HF BPF Project

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Project Introduction

General

This kit is a daughter board, designed by Jan G0BBL and Tony KB9YIG, that provides four electronically switched band-pass filters for the Softrock Lite + Xtall V9.0 RX, replacing the single-band daughter board in the original design.

The kit can be built in two different "flavors", each providing four switchable bands:

- Option 1: A 160 - 10m version (see main schematic, below), and
- Option 2: A 80-10m + 6m version (see inset in lower left corner of schematic below)

  The kit will ship with parts that enable the builder to decide what bands (which "flavor") he/she desires. The board itself works for both option 1 and option 2. The differences are in the components for the first 2 bands (Caps C07 - C12 and coils L1 - L6.

  The board can also be used with the earlier RXTX V6.3 and RX V8.3 kits. However, in those cases, the builder must supply the required +5 Vdc bus (and ground connection) to the HF-BPF board, there being no matching sockets therefor on the earlier boards.

  If you use Rocky as your SDR, the project initially is manually switched, using two header pins and their associated jumpers.

  Starting with v9.0 kits shipped after 21 Feb 2009, the USB interface microprocessor will be an ATTiny85 device with JanG0BBL's new enhanced features code. If there is interest in a programmed ATTiny85 device for an existing v9.0 receiver, contact Tony Parks and he will price the replacement device to cover device cost, PayPal loss and mailing cost.

  PowerSDR and Winrad have enabled the programmatic switching of the board.

  Included in the kit is a two pin socket section to interface with J3 on the RX v9.0 board. Wires need to be connected to the two jumper plug locations, (with the jumper plugs not used), on the switched BPF board to the two pin socket section. This then is the plug connection between the v9.0 board and the electronically switched BPF board. An insulated sleeve may be put on the little plug to give it a more finished look and a mark may be added to indicate polarization.

  ### Filter VNA Tests

  Mike Collins KF4BQ tested (on 13 December 2008) the completed board and the results can be found at this link.

  The latest schematics (1/12/2009) are at the following links:

  - Option 1 - 1.5-30 MHz
  - Option 2 - 3.5-30 MHz plus 6m

  ### BF-BPF is Now in Production

  Kit price for the electronically switched v9.0 BPF is $14 for US/Canada and $15 for DX where mailing costs are included in each kit price.

  ### Theory of Operation

  - The board gets its power and control signals, as well as inputs and outputs, from the appropriate points on the Softrock Lite + Xtall RX V9.0
  - Control signals (two inputs that can each be "high" or "low", resulting in four possible combinations) are available at J3 on the V9.0 board and are provided to this board via a cable connection to the holes for P102.
  - Power (regulated +5 Vdc) comes from the 3-pin J2 on the V9.0 board via P101
  - The RF antenna inputs and the balanced RF outputs are facilitated via P100, which plugs into the V9.0 board's 9-pin J1.
  - RF in and out are coupled via transformers. T1 couples RF from the antenna into U1, the first of two switching ICs. The second switch, using the same truth table, switches the appropriate bandpass filter circuit through to the output transformer, T2, and thence to the pins of P100 that feed the balanced signal to the V9.0 RX.
  - Each switch has four outputs, one for each of the four bandpass filters implemented on the board. The switch routes the RF to the appropriate filter, based upon the levels present at S0 and S1 (which can be set via JP1 and JP2), according to the following truth table:

JP1 (S0)	JP2 (S1)	Band
jumpered	jumpered	1.8=4 MHz

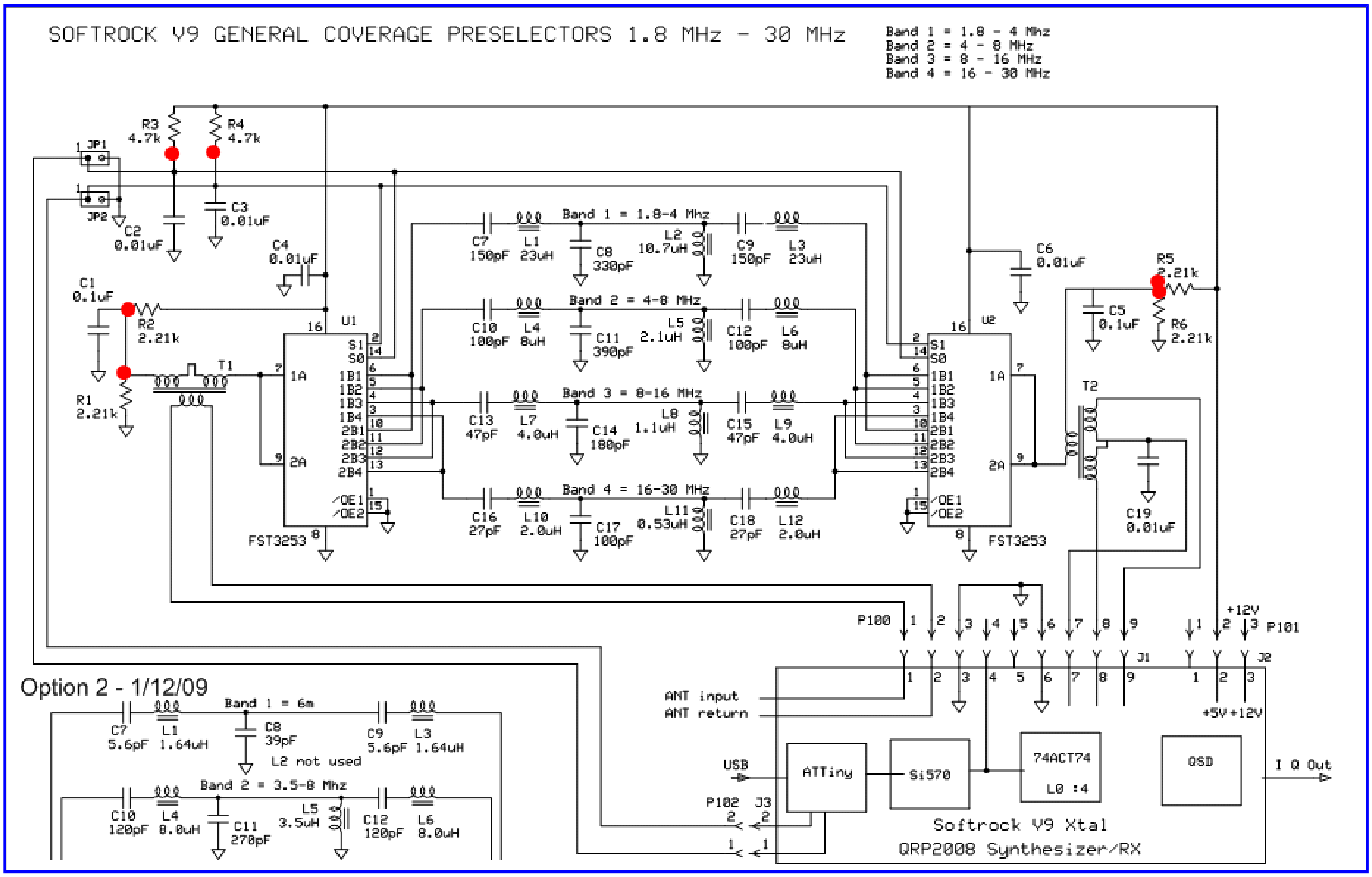
open	jumpered	4-8 MHz
jumpered	open	8-16 MHz
open	open	16-30 MHz

A Few Words About The Coils from Jan G0BBL
Turn Counts and Inductances

- Coil winding data is based on the manufacturer's data used in the toroid calculators that are avaiable. If you do NOT have an Inductance meter, then please use these values.
- In practice the value of the toroids will be slightly HIGHER than the design value. This has been confirmed by a number of amateurs. However as it is much EASIER to take off a turn then to ADD turns, I have suggested to Tony and Robby to use the TOROID calculator data instead of the original values which I provided (obtained by measuring coils used in prototype)
- Bodo DJ9CS and Mike W1USN checked their winding data and also suggested to use the data from the Toroid calculator. Please note that the value of the core AL may vary by +/- 10% as has been mentioned elsewhere.
  - **Critical Coils**
    - From experience the inductance of the Centre (center, for the colonials) Coil (ie L2. L5,. L8 and L11) is critical for setting the Centre Frequency of the BPF concerned. If you are sure that a BPF is too low in frequency then you may take the effort to take a turn off the centre inductor.
    - If you have a band which is completely out then closely check the ceramic capacitors. A hairline crack may indicate the capacitor is faulty. For this reason I would suggest to mount C's about 3mm (1/8") away from the PCB. Capacitors generally will NOT survive desoldering so do not reuse caps.

Project Schematic

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

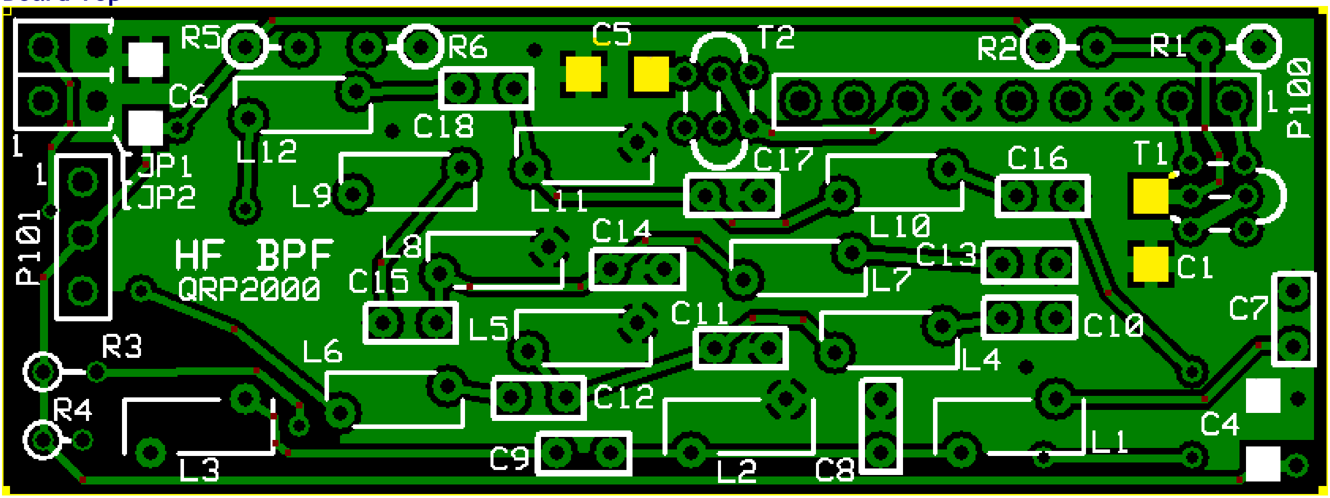


Project Bill of Materials

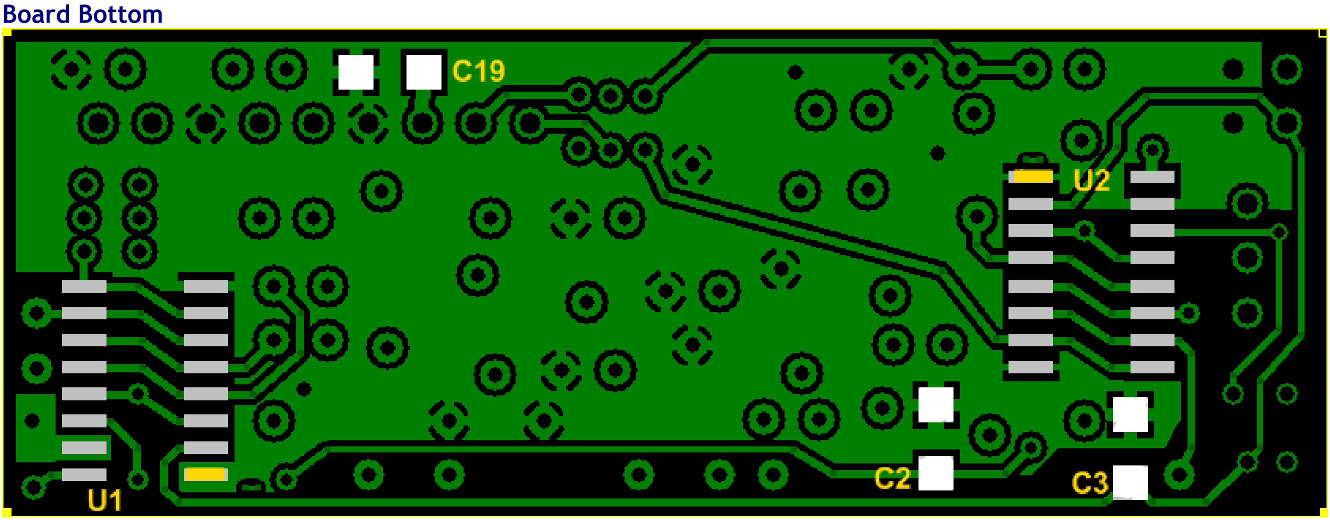
See Project Bill of Materials

Project Expert's (terse) Build Notes

Board Top



Board Bottom



- Install all SMT and SOIC components to the bottom of the board, then the top of the board
- Wind and install the transformers
- Wind and install the Coils
- Install the ceramic capacitors
- Install the resistors
- Install the jumpers and connectors

Project Detailed Build Notes

For the non-expert builders among us, this site takes you through a stage-by-stage build of the kit. Each stage is self-contained and outlines the steps to build and test the stage. This ensures that you will have a much better chance of success once you reach the last step, since you will have successfully built and tested each preceding stage before moving on to the next stage.

Each stage is listed below, in build order, and you can link to it by clicking on its name below (or in the header and/or footer of each web page).

- Inventory the Bill of Materials
- Build and Test the Busses and Rails Stage
- Build and Test the Switches Stage
- Build and Test the Transformers Stage

- Build and Test the Band 1: 1.8-4 MHz Stage
- Build and Test the Band 2: 4-8 MHz Stage
- Build and Test the Band 3: 8-16 MHz Stage
- Build and Test the Band 4: 16-30 MHz Stage
- Build and Test the Band1a 6m Stage
- Build and Test the Band2a 3.5-8 MHz Stage

Background Info

Tools

Winding Inductors

To learn how to wind coils and transformers, please read the

- tips from the experts and then
- view the excellent videos on KC0WOXs Website
- or take a read of Dinesh's VU2FD guidelines.

Soldering

The video below describes techniques for soldering SOIC 14 (and 16 and 8) SMDs

View the above in full-screen mode on Youtube.

