

HF BPF 04_Band 1: 1.8-4 MHz

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Band 1: 1.8-4 MHz Introduction

General

The latest design of the HF-BPF kit now permits of two options:

- Option 1: the original design covering 1.8 MHz - 30 MHz, in 4 bands, and
- Option 2: a board covering 3.5 MHz - 30 MHz plus 6m, in 4 bands

These builders notes describe 4 "bands" and the board layout permits filters for four bands. However, depending upon the option (1 or 2), the bands named "band 1" and "band 2" will be built and installed differently. The changes for Band 1 are as follows (and will be implemented somewhat more elegantly in these note, time and resources permitting):

- Band 1 is changed between option 1 (1.8-4 MHz) and option 2 (6m):
 - C7: option 1=150 pF; option 2 = 5.6 pF
 - C8: option 1=330 pF ; option 2 = 39 pF
 - C9: option 1=150 pF ; option 2 = 5.6 pF
 - L1: option 1= 23 uH ; option 2 = 1.64 uH
 - L2: option 1= 10.7uH; option 2 = not used
 - L3: option 1= 23 uH ; option 2 = 1.64 uH

Theory of Operation

This stage builds and installs the filter "chain" for Band 1. Refer to [Jan G0BBL's Design Plots](#) to see the performance characteristics of this chain.

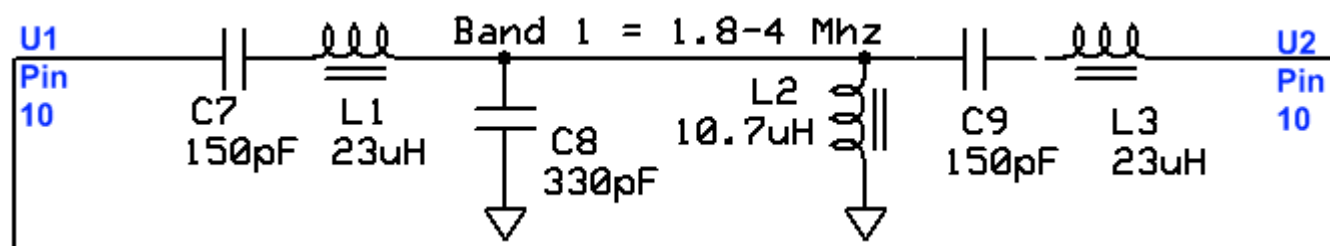


Remember, when winding toroidal inductors, a single pass through the core counts as 1 turn. You might want to review [Leonard KC0WOX's excellent 10-minute video](#) on winding toroidal coils.

Band 1: 1.8-4 MHz Schematic

(Resistor testpoints (hairpin, top, or left-hand lead), as physically installed on the board, are marked in the schematic with red dots)

([Click for Full Schematic](#))



Band 1: 1.8-4 MHz Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
☐	C07	150 pF 5%	151	Ceramic			Band 1: 1.8-4 MHz
☐	C08	330 pF 5%	331	Ceramic			Band 1: 1.8-4 MHz
☐	C09	150 pF 5%	151	Ceramic			Band 1: 1.8-4 MHz
☐	L1	23 uH 71T #30 on T30-2 (39")	red	coil			Band 1: 1.8-4 MHz
☐	L1-core	T30-2 toroid core		toroid			Band 1: 1.8-4 MHz
☐	L2	10.7 uH 50T #30 on T30-2 (28")	red	coil			Band 1: 1.8-4 MHz
☐	L2-core	T30-2 toroid core		toroid			Band 1: 1.8-4 MHz
☐	L3	23 uH 71T #30 on T30-2 (39")	red	coil			Band 1: 1.8-4 MHz

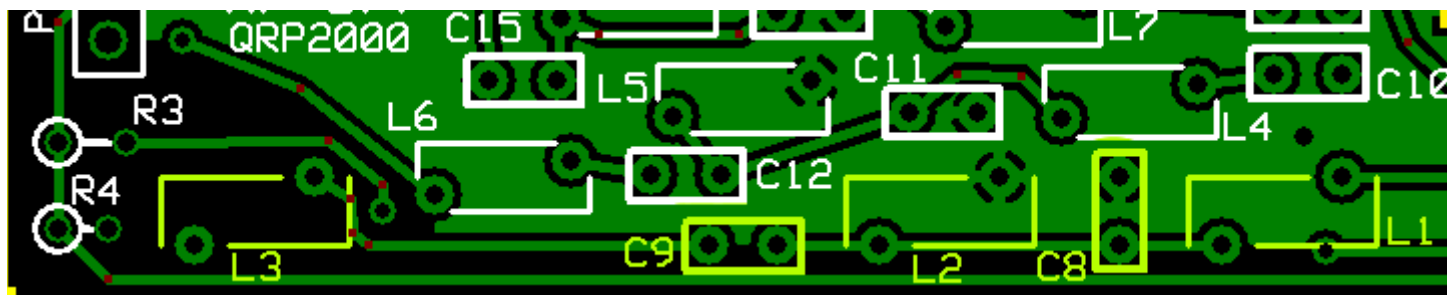
☐	L3-core	T30-2 toroid core	red 	toroid			Band 1: 1.8-4 MHz
☐	wire 1	#30enameled magnetic wire		misc			Band 1: 1.8-4 MHz

