap. The LED will be held perfectly aligned and at the proper height when you snap in on the switch. If you ever want to go back to a "Factory Original K2", simply replace the key cap.

I routed the two LED wires through the Power Switch cut out and into the main area of the K2. I used a two-pin inline connector on the LED wires so I could disconnect the front panel from the circuit if need be. I soldered the "Audio" wire to the "speaker" side of the headphone jack on the bottom of the RF board. This pad is facing toward the front panel and ties to the two resistors that feed the headphone jack. I routed this wire through the Power Switch cut out as well.

All we have left to do is add 8 volts and ground and we're done. I picked up 8 volts at the right hand side of RFC16 or 8A. I picked up ground from one of the test point ground loops on the RF board. I used a 5 pin connector to attach my unit to the K2 to allow for easy removal should the need arise. I used double-sided foam tape to attach the circuit board to the right hand side panel just above the two-pin speaker plug on the RF board.

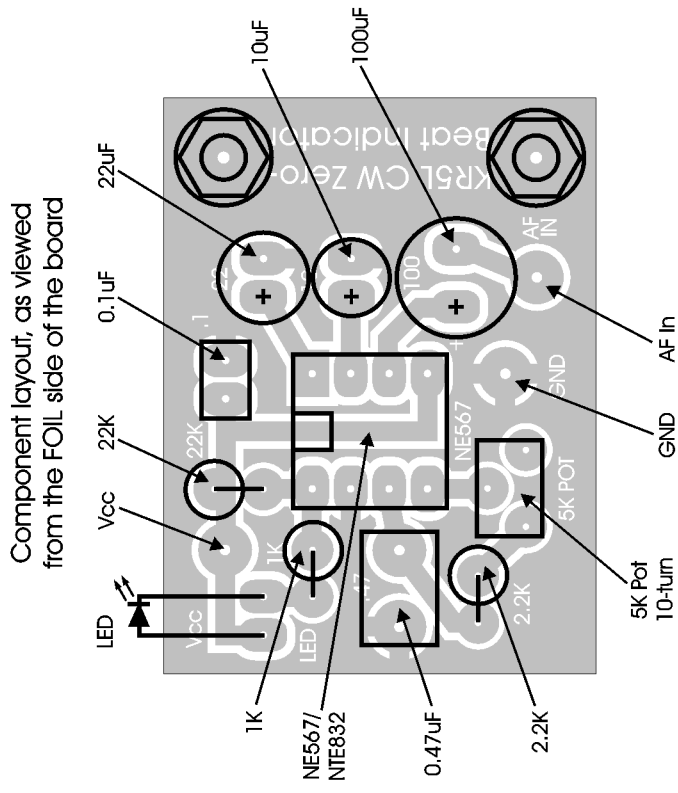
The little circuit performs amazingly well. I can really dig signals out of the noise. I found the circuit would work with "comfortable" audio levels. Generally if you can easily hear the signal the circuit will detect it. It can even pull the 7.0000 MHz birdie out of the noise (if the QRN isn't overwhelming).

A couple of K2ers have built the circuit and have had the same results as I have. I hope you find this accessory useful. Please drop me a note via email if you build this circuit and let me know how it works for you.

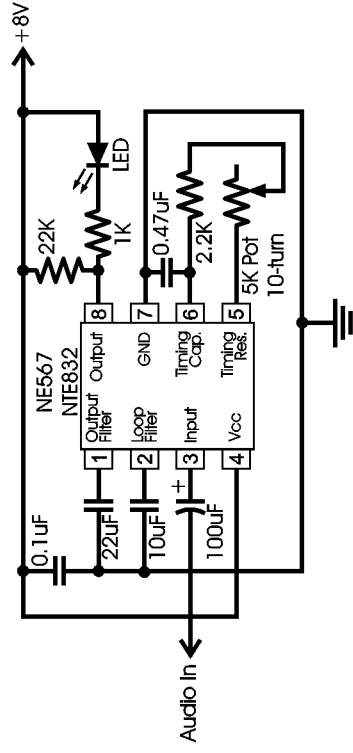
Good Luck and keep the solder fumes aloft,

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KR5L NE567/NTE832 PLL CW Zero-Beat Indicator



NOTE: COMPONENTS MOUNT ON NON-FOIL SIDE OF PC BOARD



Special Parts available from Mouser (www.mouser.com):

- 0.47uF Metallized Polyester Film, 581-470NK63 (\$0.67)
- 0.1uF Monolithic Ceramic, 581-JDZ104K1 (\$0.31)
- 10uF 16V Tantalum, 581-10K16V (\$0.50)
- 22uF 16V Tantalum, 581-22K16V (\$0.73)
- 100uF 16C Electrolytic, 208-16V100 (\$0.39)
- 5K 12-Turn Top-Adjust Pot, 594-74W-5K (\$2.25)
- NE567 DIP-8 Tone Decoder/PLL, 513-NUM567D (\$0.38)