- Read the Primer on SMT Soldering at the Sparkfun site. It is a very good read and it speaks great truths. Then take the time to watch the video tutorial on soldering an SOIC SMD IC.
- Solder Stations. Don't skimp here. Soldering deficiencies account for 80 percent of the problems surfaced in troubleshooting. It is preferable to have an ESD-safe station, with a grounded tip. A couple of good stations that are relatively inexpensive are:
  - 

    Velleman VTSS5U 50W Solder Station (approx $20 at Frys)

- Harbor Freight ESD Solder Station (under $50)

ESD Protection

- Avoid carpets in cool, dry areas.
- Leave PC cards and memory modules in their anti-static packaging until ready to be installed.
- Dissipate static electricity before handling any system components (PC cards, memory modules) by touching a grounded metal object, such as the system unit unpainted metal chassis.
- If possible, use antistatic devices, such as wrist straps and antistatic mats (see Radio Shack's Set for $25 or the JameCo AntiStatic mat for $15)).
- Always hold a PC card or memory module by its edges. Avoid touching the contacts and components on the memory module.
- Before removing chips from insulator, put on the wrist strap connected to the ESD mat. All work with CMOS chips should be done with the wrist strap on.
- As an added precaution before first touching a chip, you should touch a finger to a grounded metal surface.
- If using a DMM, its outside should be in contact with the ground of the ESD mat, and both leads shorted to this ground before use.
- See the review of ESD Precautions at this link.

Work Area

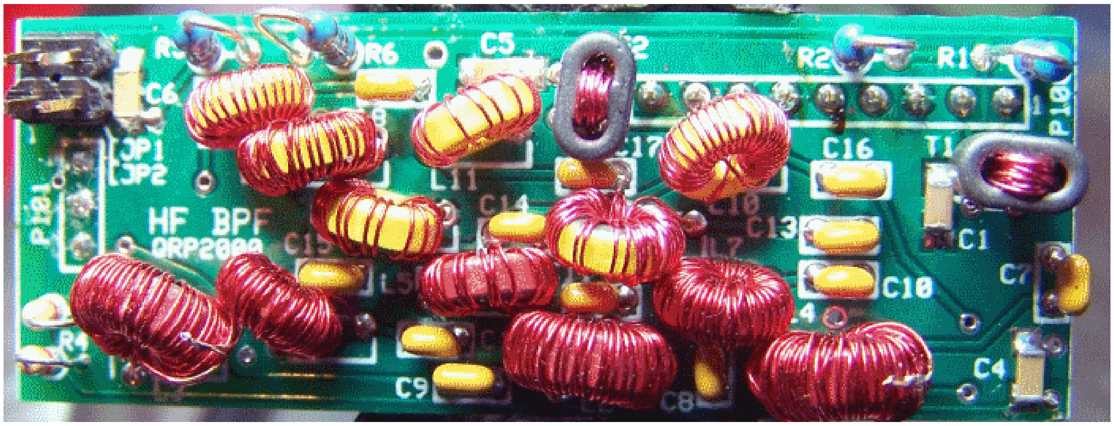
- You will need a well-lit work area and a minimum of 3X magnification (the author uses a cheap magnifying fluorescent light with a 3X lens. This is supplemented by a hand-held 10 X loupe - with light - for close-in inspection of solder joints and SMT installation.
- You should use a cookie sheet or baking pan (with four sides raised approximately a half an inch) for your actual work space. It is highly recommended for building on top of in order to catch stray parts, especially the tiny SMT chips which, once they are launched by an errant tweezer squeeze, are nigh on impossible to find if they are not caught on the cookie sheet.

Misc Tools

- It is most important to solidly clamp the PCB in a holder when soldering. A "third-hand" (e.g., Panavise or the Hendricks kits PCB Vise) can hold your board while soldering.   In a pinch, you can get by with a simple third-hand, alligator clip vise. Jan G0BBL suggests "A very cheap way is to screw a Large Document Clip to a woodblock which will clamp the side of a PCB."
- Magnifying Head Strap
- Tweezers (bent tip is preferable).
- A toothpick and some beeswax - these can be used to pickup SMT devices and hold them steady while soldering.
- Diagonal side cutters.
- Small, rounded jaw needle-nose pliers.
- Set of jewelers' screwdrivers
- An Exacto knife.
- Fine-grit emery paper.

Project Completed Stage

Top of the Board



Bottom of the Board

View of Completed Bottom

Project Testing

Each stage will have a "Testing" Section, outlining one or more tests that, when successfully completed, provide you with the confidence and assurance that you are heading in the right direction towards a fully tested and built transceiver.

When you perform a test, you should always record the results of the test where indicated in the Testing section. This will make troubleshooting via the reflector much easier, since you will be communicating with the experts using a standard testing and measurement regime.

When comparing measurements to those published in these notes, the builder should be aware that actual and expected values could vary by as much as +/- 10%. The idea behind furnishing "expected/nominal" measurement values is to provide the builder with a good, "ballpark" number to determine whether or not the test has been successful. If the builder has concerns about his measurements, he should by all means pose those concerns as a query in the Softrock reflector so the experts can provide assistance.

It goes without saying that you should ALWAYS precede any tests with a very careful, minute inspection (using the best light and magnification available to you) to be sure all solder joints are clean and there are no solder bridges or cold joints.

This kit can be built and reliably tested using nothing more than a common multimeter. Tests assume that the builder has a decent digital multimeter of sufficiently high input impedance as to minimize circuit loading issues. Measurements will be taken of current draws, test point voltages, and resistances.

Most stages will have a current draw test, in which the builder tests the stage's current draw in two different ways:

- **First, testing the draw through a current-limiting resistor**
- **Then, when that test is OK, removing the current-limiting resistor and measuring the real current draw.**

Some tests will require you to use your ham radio to receive or generate a signal of a specified frequency in order to test transmitters, oscillators, dividers, and/or receivers.

Optional testing. If the builder has (access to) a dual channel oscilloscope, along with an audio signal generator and an RF signal generator, and feels the need to perform tests beyond the basic DMM tests, certain stages will include in their testing section some optional tests involving this advanced equipment.

The IQGen or DQ-Gen programs available free from Michael Keller, DL6IAK, can be used in a pinch to get the sound card to produce audio tones for injection into the circuit.
You can always use Rocky to generate I and Q signals for tests requiring these audio signals (this is the author's preferred way)

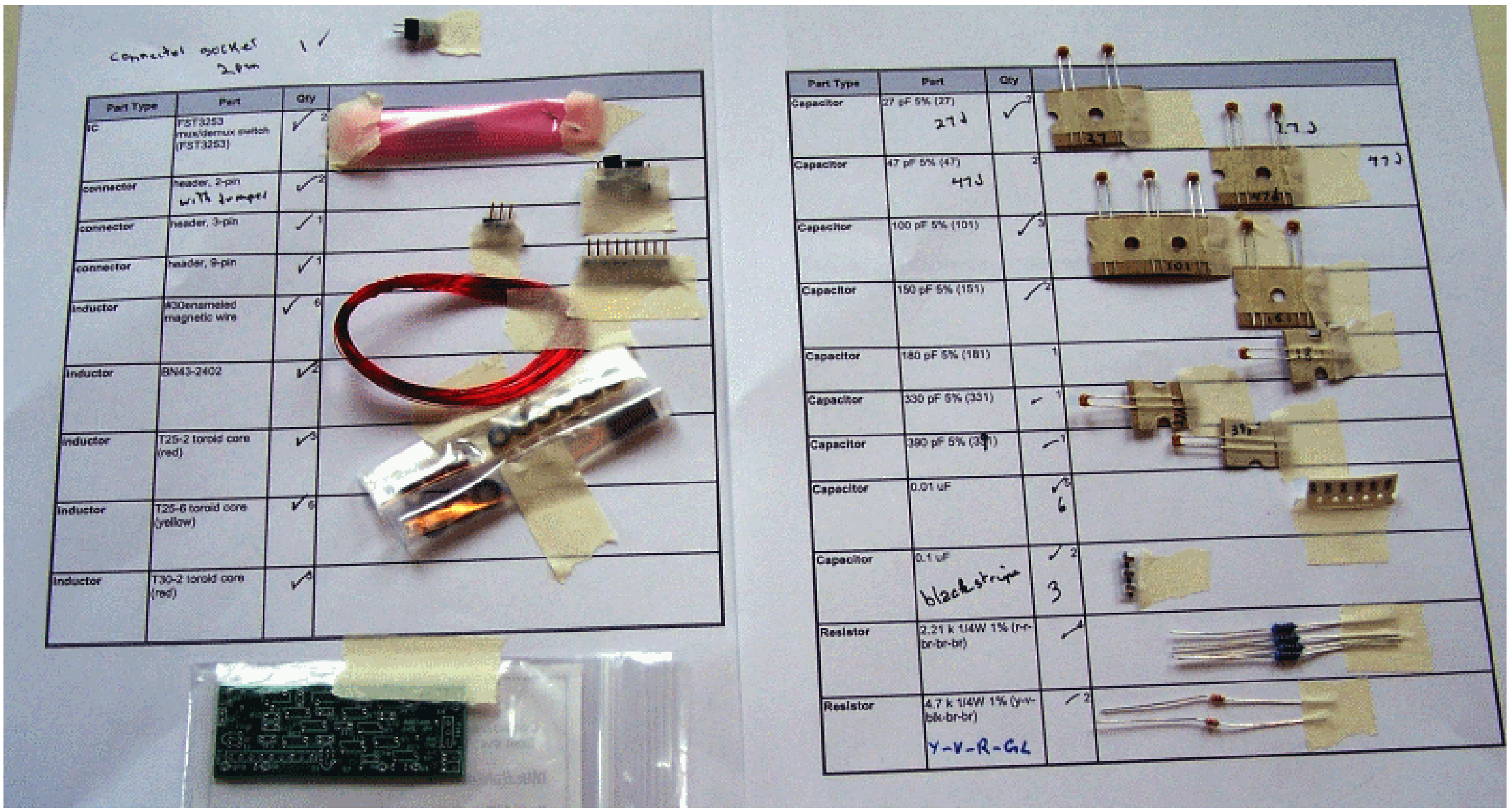
Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 00_Bill of Materials

Bill of Materials Introduction

General

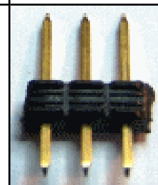
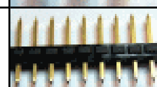
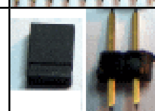
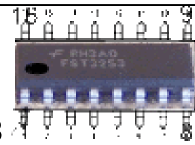
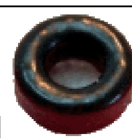
Inventory your kit before doing anything else. You may want to print out and use the inventory sheet provided in this web site to aid you in identifying and arranging the various components.



Bill of Materials

Component Inventory Summary

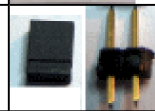
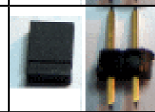
Component	Value	Markings	Quantity
Capacitor-Ceramic	5.6 pF 5%	5.6	2
Capacitor-Ceramic	27 pF 5%	27J	2
Capacitor-Ceramic	39pF 5%	39J	1
Capacitor-Ceramic	47 pF 5%	47J	2
Capacitor-Ceramic	100 pF 5%	101	3
Capacitor-Ceramic	120 pF 5%	121	2
Capacitor-Ceramic	150 pF 5%	151	2
Capacitor-Ceramic	180 pF 5%	181	1
Capacitor-Ceramic	270 pF 5%	271	1

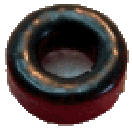
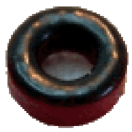
Capacitor-Ceramic	330 pF 5%	331	1
Capacitor-Ceramic	390 pF 5%	391	1
Capacitor-SMT 1206	0.01 uF		5
Capacitor-SMT 1206	0.1 uF	black stripe 	2
Capacitor-unused	not used		1
connector-header	header, 3-pin		1
connector-header	header, 9-pin		1
connector-jumper	header, 2-pin w/jumper		2
connector-socket	header,female, 2 pin		1
IC-SOIC-16	FST3253 mux/demux switch	FST3253 	2
inductor-binocular core	BN43-2402		2
inductor-coil	0.53 uH 14T #30 on T25-6 (10")	yellow	1
inductor-coil	1.1 uH 20T #30 on T25-6 (11")	yellow	1
inductor-coil	1.64 uH 23T #30 on T25-6 (15")	yellow	2
inductor-coil	2 uH 27T #30 on T25-6 (16")	yellow	2
inductor-coil	2.1 uH 24T #30 0n T25-2 (14")	red	1
inductor-coil	3.5 uH 32T #30 on T25-2 (15")	red	1
inductor-coil	4 uH 38T #30 on T25-6 (18")	yellow	2
inductor-coil	8 uH 49T #30 on T25-2 (22")	red	4
inductor-coil	10.7 uH 50T #30 on T30-2 (28")	red	1
inductor-coil	23 uH 71T #30 on T30-2 (39")	red	2
inductor-misc	#30enameled magnetic wire		6
inductor-toroid	T25-2 toroid core	red 	3
inductor-toroid	T25-6 toroid core	yellow 	6
inductor-toroid	T30-2 toroid core	red 	3
inductor-transformer	4T #30 trifilar BN43-2402 (7")		1
inductor-transformer	8T/2T bifilar BN43-2402 (10")		1

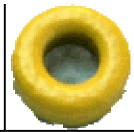
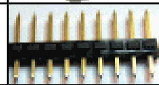
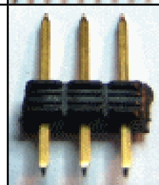
Resistor-1/4W	2.21 k 1/4W 1%	r-r-br-br-br 	4
Resistor-1/4W	4.7 k 1/4 W 5%	y-v-r-gl 	2

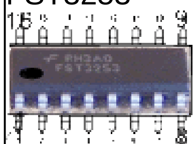
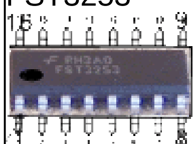
Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❑	C01	0.1 uF	black stripe 	SMT 1206			Busses and Rails
❑	C02	0.01 uF		SMT 1206			Busses and Rails
❑	C03	0.01 uF		SMT 1206			Busses and Rails
❑	C04	0.01 uF		SMT 1206			Busses and Rails
❑	C05	0.1 uF	black stripe 	SMT 1206			Busses and Rails
❑	C06	0.01 uF		SMT 1206			Busses and Rails
❑	C07	5.6 pF 5%	5.6	Ceramic			Band1a 6m
❑	C07	150 pF 5%	151	Ceramic			Band 1: 1.8-4 MHz
❑	C08	330 pF 5%	331	Ceramic			Band 1: 1.8-4 MHz
❑	C08	39pF 5%	39J	Ceramic			Band1a 6m
❑	C09	150 pF 5%	151	Ceramic			Band 1: 1.8-4 MHz
❑	C09	5.6 pF 5%	5.6	Ceramic			Band1a 6m
❑	C10	120 pF 5%	121	Ceramic			Band2a 3.5-8 MHz
❑	C10	100 pF 5%	101	Ceramic			Band 2: 4-8 MHz
❑	C11	390 pF 5%	391	Ceramic			Band 2: 4-8 MHz
❑	C11	270 pF 5%	271	Ceramic			Band2a 3.5-8 MHz
❑	C12	120 pF 5%	121	Ceramic			Band2a 3.5-8 MHz
❑	C12	100 pF 5%	101	Ceramic			Band 2: 4-8 MHz
❑	C13	47 pF 5%	47J	Ceramic			Band 3: 8-16 MHz
❑	C14	180 pF 5%	181	Ceramic			Band 3: 8-16 MHz
❑	C15	47 pF 5%	47J	Ceramic			Band 3: 8-16 MHz
❑	C16	27 pF 5%	27J	Ceramic			Band 4: 16-30 MHz
❑	C17	100 pF 5%	101	Ceramic			Band 4: 16-30 MHz
❑	C18	27 pF 5%	27J	Ceramic			Band 4: 16-30 MHz
							Busses and