Band 1: 1.8-4 MHz Summary Build Notes

- Install the Capacitors
- Wind and Install the Coils
- [Test the Stage](#)

Band 1: 1.8-4 MHz Detailed Build Notes

Top of the Board



Install the Capacitors

Per Jan, G0BBL, solder the Ceramic Capacitors with a clearance of 1/16" to 1/8" (2mm to 3mm) away from the PCB surface.

Check	Designation	Component	Marking	Category	Orientation	Notes
☐	C09	150 pF 5%	151	Ceramic		
☐	C07	150 pF 5%	151	Ceramic		
☐	C08	330 pF 5%	331	Ceramic		

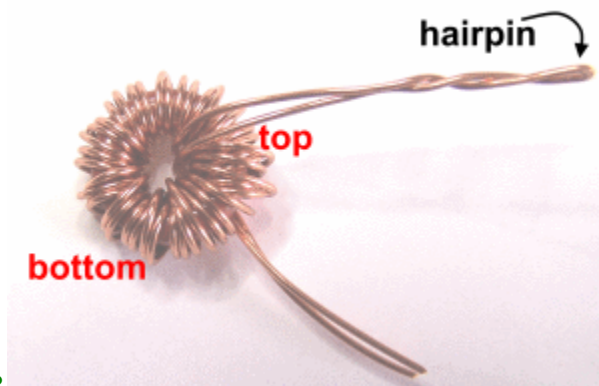
Wind and Install the Coils

L1 and L3 and their 71 turns can be a daunting task, especially given the small size of the T30-2 core. Tony Parks suggests an alternative approach to winding, counting, and keeping track of 71 turns:

- Note: in this context, "top" and "bottom" are when viewing the toroid in the horizontal position NOT in the vertical position:



- To wind L1/L3 take the 40" of wire needed for the total winding and bend it back on itself to make a long hairpin.



- The bent end of the hairpin is then used, as if it were a single wire, to loop through the core to wind on 1/2 of the total required turns making 35 loops through the core. The turns are distributed around the core to give a somewhat uniform covering of the circumference of the core
- The hair pin end is then cut open and one of the leads is looped one more time through the core to result in 71 total turns on the core: one winding of 35 turns and one winding of 36 turns.
- You end up with two pairs of leads: one pair will come out the top side of the core and one pair of leads will come out the bottom side of the core.



Identify the two windings with an ohmmeter and connect one of the leads coming out of the top side of the core to one of the leads of the other winding coming out of the bottom side of the core.