❏	C19	0.01 uF		SMT 1206			Rails
❏	JP1	header, 2-pin w/jumper		jumper			Busses and Rails
❏	JP2	header, 2-pin w/jumper		jumper			Busses and Rails
❏	L04	8 uH 49T #30 on T25-2 (22")	red	coil			Band2a 3.5-8 MHz
❏	L05	3.5 uH 32T #30 on T25-2 (15")	red	coil			Band2a 3.5-8 MHz
❏	L06	8 uH 49T #30 on T25-2 (22")	red	coil			Band2a 3.5-8 MHz
❏	L1	23 uH 71T #30 on T30-2 (39")	red	coil			Band 1: 1.8-4 MHz
❏	L1	1.64 uH 23T #30 on T25-6 (15")	yellow	coil			Band1a 6m
❏	L10	2 uH 27T #30 on T25-6 (16")	yellow	coil			Band 4: 16-30 MHz
❏	L10-core	T25-6 toroid core	yellow 	toroid			Band 4: 16-30 MHz
❏	L11	0.53 uH 14T #30 on T25-6 (10")	yellow	coil			Band 4: 16-30 MHz
❏	L11-core	T25-6 toroid core	yellow 	toroid			Band 4: 16-30 MHz
❏	L12	2 uH 27T #30 on T25-6 (16")	yellow	coil			Band 4: 16-30 MHz
❏	L12-core	T25-6 toroid core	yellow 	toroid			Band 4: 16-30 MHz
❏	L1-core	T30-2 toroid core	 red	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	not used		unused			Band1a 6m
❏	L2-core	T30-2 toroid core		toroid			Band 1: 1.8-4 MHz

			red 				
❏	L3	23 uH 71T #30 on T30-2 (39")	red	coil			Band 1: 1.8-4 MHz
❏	L3	1.64 uH 23T #30 on T25-6 (15")	yellow	coil			Band1a 6m
❏	L3-core	T30-2 toroid core	red 	toroid			Band 1: 1.8-4 MHz
❏	L4	8 uH 49T #30 on T25-2 (22")	red	coil			Band 2: 4-8 MHz
❏	L4-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❏	L5	2.1 uH 24T #30 0n T25-2 (14")	red	coil			Band 2: 4-8 MHz
❏	L5-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❏	L6	8 uH 49T #30 on T25-2 (22")	red	coil			Band 2: 4-8 MHz
❏	L6-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❏	L7	4 uH 38T #30 on T25-6 (18")	yellow	coil			Band 3: 8-16 MHz
❏	L7-core	T25-6 toroid core	yellow 	toroid			Band 3: 8-16 MHz
❏	L8	1.1 uH 20T #30 on T25-6 (11")	yellow	coil			Band 3: 8-16 MHz
❏	L8-core	T25-6 toroid core	yellow 	toroid			Band 3: 8-16 MHz
❏	L9	4 uH 38T #30 on T25-6 (18")	yellow	coil			Band 3: 8-16 MHz
❏	L9-core	T25-6 toroid core	yellow	toroid			Band 3: 8-16 MHz

							
❏	P100	header, 9-pin		header			Busses and Rails
❏	P101	header, 3-pin		header		Pins: 1=gnd; 2=+5 Vdc; 3=+12Vdc. From V9.0 J2	Busses and Rails
❏	P102	header,female, 2 pin		socket		2 pin socket provided for later connect to V9.0 RX's J3 (for eventual programmatic band switching, once the microcontroller is reprogrammed)	Bill of Materials
❏	R01	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W		Busses and Rails
❏	R02	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E		Busses and Rails
❏	R03	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E		Busses and Rails
❏	R04	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E		Busses and Rails
❏	R05	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E		Busses and Rails
❏	R06	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W		Busses and Rails
❏	T1	4T #30 trifilar BN43-2402 (7")		transformer			Transformers
❏	T1 wire	#30enameled magnetic wire		misc		3 lengths of #30, each 7" (18cm) long, should do OK	Transformers
❏	T1-core	BN43-2402		binocular core			Transformers
❏	T2	8T/2T bifilar BN43-2402 (10")		transformer			Transformers
		#30enameled				primary: one 10" (25 cm) length;	

❏	T2 wire	magnetic wire		misc		secondaries: two 5" (12.5 cm) length should do OK	Transformers
❏	T2-core	BN43-2402		binocular core			Transformers
❏	U1	FST3253 mux/demux switch	FST3253 	SOIC-16			Switches
❏	U2	FST3253 mux/demux switch	FST3253 	SOIC-16			Switches
❏	wire 1	#30enameled magnetic wire		misc			Band 1: 1.8-4 MHz
❏	wire 2	#30enameled magnetic wire		misc			Band 2: 4-8 MHz
❏	wire 3	#30enameled magnetic wire		misc			Band 3: 8-16 MHz
❏	wire 4	#30enameled magnetic wire		misc			Band 4: 16-30 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 01_Busses and Rails

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Busses and Rails Introduction

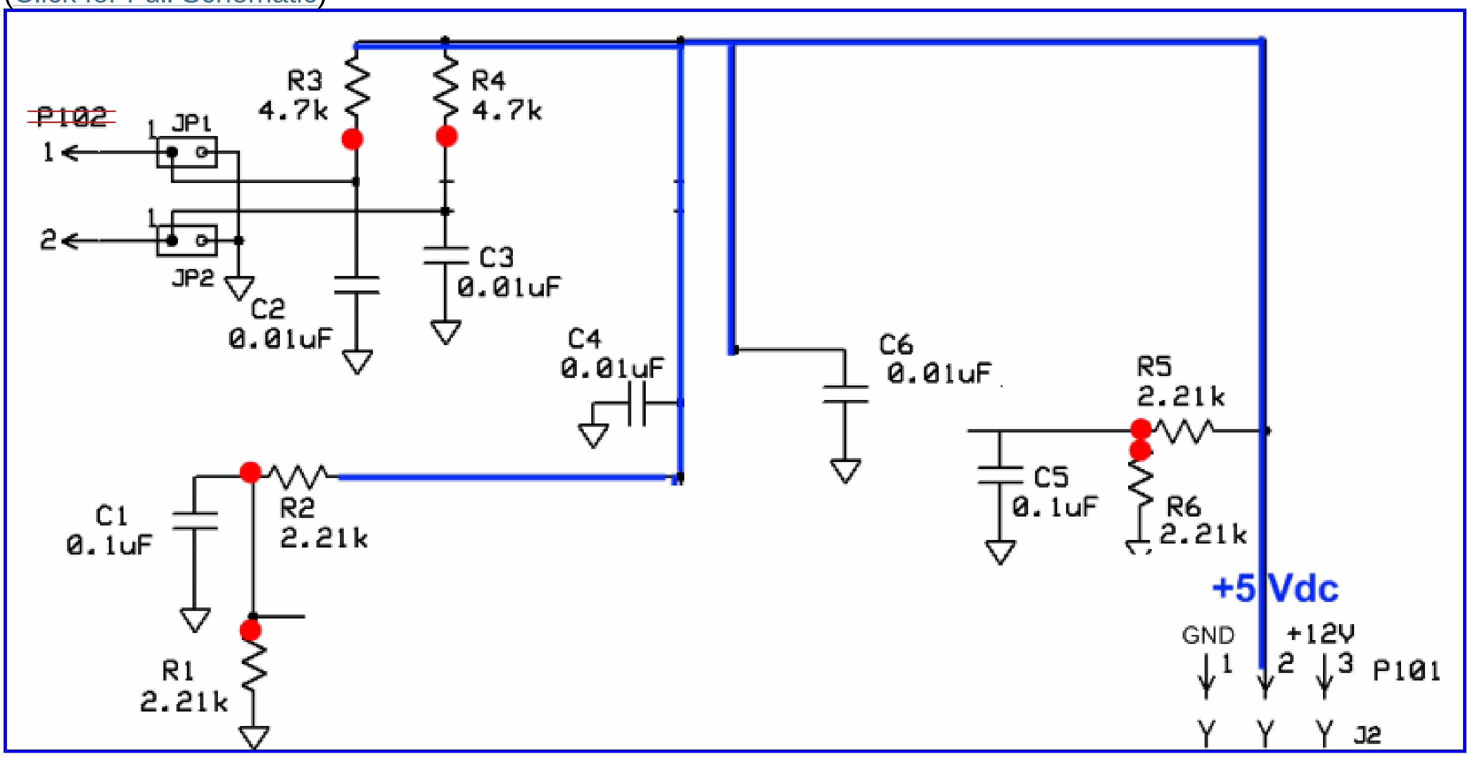
General

This stage provides the infrastructure "backbone" needed to support the switches and band filter chains.

Busses and Rails Schematic

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

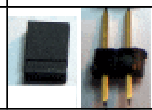
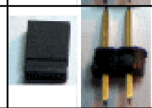
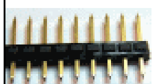
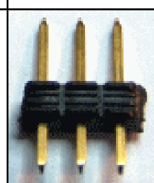
(Click for Full Schematic)



Busses and Rails Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C01	0.1 uF	black stripe 	SMT 1206			Busses and Rails
❏	C02	0.01 uF		SMT 1206			Busses and Rails
❏	C03	0.01 uF		SMT 1206			Busses and Rails

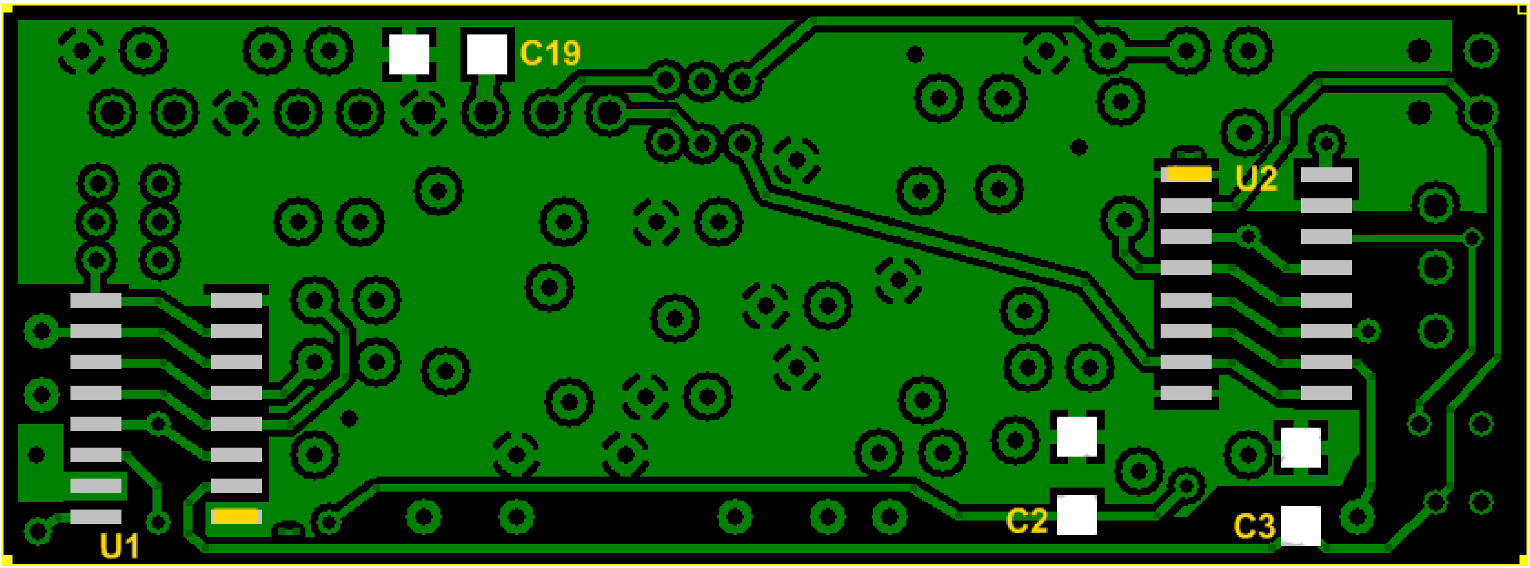
❑	C04	0.01 uF		SMT 1206			Busses and Rails
❑	C05	0.1 uF	black stripe 	SMT 1206			Busses and Rails
❑	C06	0.01 uF		SMT 1206			Busses and Rails
❑	C19	0.01 uF		SMT 1206			Busses and Rails
❑	JP1	header, 2-pin w/jumper		jumper			Busses and Rails
❑	JP2	header, 2-pin w/jumper		jumper			Busses and Rails
❑	P100	header, 9-pin		header			Busses and Rails
❑	P101	header, 3-pin		header		Pins: 1=gnd; 2=+5 Vdc; 3=+12Vdc. From V9.0 J2	Busses and Rails
❑	R01	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W		Busses and Rails
❑	R02	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E		Busses and Rails
❑	R03	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E		Busses and Rails
❑	R04	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E		Busses and Rails
❑	R05	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E		Busses and Rails
❑	R06	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W		Busses and Rails

Busses and Rails Summary Build Notes

- Install Bottomside SMT Caps
- Install Topside SMT Caps
- Install Resistors
- Install Connectors
- Test the Stage

Busses and Rails Detailed Build Notes

Bottom of the Board

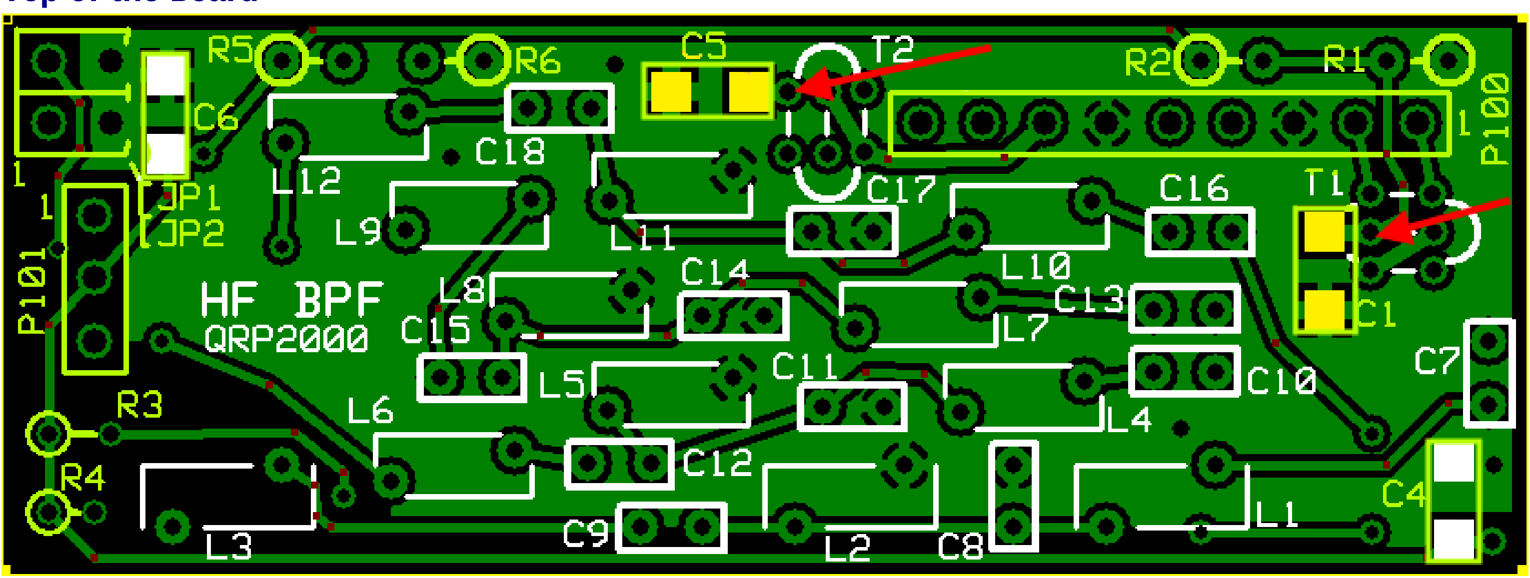


Install Bottomside SMT Caps

See graphic above: pads for 0.01 uF caps are white

Check	Designation	Component	Marking	Category	Orientation	Notes
❏	C19	0.01 uF		SMT 1206		
❏	C02	0.01 uF		SMT 1206		
❏	C03	0.01 uF		SMT 1206		

Top of the Board



Install Topside SMT Caps

See graphic above: pads for 0.01 uF caps are white

Take great care in soldering C5 and C1 to the board. The right-hand end of C5 and the top end of C1 are very close to thru-holes for T2 and T1 (see red arrows on the topside board view), respectively. You do NOT want to inadvertently splash solder

into these holes (transformer mounting is hard enough without having to deal with solder residue blocking the holes).
The author used a fine-pointed, wooden toothpick to block the holes when soldering these caps.

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	C06	0.01 uF		SMT 1206		
❑	C01	0.1 uF	black stripe 	SMT 1206		
❑	C04	0.01 uF		SMT 1206		
❑	C05	0.1 uF	black stripe 	SMT 1206		

Install Resistors

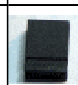
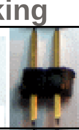
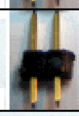
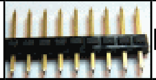
Resistor Orientation Codes

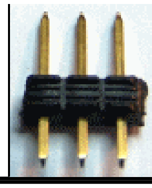
Note the orientation ("NS" means the resistor barrel is in the "northern" hole and the hairpin lead is in the "southern" hole. Orientation codes "WE", "EW", and "SN" operate in a similar fashion

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	R01	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W	
❑	R02	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E	
❑	R03	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E	
❑	R04	4.7 k 1/4 W 5%	y-v-r-gl 	1/4W	W-E	
❑	R05	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	W-E	
❑	R06	2.21 k 1/4W 1%	r-r-br-br-br 	1/4W	E-W	

Install Connectors

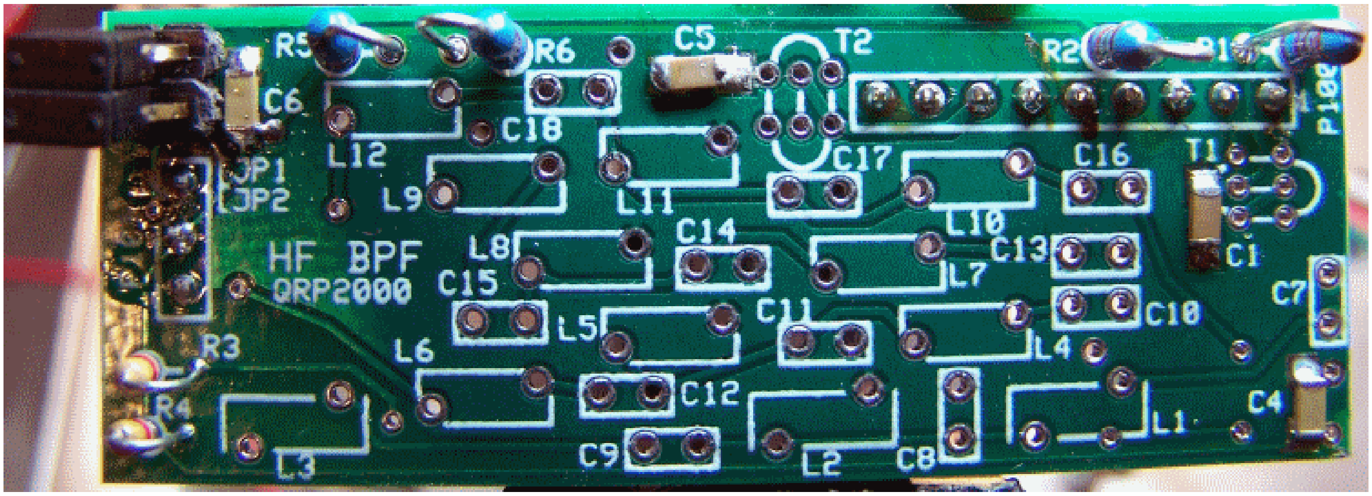
- **JP1 & 2 installed to board top, with Pins pointing upwards**
- **P100 & 101 installed to bottom of board, with pins pointing downward (so as to ultimately mate with the V9.0 board)**
- **Once the firmware for the V9.0 RX is rewritten to provide the control signals for the BPF switching, JP1 and JP2 will be connected via a cable to the (male) J3 on the V9.0 RX board**

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	JP1	header, 2-pin w/jumper	 	jumper		
❑	JP2	header, 2-pin w/jumper	 	jumper		
❑	P100	header, 9-pin		header		
						Pins: 1=gnd;

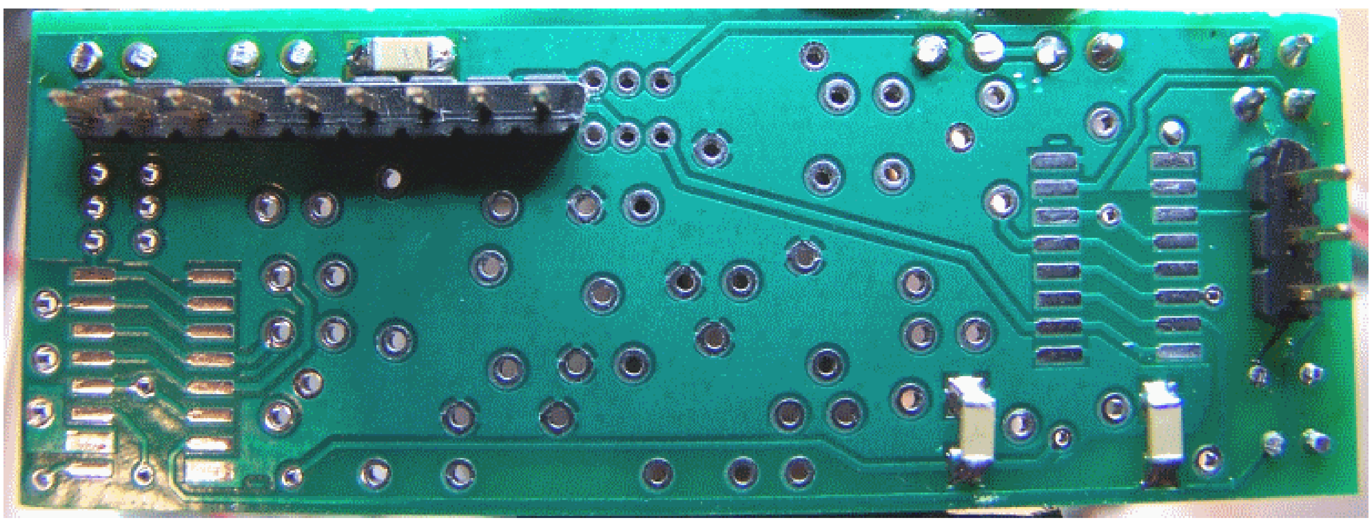
❑	P101	header, 3-pin		header		2=+5 Vdc; 3=+12Vdc. From V9.0 J2

Busses and Rails Completed Stage

Top of the Board



Bottom of the Board



Busses and Rails Testing

Visual Check

Test Setup

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

Resistance Tests

Test Setup

The following tests help validate there is are good solder joints and no shorts on the power rail and should be passed before applying power to the HF-BPF board. If these tests are passed, you

can be pretty sure the voltage tests will succeed.

Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
P101-pin 2 to P100 pin 3	k ohms	2.21	2.21	________
Right-hand pin of JP1 to P100 pin 3	ohms	0	0	________
Right-hand pin of JP2 to P100 pin 3	ohms	0	0	________
R4 hairpin to P101 pin 2	k ohms	4.7	4.72	________
R3 hairpin to P101 pin 2	k ohms	4.7	4.63	________
JP1 left-hand pin to P101 pin 2	k ohms	4.7	4.63	________
JP2 left-hand pin to P101 pin 2	k ohms	4.7	4.72	________
C5 right-hand end to P101 pin 2	k ohms	1.7	1.64	________
C1 top end to P101 pin 2	k ohms	1.7	1.65	________

VoltageTests

Test Setup

This test assumes you have a V9.0 Lite + Xtall RX board that has been completed through (at least) the power supply stage. This is required because you want to test the "fit" of P100 and P101 to their corresponding jacks (J1 and J2) on the RX board and the RX board is a convenit=ent source of regulated 5 Vdc power.

- **Test the installation of P100 and P101 for "fit" by plugging the HF-BPF board into J1 and J3 of the V9.0 RX board**
- **Make sure JP1 and JP2 are un-jumpered. This should ensure that R3 abd R4 cause Pins 1 of JP1 and JP2 to be pulled up to the 5 volt rail.**
- **Apply power (9-12 Vdc) to the V9.0 RX board**
- **Measure the voltages with respect to ground according to the table below (you can use either of the right-hand pins on JP1 or JP2 as a convenient ground connection)**

Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
P101-Pin2	Vdc	5	4.96	________
R6, hairpin lead	Vdc	2.5	2.48	________
R1, hairpin lead	Vdc	2.5	2.48	________
R3, hairpin lead	Vdc	5	2.96	________
R4, hairpin lead	Vdc	5	4.96	________

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 02_Switches

Switches Introduction

General

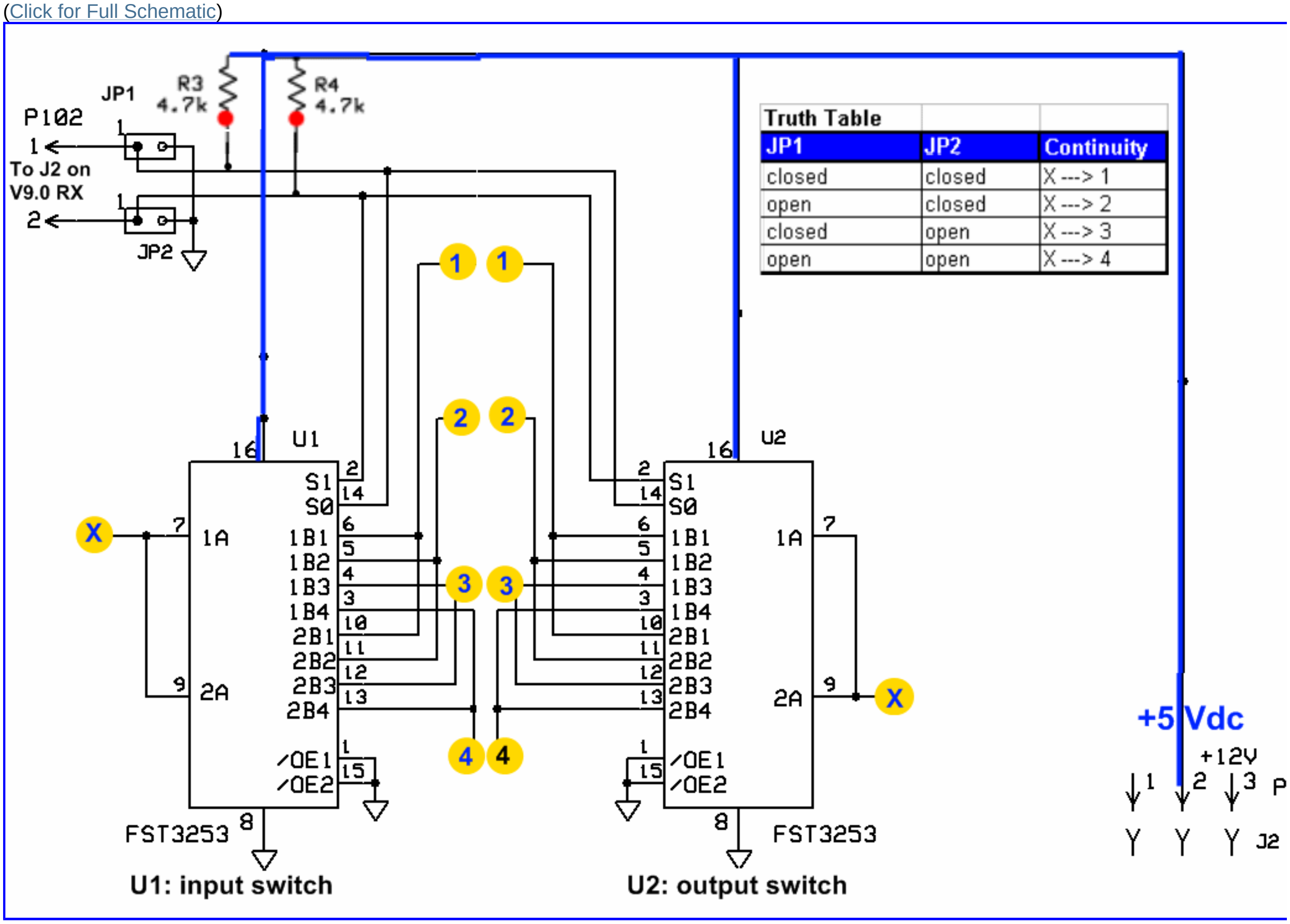
This stage uses two extremely sensitive components, U1 and U2. Be sure to take appropriate ESD (anti-static) precautions when working in this stage.
In fact, if you are building this during the "static season", you might want to put off the build/test steps related to these switches until AFTER completing all the other stages.