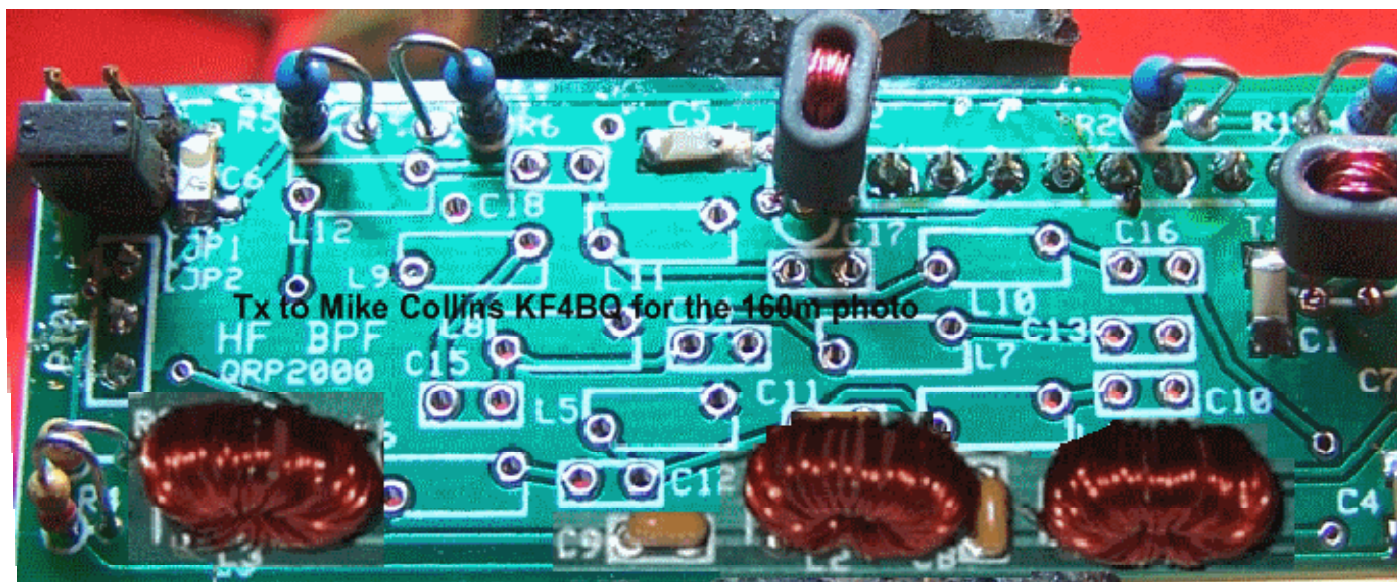
- This will result in a winding of 71 turns on the core and thus the desired inductance.

The "hairpin dual winding" technique is described here for the two 71 turn coils, but could be used for any coil which has a very large number of turns. I probably would not recommend it for low-turn-count coils, because the effect on the coil of the connection between the two windings is probably more pronounced the fewer the number of turns overall.

Check	Designation	Component	Marking	Category	Orientation	Notes
☐	wire 1	#30 enameled magnetic wire		misc		
☐	L3-core	T30-2 toroid core	red 	toroid		
☐	L2-core	T30-2 toroid core	red 	toroid		
☐	L1-core	T30-2 toroid core	red 	toroid		
☐	L1	23 uH 71T #30 on T30-2 (39")	red	coil		
☐	L3	23 uH 71T #30 on T30-2 (39")	red	coil		
☐	L2	10.7 uH 50T #30 on T30-2 (28")	red	coil		

Band 1: 1.8-4 MHz Completed Stage

Top of the Board



Band 1: 1.8-4 MHz Testing

Visual Check

Test Setup

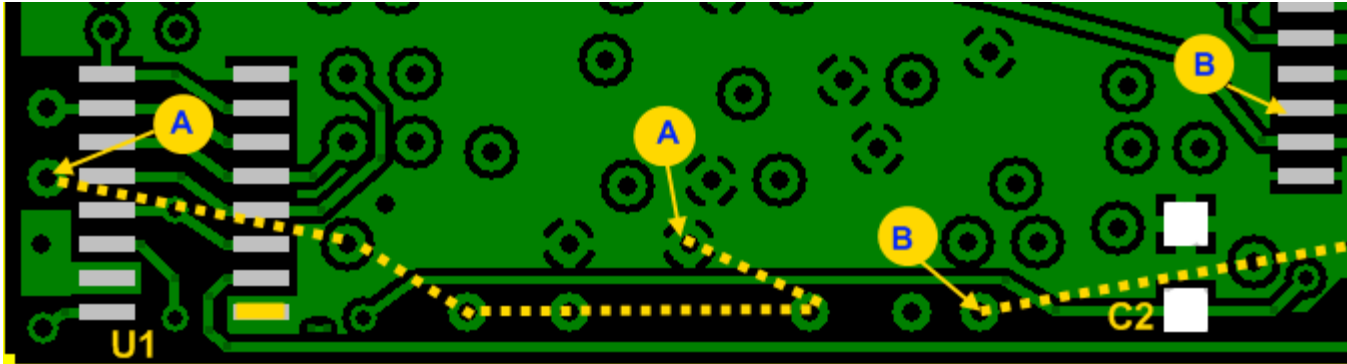
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

Pay especial attention to the joints on the inductors. If necessary, touch up the joints with your iron and/or some flux.

Continuity Tests

Test Setup

- o This tests for continuity in the "chain" of inductors for this band
- o The graphic below shows two continuity chains and their associated test points on the bottom of the board.
- o The "A and B chains" are shown using lettered dots and lines. :
- o For each of the two segments (A-A and B-B), measure the resistance between the dot pairs - you want ~0 ohms.



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
Point A to Point A	ohms	0	0	_____
Point B to Point B	ohms	0	0	_____

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