This stage provides the two FST 3253 1-4 switches to permit switching a particular band's filter "chain" into or out of the board's outputs. The switches essentially "connect" the Input transformer, via a set of filters, to the output transformer

P102 is not initially implemented. Once the capability to map frequency changes to bands and the interfacing of that to the ATTINY45 are implemented, you will need to connect the outermost pin of JP1 and JP2 tvia a short 2 wire cable to P102 (female 2-pin header) for plugging into J2 of the V9.0 RX

Switches 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)

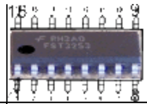
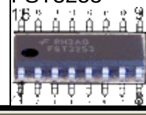


Truth Table		
JP1	JP2	Continuity
closed	closed	X ---> 1
open	closed	X ---> 2
closed	open	X ---> 3
open	open	X ---> 4

Switches Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
			FST3253				

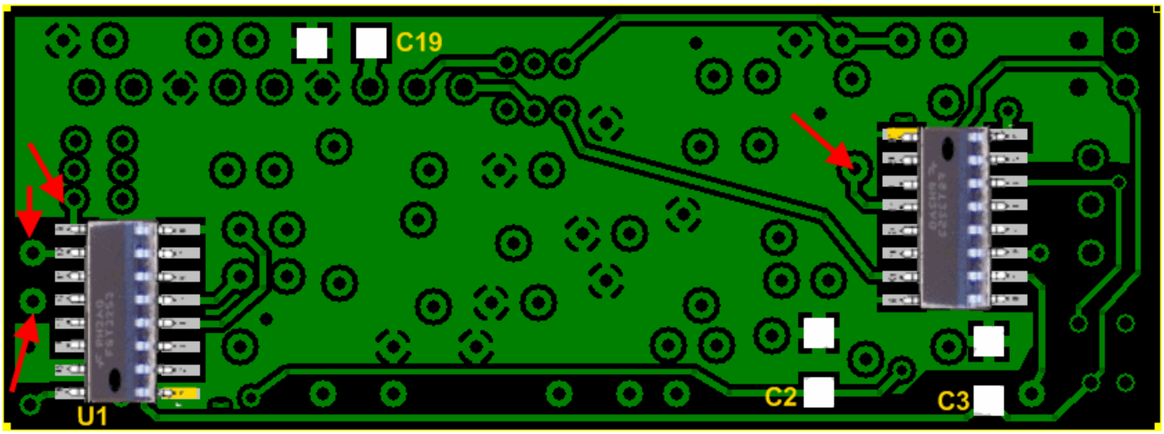
❏	U1	FST3253 mux/demux switch		SOIC-16			Switches
❏	U2	FST3253 mux/demux switch	FST3253 	SOIC-16			Switches

Switches Summary Build Notes

- Install FST3253 Switches
- Test the Stage

Switches Detailed Build Notes

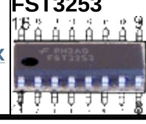
Bottom of the Board



Install FST3253 Switches

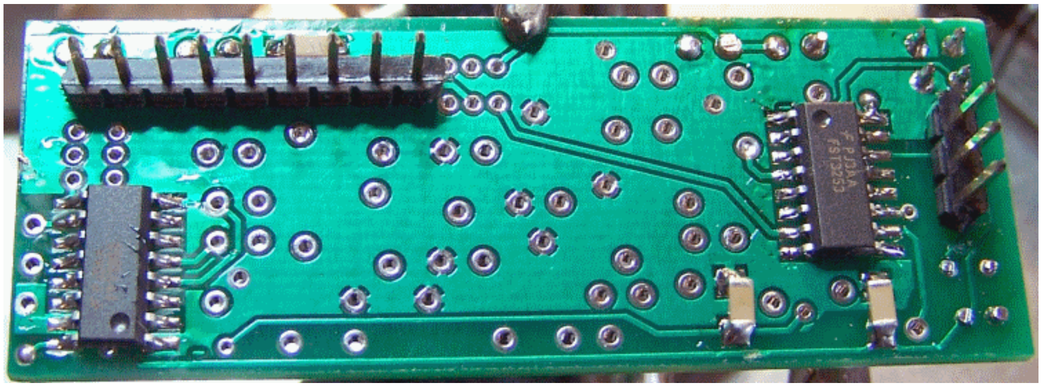
Pin 1 is highlighted in the above graphic .

Take care to avoid solder splashovers that can clog up thru-holes for later components. Particularly sensitive sites are indicated in the above graphic by red arrows. If your hands are less than steady, you mat want to insert a toothpick temporarily into the affected thru-hole while soldering in its vicinity.

Check	Designation	Component	Marking	Category	Orientation	Notes
❏	U1	FST3253 mux/demux switch	FST3253 	SOIC-16		Take ESD precautions
❏	U2	FST3253 mux/demux switch	FST3253 	SOIC-16		Take ESD precautions

Switches Completed Stage

Bottom of the Board



Switches Testing

ESD

Test Setup

Take ESD precautions when conducting these inspections and tests. The IC switches are extremely sensitive to static damage.

Visual Check

Test Setup

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

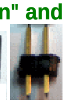
Pay especial attention to the joints on the two IC's pins. If necessary, touch up the joints with your iron and/or some flux. Wick up any excess.

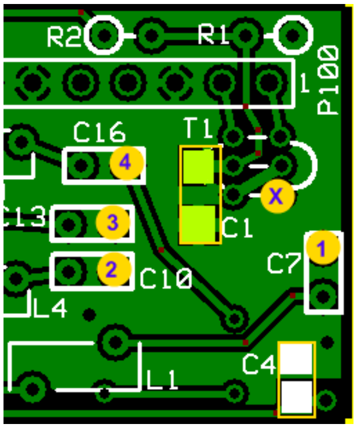
U1 Continuity Tests (only if necessary)

Test Setup

Normally this test is unnecessary, since the following stage has a simpler, less risky test of the switches' functioning. Conduct this test only in the case that the test in the following stage is not passed. Then, make sure that you have prevented ESD/static discharge via good ESD precautions when conducting this test.

"Continuity" in this case is actually a resistance that is several orders of magnitude below the non-continuity case. Depending upon the ohmmeter, you could see "continuity" indicated by a resistance of between 60 and 90 k ohms; "non-continuity" would be indicated by a resistance of 3 - 6 M ohms.

- **The following tests should only be attempted if you have taken good anti-static, ESD precautions, since the potential exists to completely "fry" the FST 3253. This is especially true during the so-called "static season".**
- **Apply 5 Vdc to the board at P101-2 (+5) and P100-3 (ground)**
- **For FST 3253 switch U1, measure the continuity between Point X and Points 1, 2, 3, and 4, for each of the appropriate jumper settings on JP1 and JP2**
- **The terms "open" and "closed" refer to the jumpered status of JP1 and/or JP2. "Open" means not jumpered.**  
- **The nominal result of "X ---> 1" means there is continuity between the 2 points. See testpoints graphic below.**



Test Measurements

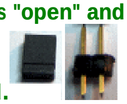
Testpoint	Units	Nominal Value	Author's	Yours
JP1&2 Closed	k ohm	U1: X --->1 (= 70-100)	~64	________
JP1 Open, JP2 Closed	k ohm	U1: X --->2 (= 70-100)	~64	________
JP1 Closed, JP2 Open	k ohm	U1: X --->3 (= 70-100)	~64	________
JP1&2 Open	k ohm	U1: X --->4 (= 70-100)	~64	________

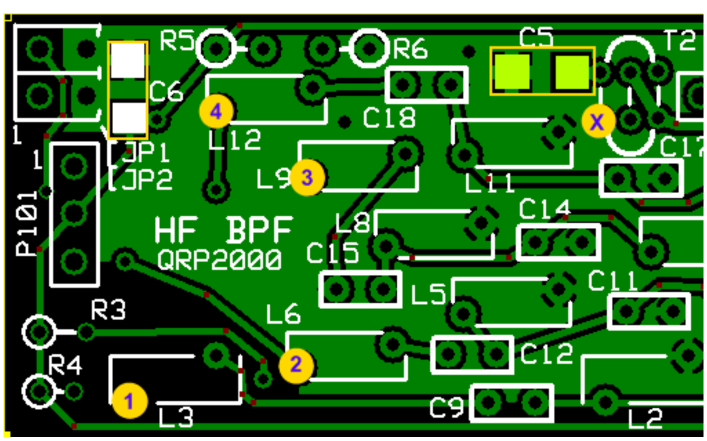
U2 Continuity Tests (only if necessary)

Test Setup

Normally this test is unnecessary, since the following stage has a simpler, less risky test of the switches' functioning. Conduct this test only in the case that the test in the following stage is not passed. Then, make sure that you have prevented ESD/static discharge via good ESD precautions when conducting this test.

"Continuity" in this case is actually a resistance that is several orders of magnitude below the non-continuity case. Depending upon the ohmmeter, you could see "continuity" indicated by a resistance of between 60 and 90 k ohms; "non-continuity" would be indicated by a resistance of 3 - 6 M ohms.

- **The following tests should only be attempted if you have taken good anti-static, ESD precautions, since the potential exists to completely "fry" the FST 3253. This is especially true during the so-called "static season".**
- **Apply 5 Vdc to the board at P101-2 (+5) and P100-3 (ground)**
- **For FST 3253 switch U2, measure the continuity between Point X and Points 1, 2, 3, and 4, for each of the appropriate jumper settings on JP1 and JP2**
- **The terms "open" and "closed" refer to the jumpered status of JP1 and/or JP2. "Open" means not jumpered.** 
- **The nominal result of "X ---> 1" means there is continuity between the 2 points. See testpoints graphic below.**



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
JP1&2 Closed	k ohm	U2: X --->1 (= 70-100)	~64	________
JP1 Open, JP2 Closed	k ohm	U2: X --->2 (= 70-100)	~64	________

JP1 Closed, JP2 Open	**k ohm**	**U2: X --->3 (= 70-100)**	**~64**	______
JP1&2 Open	**k ohm**	**U2: X --->4 (= 70-100)**	**~64**	______

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 03_Transformers

Search: Search selected SDR sites

Transformers Introduction

General

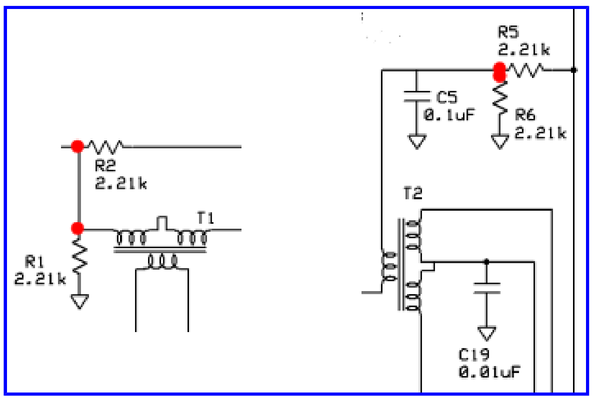
In this stage, you wind the input and output transformers that are, respectively, in front of and following the two switches.

Following the installation of the transformers, you will validate their connection/soldering with a series of continuity tests and then you will validate the functioning of the two switches through a series of voltage tests and jumper settings.

Transformers 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)



Transformers Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❑	T1	4T #30 trifilar BN43-2402 (7")		transformer			Transformers
❑	T1 wire	#30enameled magnetic wire		misc		3 lengths of #30, each 7" (18cm) long, should do OK	Transformers
❑	T1-core	BN43-2402		binocular core			Transformers
❑	T2	8T/2T bifilar BN43-2402 (10")		transformer			Transformers
❑	T2 wire	#30enameled magnetic wire		misc		primary: one 10" (25 cm) length; secondaries: two 5" (12.5 cm) length should do OK	Transformers

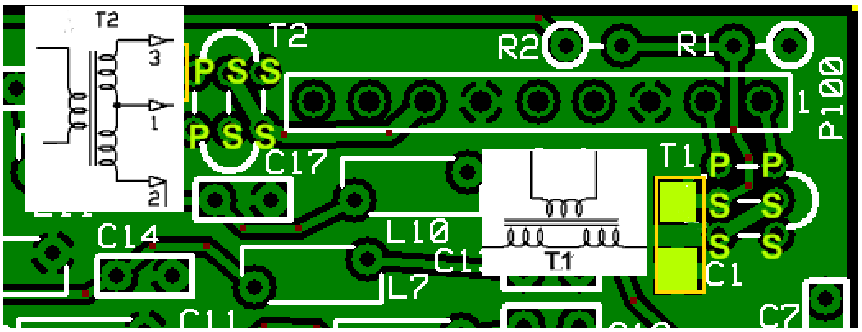
❏	T2-core	BN43-2402		binocular core			Transformers

Transformers Summary Build Notes

- Wind and install T1
- Wind and install T2
- Test the Stage

Transformers Detailed Build Notes

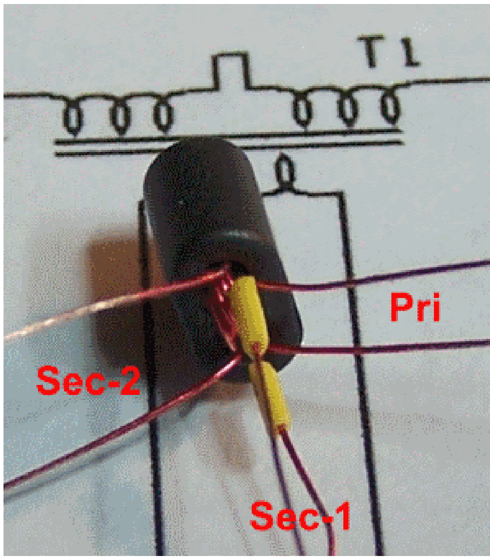
Top of the Board

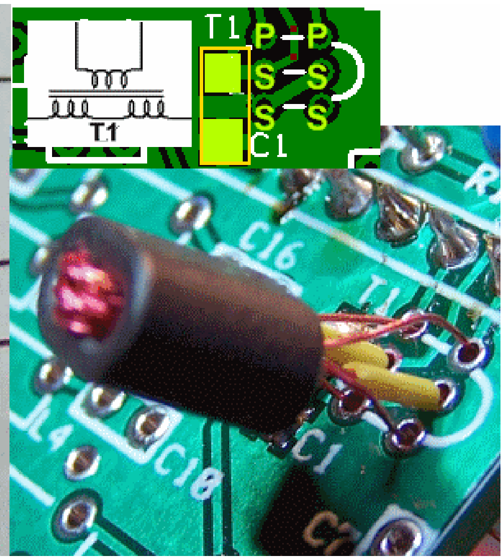


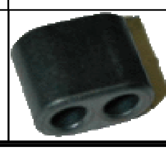
Wind and install T1

- With binocular cores, going in the bottom, looping around the top, and exiting out the bottom on the other side counts as one turn. 

- prepare three 7" lengths of #30 wire and twist them tightly together (3 twists to the inch)
- Wind 4 turns of the trifilar twisted #30 on the BN43-2402 binocular core
- Exercise care in winding the binocular cores to direct the wire into each core hole so that the hard material of the core does not scrape off portions of the wire's enamel insulation. (It may be advisable to lightly spin with one's fingers a small drill bit in each of the binocular core hole openings to remove sharp edges that may cut through the enamel insulation of a wire.)
- Note the mounting hole pattern on the circuit board for T1.. The leads from the binocular core should be such that each side (hole) of the core has 3 leads coming out: one primary lead and 2 secondary leads(or 2 primary leads and one secondary lead)
- You will need to identify each winding and identify it as primary, secondary1, and secondary2. One way to "mark" the wires for each winding is to use 3 pairs of hookup wire insulation bits, a different color for each winding. Another way is to cut each winding's leads to different lengths, e.g.: longest is primary, middle length is secondary #1, and so on.
- Before mounting, test to ensure there are no shorts between the primary and secondary windings.
- To provide some structure and standoff distance, it is adviseable to keep a 1/8 ; inch insulation sleeve over the middle set of leads (the first secondary pair) as an integral part of the mounting.



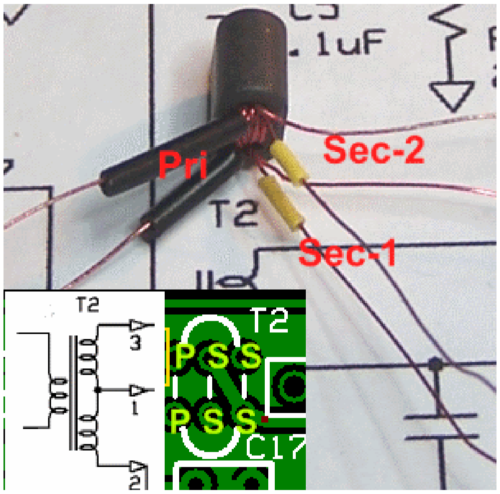


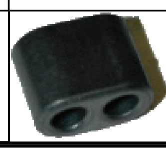
Check	Designation	Component	Marking	Category	Orientation	Notes
❏	T1 wire	#30enameled magnetic wire		misc		3 lengths of #30, each 7" (18cm) long, should do OK
❏	T1	4T #30 trifilar BN43-2402 (7")		transformer		
❏	T1-core	BN43-2402		binocular core		

Wind and install T2

- With binocular cores, going in the bottom, looping around the top, and exiting out the bottom on the other side counts as one turn. 

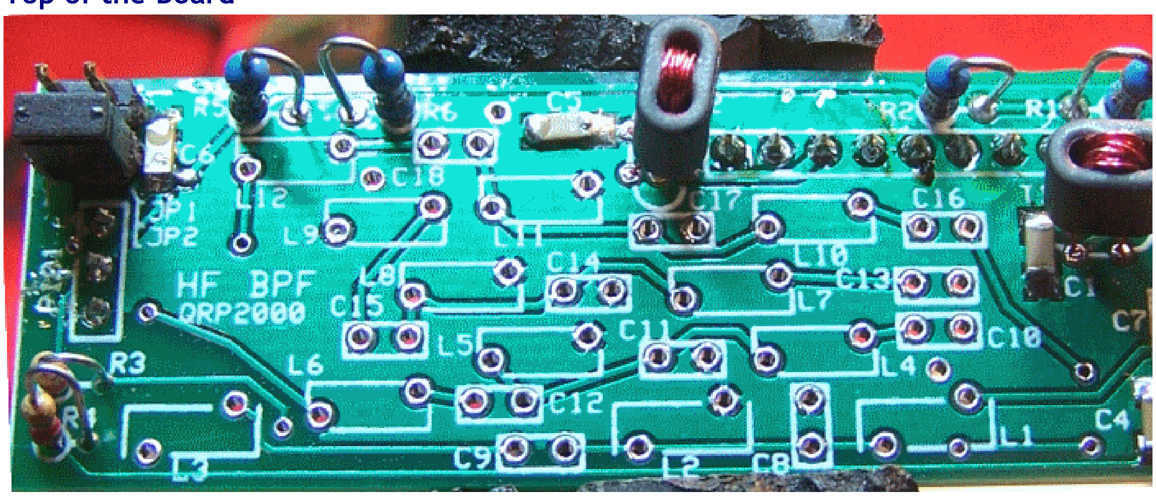
- Wind the primary first (primarywinding is 8 turns using 10" of #30 wire)
- Then wind the secondaries (secondary windings are 2 turns, bifilar, using two 5" lengths of #30 wire, twisted together 3 twists (or so) to the inch)
- Note the mounting hole pattern on the circuit board for T2. The two rows of three holes provide the mounting points, from left to right, respectively, of the pairs of primary, first secondary, and second secondary leads..
- A correctly wound T2 will have three leads coming out of each side of the core: two secondary leads (the bifilar windings) and one primary lead. The 3 leads on one side of the core should go into the corresponding "S" (secondary) and "P" holes in the left-hand column of holes for T2 in the picture above. The three leads from the other side should go into the corresponding holes in the right-hand column of holes for T2.
- To provide some structure and standoff distance, it is adviseable to keep a 1/8 inch insulation sleeve over the middle set of leads (the first secondary pair) as an integral part of the mounting.



Check	Designation	Component	Marking	Category	Orientation	Notes
❏	T2 wire	#30enameled magnetic wire		misc		primary: one 10" (25 cm) length; secondaries: two 5" (12.5 cm) length should do OK
❏	T2	8T/2T bifilar BN43-2402 (10")		transformer		
❏	T2-core	BN43-2402		binocular core		

Transformers Completed Stage

Top of the Board



Transformers Testing

Visual Check

Test Setup

Before condiucting the continuity tests below, using good light and magnification, conduct a thorough visual check of the transformer leads' solder joints, looking carefully for cold solder joints.

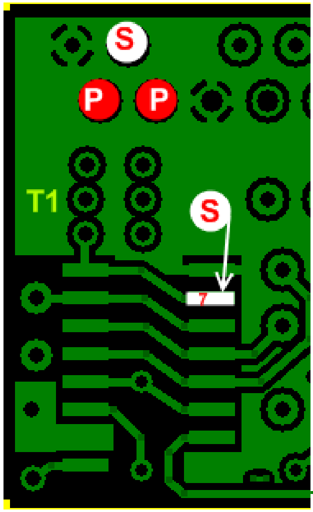
Soldering defects are the most common causes of transformers not working correctly

Test T1 Continuity

Test Setup

Take ESD precautions in the secondary windings' tests

- This tests the installation and soldering of the leads for T1 by testing for continuity between points on the bottom of the board which are connected via traces to the appropriate leads of T1
- The test points for the primary winding are marked "P"; the test points for the secondary are marked "S".
- The primary winding testpoints correspond to pins 1 and 2 of P100 (the antenna input into the board). T1 is right at the antenna input and looks like a DC short. The BPF individual modules use capacitive coupling to the transformer for part of the filtering so they look open (to DC). Thanks to Mike Collins KF4BQ and Daniel Lagerblad for this note.



Test T1 Continuity"

Test Measurements

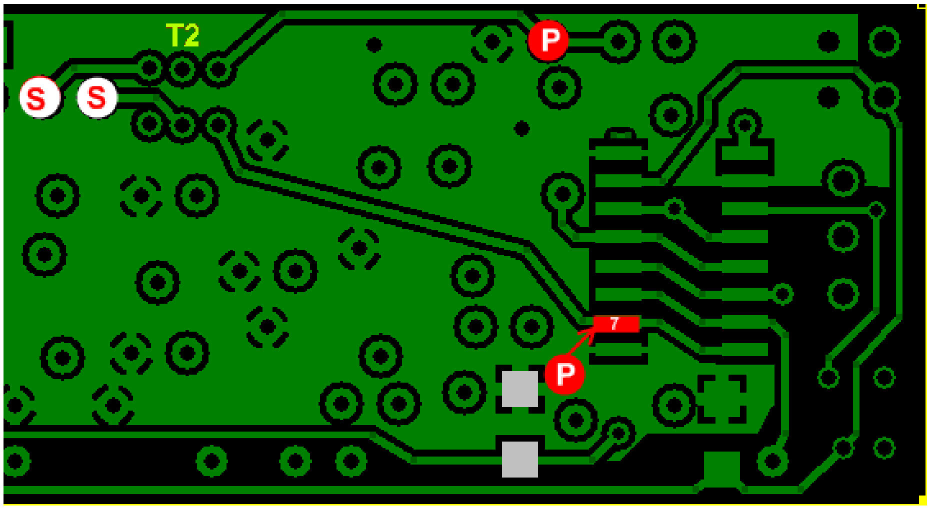
Testpoint	Units	Nominal Value	Author's	Yours
Resistance between P and P (Pri; see above)	ohms	0	0	________
Resistance between points S and S (sec)	ohms	0	0	________

Test T2 Continuity

Test Setup

Take ESD precautions in the primary windings' tests

- This tests the installation and soldering of the leads for T2 by testing for continuity between points on the bottom of the board which are connected via traces to the appropriate leads of T2
- The test points for the primary winding are marked "P"; the test points for the secondary are marked "S".



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
Resistance between P and P (Pri; see above)	ohms	0	0	
Resistance between points S and S (sec)	ohms	0	0	

SwitchingTest

Test Setup

This test validates whether the switches are switching correctly for the four different settings of JP1 and JP2.

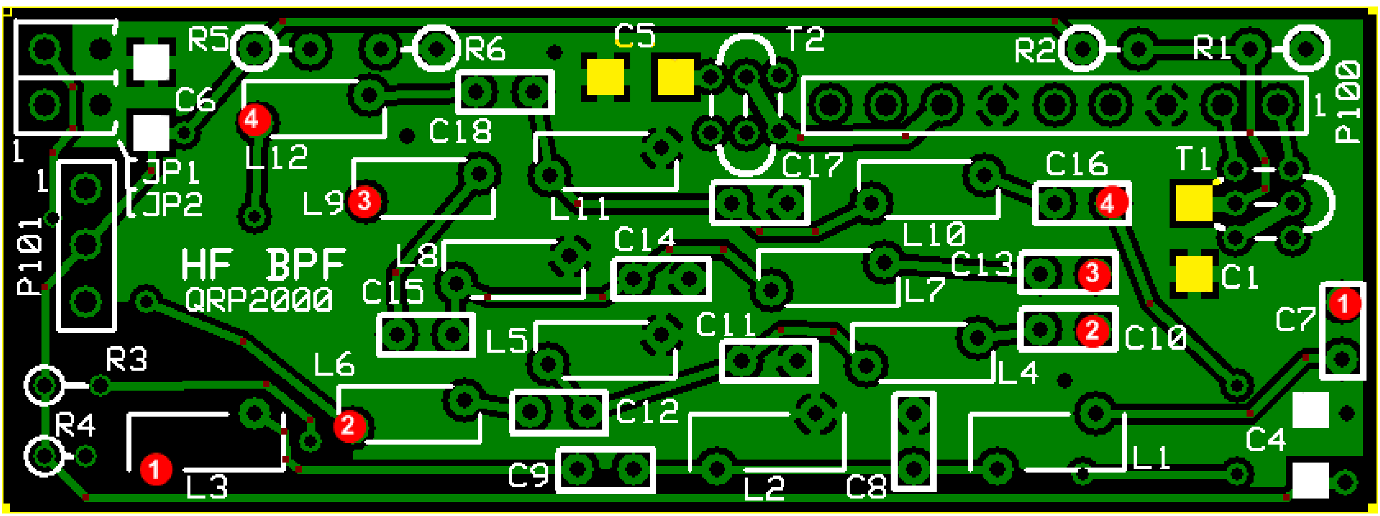
In each switch, the switched path has approximately 2.5 Vdc available at the two voltage dividers (R1/R2, and R5/R6). Thus, we can test for correct switching by measuring the voltage with respect to ground at each of the test points for U1 and U2.

Testpoints on each successfully switched path will measure 50% of the +5 V power rail

Testpoints on non-switched paths will measure less than 1 Vdc..

Test Setup

- Plug the HF-BPF board into the jacks on the V9.0 board (to get power to the HF-BPF board)
- Apply power to the V9.0 board
- Connect the DMM's COM lead to a ground point
- Measure the voltage with respect to ground of each of the two testpoints for the path chosen (expect 2.5 V on chosen path, < 1 Vdc for other paths)
- For example, path 1 has two test points, each indicated as "1" in the graphic below.



Test Measurements

Testpoint	Units	Nominal Value	Author's	Yours
JP1 and JP2 closed - measure testpoint 1 (at L3)	Vdc	2.5	2.48	
JP1 and JP2 closed - measure testpoint 1 (at C7)	Vdc	2.5	2.48	
JP1 Open, JP2 Closed - measure testpoint 2 (at L6)	Vdc	2.5	2.48	
JP1 Open, JP2 Closed - measure testpoint 2 (at C10)	Vdc	2.5	2.48	
JP1 Closed, JP2 Open - measure testpoint 3 (at L9)	Vdc	2.5	2.48	
JP1 Closed, JP2 Open - measure testpoint 3 (at C13)	Vdc	2.5	2.48	
JP1 Open, JP2 Open - measure testpoint 4 (at L12)	Vdc	2.5	2.48	
JP1 Open, JP2 Open - measure testpoint 4 (at C16)	Vdc	2.5	2.48	

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 4/2/2009 WB5RVZ Main

Homepage

HF BPF 04_Band 1: 1.8-4 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz
Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Band 1: 1.8-4 MHz Introduction

General

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

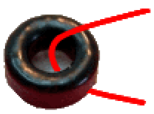
- Option 1: the original design covering 1.8 MHz - 30 mHz, in 4 bands, and
- Option 2: a board covering 3.5 MHz - 30 MHz plus 6m, in 4 bands

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 implmented 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

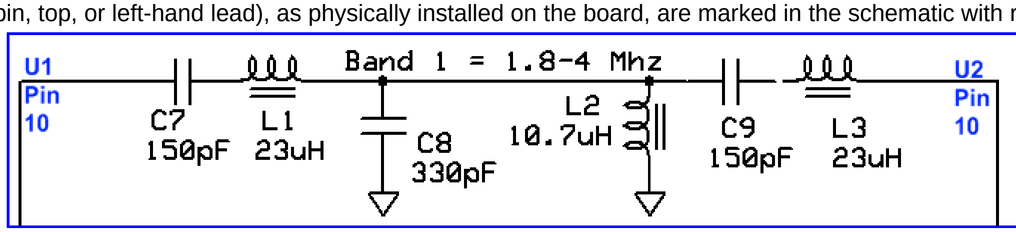
This stage builds and installs the filter "chain" for Band 1. Refer to Jan G0BBL's Design Plots to see the performance characteristics of this chain.



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

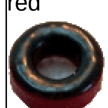
(Resistor testpoints (hairpin, top, or left-hand lead), as physically installed on the board, are marked in the schematic with red dots)

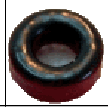


(Click for Full Schematic)

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	red 	toroid			Band 1: 1.8-4 MHz
❏		10.7 uH 50T #30 on T30-2					Band 1: 1.8-4

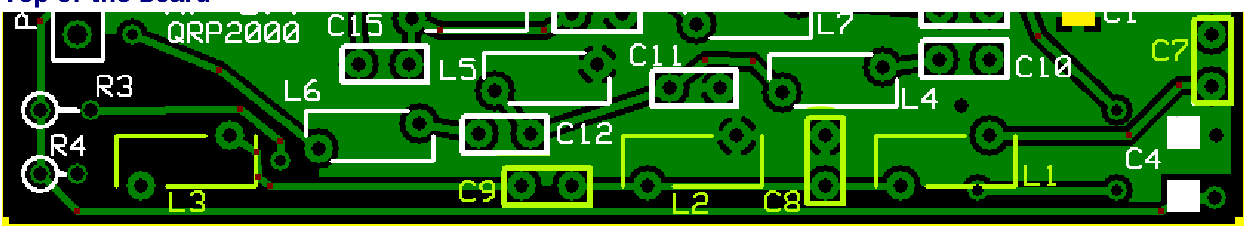
	L2	(28")	red	coil			MHz
❑	L2-core	T30-2 toroid core	red 	toroid			Band 1: 1.8-4 MHz
❑	L3	23 uH 71T #30 on T30-2 (39")	red	coil			Band 1: 1.8-4 MHz
❑	L3-core	T30-2 toroid core	red 	toroid			Band 1: 1.8-4 MHz
❑	wire 1	#30enameled magnetic wire		misc			Band 1: 1.8-4 MHz

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



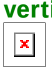
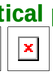
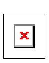
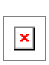
Install the Capacitors

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

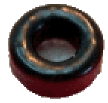
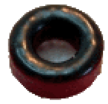
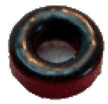
L1 and L3 and their 71 turns can be a daunting task, especially given the small size of the T30-2 core. Tony Parks suggests an alternative approach to winding, counting, and keeping track of 71 turns:

- **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.

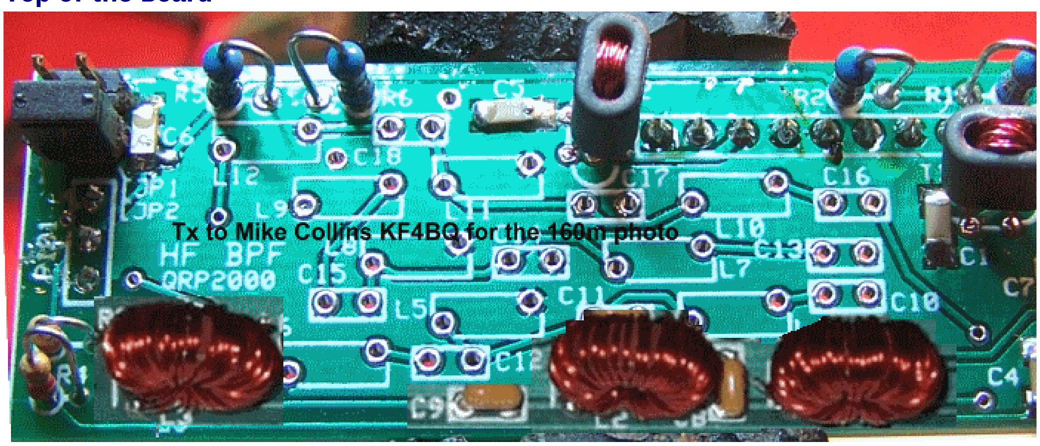
- **This will result in a winding of 71 turns on the core and thus the desired inductance.**

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	#30enameled 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

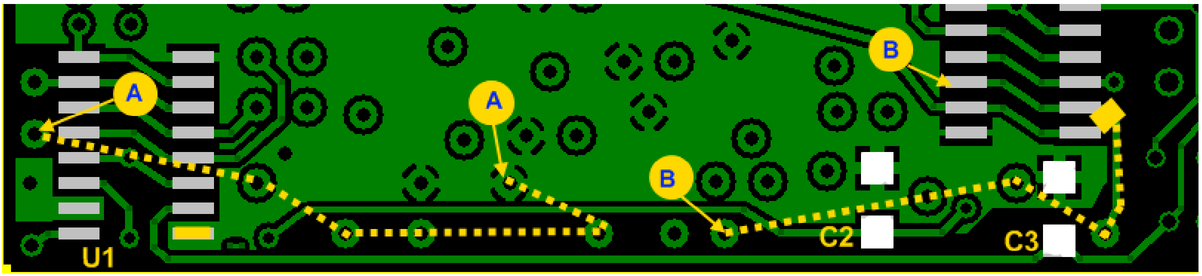
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

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

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**
- **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	________

HF BPF 05_Band 2: 4-8 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Band 2: 4-8 MHz Introduction

General

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

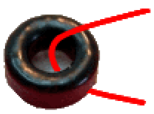
- Option 1: the original design covering 1.8 MHz - 30 mHz, in 4 bands, and
- Option 2: a board covering 3.5 MHz - 30 MHz plus 6m, in 4 bands

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 2 are as follows (and will be implmented somewhat more elegantly in these note, time and resources permitting):

- Band 2 is changed between option 1 (4-8 MHz) and option 2 (3.5-8MHz):
  - C10: option 1=100 pF; option 2 = 120 pF
  - C11: option 1=390 pF ; option 2 = 270 pF
  - C12: option 1=100 pF ; option 2 = 120 pF
  - L4: unchanged
  - L5: option 1= 2.1 uH ; option 2 = 3.5 uH
  - L6: unchanged

Theory of Operation

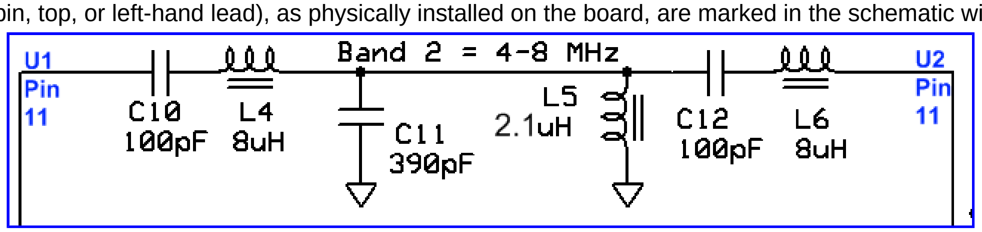
This stage builds and installs the filter "chain" for Band 2. Refer to Jan G0BBL's Design Plots to see the performance characteristics of this chain.



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 2: 4-8 MHz Schematic

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

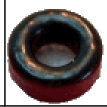
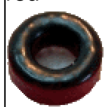


(Click for Full Schematic)

Band 2: 4-8 MHz Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C10	100 pF 5%	101	Ceramic			Band 2: 4-8 MHz
❏	C11	390 pF 5%	391	Ceramic			Band 2: 4-8 MHz
❏	C12	100 pF 5%	101	Ceramic			Band 2: 4-8 MHz
❏	L4	8 uH 49T #30 on T25-2 (22")	red	coil			Band 2: 4-8 MHz
❏	L4-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❏		2.1 uH 24T #30 0n T25-2					Band 2: 4-8

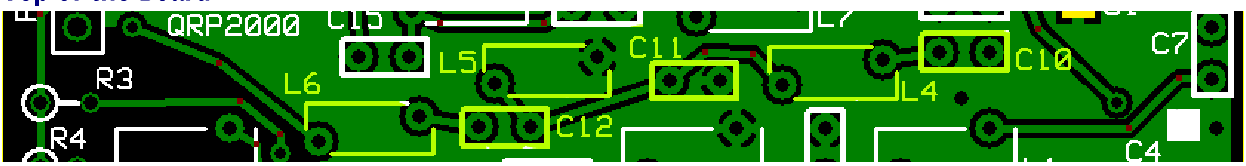
	L5	(14")	red	coil			MHz
❑	L5-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❑	L6	8 uH 49T #30 on T25-2 (22")	red	coil			Band 2: 4-8 MHz
❑	L6-core	T25-2 toroid core	red 	toroid			Band 2: 4-8 MHz
❑	wire 2	#30enameled magnetic wire		misc			Band 2: 4-8 MHz

Band 2: 4-8 MHz Summary Build Notes

- Install the Capacitors
- Wind and Install the Coils
- Test the Stage

Band 2: 4-8 MHz Detailed Build Notes

Top of the Board

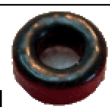
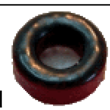
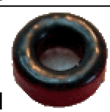


Install the Capacitors

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

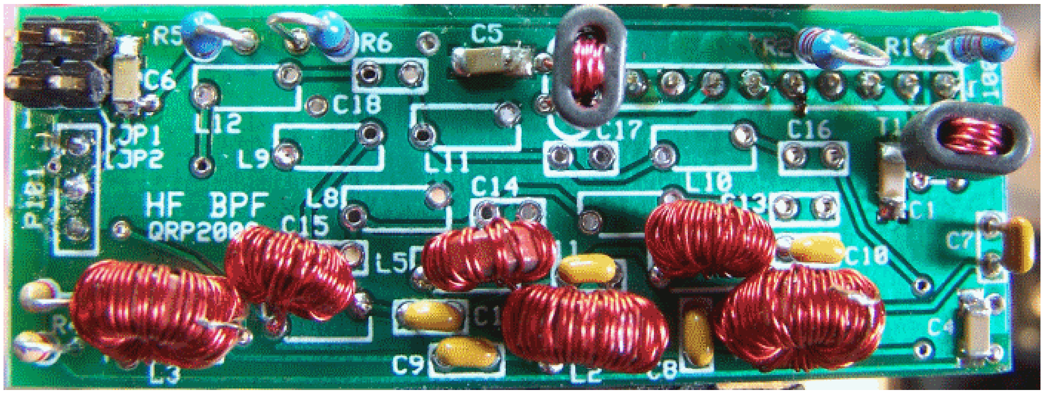
Check	Designation	Component	Marking	Category	Orientation	Notes
❑	C10	100 pF 5%	101	Ceramic		
❑	C12	100 pF 5%	101	Ceramic		
❑	C11	390 pF 5%	391	Ceramic		

Wind and Install the Coils

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	wire 2	#30enameled magnetic wire		misc		
❑	L6-core	T25-2 toroid core	red 	toroid		
❑	L5-core	T25-2 toroid core	red 	toroid		
❑	L4-core	T25-2 toroid core	red 	toroid		
❑	L5	2.1 uH 24T #30 0n T25-2 (14")	red	coil		
❑	L6	8 uH 49T #30 on T25-2 (22")	red	coil		
❑	L4	8 uH 49T #30 on T25-2 (22")	red	coil		

Band 2: 4-8 MHz Completed Stage

Top of the Board



Band 2: 4-8 MHz Testing

Visual Check

Test Setup

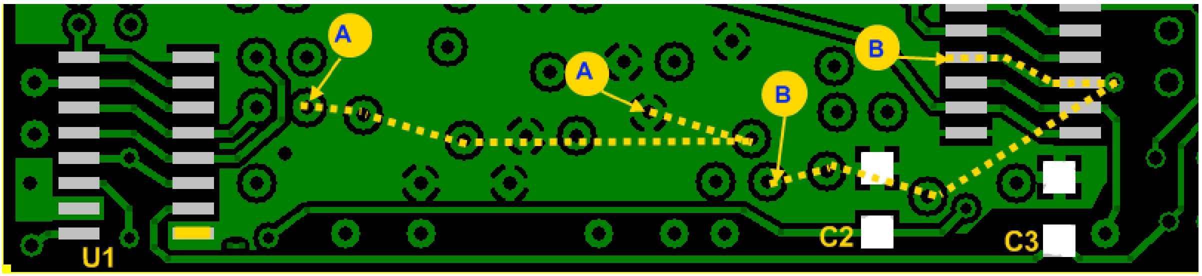
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

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

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**
- **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**	________

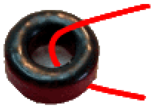
HF BPF 06_Band 3: 8-16 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Band 3: 8-16 MHz Introduction

Theory of Operation

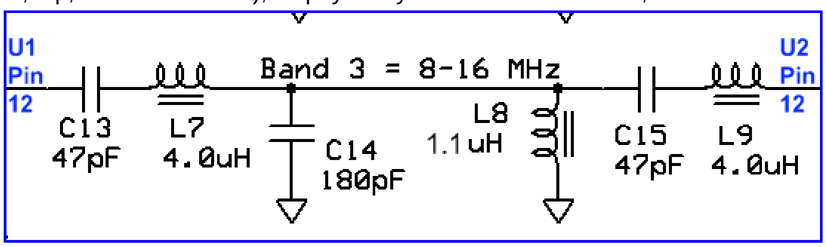
This stage builds and installs the filter "chain" for Band 3. Refer to Jan G0BBL's Design Plots to see the performance characteristics of this chain.



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 3: 8-16 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 3: 8-16 MHz Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C13	47 pF 5%	47J	Ceramic			Band 3: 8-16 MHz
❏	C14	180 pF 5%	181	Ceramic			Band 3: 8-16 MHz
❏	C15	47 pF 5%	47J	Ceramic			Band 3: 8-16 MHz
❏	L7	4 uH 38T #30 on T25-6 (18")	yellow	coil			Band 3: 8-16 MHz
❏	L7-core	T25-6 toroid core	yellow 	toroid			Band 3: 8-16 MHz
❏	L8	1.1 uH 20T #30 on T25-6 (11")	yellow	coil			Band 3: 8-16 MHz
❏	L8-core	T25-6 toroid core	yellow 	toroid			Band 3: 8-16 MHz
❏	L9	4 uH 38T #30 on T25-6 (18")	yellow	coil			Band 3: 8-16 MHz
❏	L9-core	T25-6 toroid core	yellow 	toroid			Band 3: 8-16 MHz
❏	wire 3	#30enameled magnetic wire		misc			Band 3: 8-16 MHz

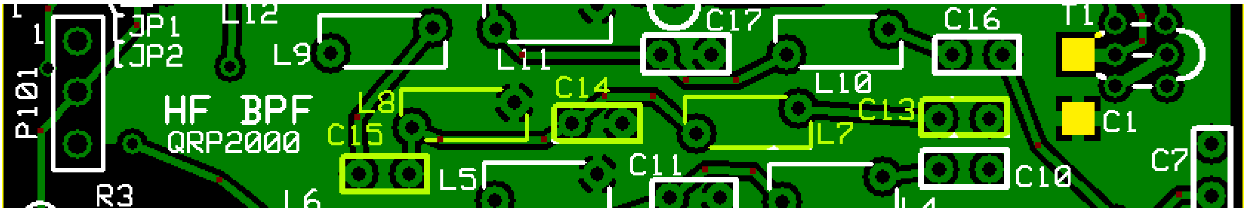
Band 3: 8-16 MHz Summary Build Notes

- Install the Capacitors

- Wind and Install the Coils
- Test the Stage

Band 3: 8-16 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.

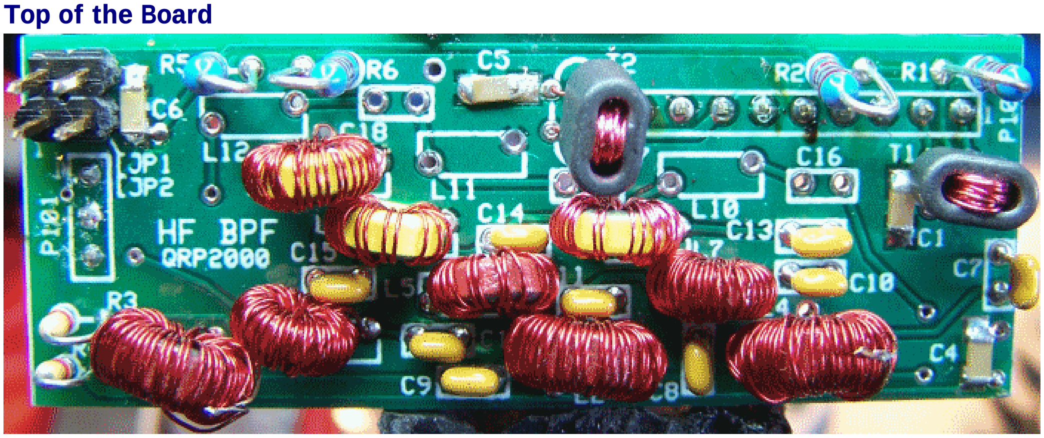
Check	Designation	Component	Marking	Category	Orientation	Notes
❑	C13	47 pF 5%	47J	Ceramic		
❑	C14	180 pF 5%	181	Ceramic		
❑	C15	47 pF 5%	47J	Ceramic		

Wind and Install the Coils

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	wire 3	#30enameled magnetic wire		misc		
❑	L9-core	T25-6 toroid core	yellow 	toroid		
❑	L8-core	T25-6 toroid core	yellow 	toroid		
❑	L7-core	T25-6 toroid core	yellow 	toroid		
❑	L9	4 uH 38T #30 on T25-6 (18")	yellow	coil		
❑	L7	4 uH 38T #30 on T25-6 (18")	yellow	coil		
❑	L8	1.1 uH 20T #30 on T25-6 (11")	yellow	coil		

Band 3: 8-16 MHz Completed Stage

Top of the Board



Band 3: 8-16 MHz Testing

Visual Check

Test Setup

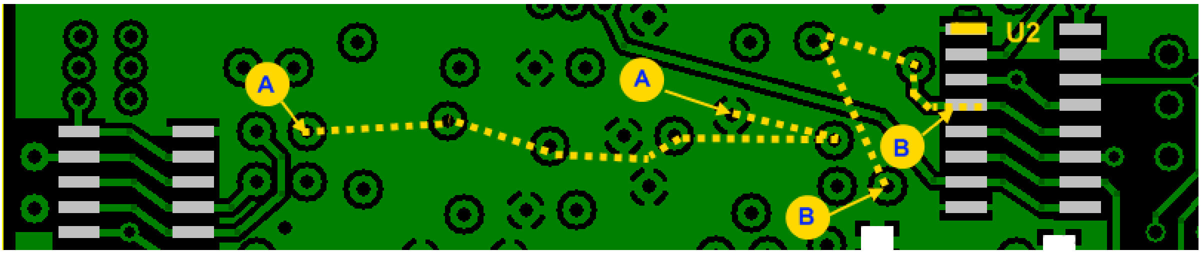
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

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

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**
- **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	________

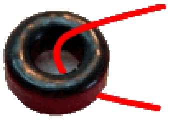
HF BPF 07_Band 4: 16-30 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Band 4: 16-30 MHz Introduction

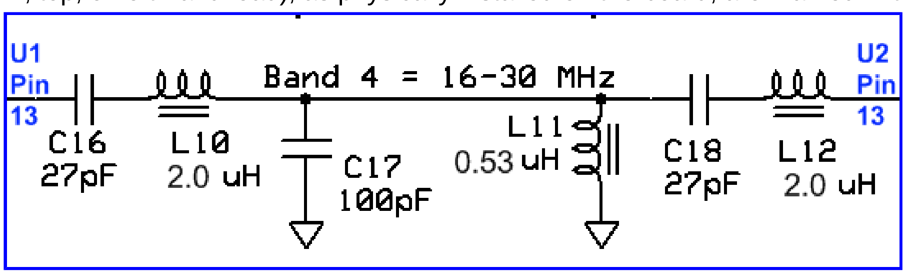
Theory of Operation

This stage builds and installs the filter "chain" for Band 4. 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 4: 16-30 MHz Schematic

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

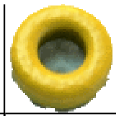


(Click for Full Schematic)

Band 4: 16-30 MHz Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C16	27 pF 5%	27J	Ceramic			Band 4: 16-30 MHz
❏	C17	100 pF 5%	101	Ceramic			Band 4: 16-30 MHz
❏	C18	27 pF 5%	27J	Ceramic			Band 4: 16-30 MHz
❏	L10	2 uH 27T #30 on T25-6 (16")	yellow	coil			Band 4: 16-30 MHz
❏	L10-core	T25-6 toroid core	yellow 	toroid			Band 4: 16-30 MHz
❏	L11	0.53 uH 14T #30 on T25-6 (10")	yellow	coil			Band 4: 16-30 MHz
❏	L11-core	T25-6 toroid core	yellow 	toroid			Band 4: 16-30 MHz
❏	L12	2 uH 27T #30 on T25-6 (16")	yellow	coil			Band 4: 16-30 MHz
❏	L12-core	T25-6 toroid core	yellow	toroid			Band 4: 16-30 MHz

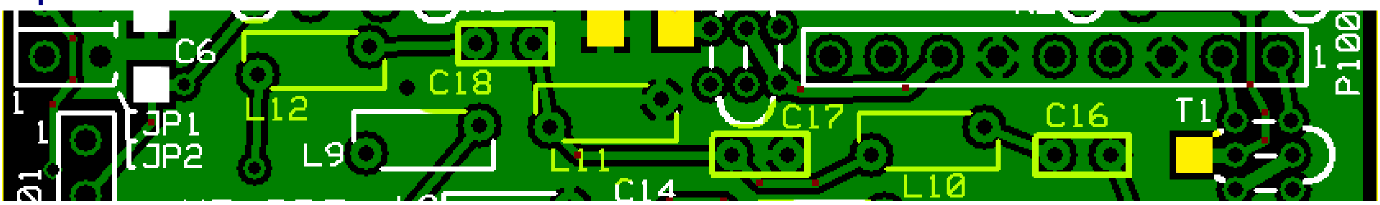
							
❏	wire 4	#30enameled magnetic wire		misc			Band 4: 16-30 MHz

Band 4: 16-30 MHz Summary Build Notes

- Install the Capacitors
- Wind and Install the Coils
- Test the Stage

Band 4: 16-30 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.

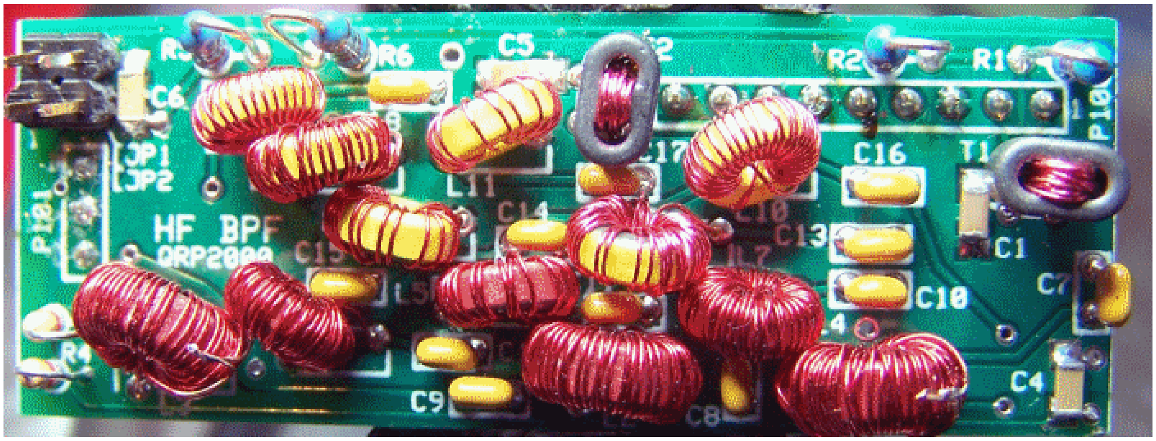
Check	Designation	Component	Marking	Category	Orientation	Notes
❏	C16	27 pF 5%	27J	Ceramic		
❏	C17	100 pF 5%	101	Ceramic		
❏	C18	27 pF 5%	27J	Ceramic		

Wind and Install the Coils

Check	Designation	Component	Marking	Category	Orientation	Notes
❏	wire 4	#30enameled magnetic wire		misc		
❏	L12-core	T25-6 toroid core	yellow 	toroid		
❏	L11-core	T25-6 toroid core	yellow 	toroid		
❏	L10-core	T25-6 toroid core	yellow 	toroid		
❏	L12	2 uH 27T #30 on T25-6 (16")	yellow	coil		
❏	L10	2 uH 27T #30 on T25-6 (16")	yellow	coil		
❏	L11	0.53 uH 14T #30 on T25-6 (10")	yellow	coil		

Band 4: 16-30 MHz Completed Stage

Top of the Board



Band 4: 16-30 MHz Testing

Visual Check

Test Setup

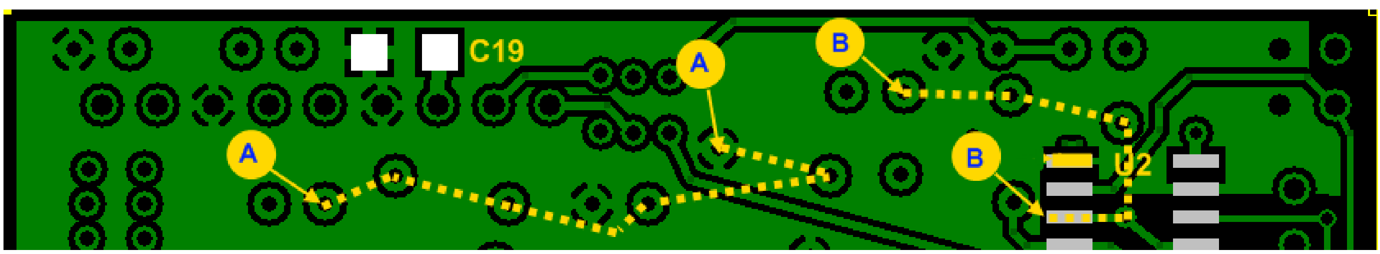
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

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

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**
- **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**	________

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 08_Band1a 6m

Band1a 6m Introduction

General

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

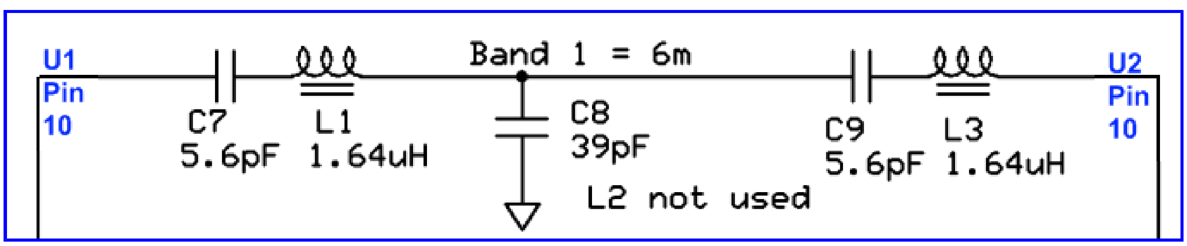
- Option 1: the original design covering 1.8 MHz - 30 mHz, in 4 bands, and
- Option 2: a board covering 3.5 MHz - 30 MHz plus 6m, in 4 bands

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 implmented 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

Band1a 6m 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)

Band1a 6m Bill of Materials

Detailed Bill of Materials

Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C07	5.6 pF 5%	5.6	Ceramic			Band1a 6m
❏	C08	39pF 5%	39J	Ceramic			Band1a 6m
❏	C09	5.6 pF 5%	5.6	Ceramic			Band1a 6m
❏	L1	1.64 uH 23T #30 on T25-6 (15")	yellow	coil			Band1a 6m
❏	L2	not used		unused			Band1a 6m
		1.64 uH 23T #30 on T25-6					Band1a

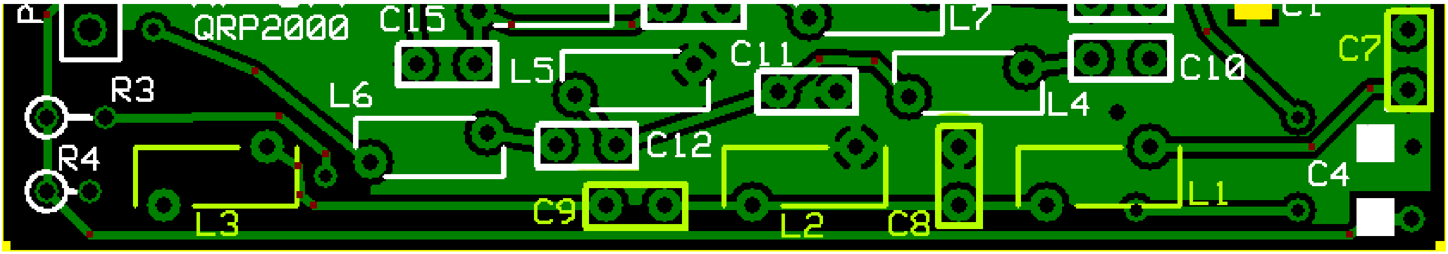
❏	L3	(15")	yellow	coil			6m

Band1a 6m Summary Build Notes

- Install the Capacitors
- Wind and Install the Coils
- Test the Stage

Band1a 6m Detailed Build Notes

Top of the Board



Install the Capacitors

Check	Designation	Component	Marking	Category	Orientation	Notes
❏	C07	5.6 pF 5%	5.6	Ceramic		
❏	C09	5.6 pF 5%	5.6	Ceramic		
❏	C08	39pF 5%	39J	Ceramic		

Wind and Install the Coils

Check	Designation	Component	Marking	Category	Orientation	Notes
❏	L1	1.64 uH 23T #30 on T25-6 (15")	yellow	coil		
❏	L3	1.64 uH 23T #30 on T25-6 (15")	yellow	coil		
❏	L2	not used		unused		

Band1a 6m Completed Stage

Top of the Board

View of Completed Top

Band1a 6m Testing

Visual Inspection

Test Setup

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

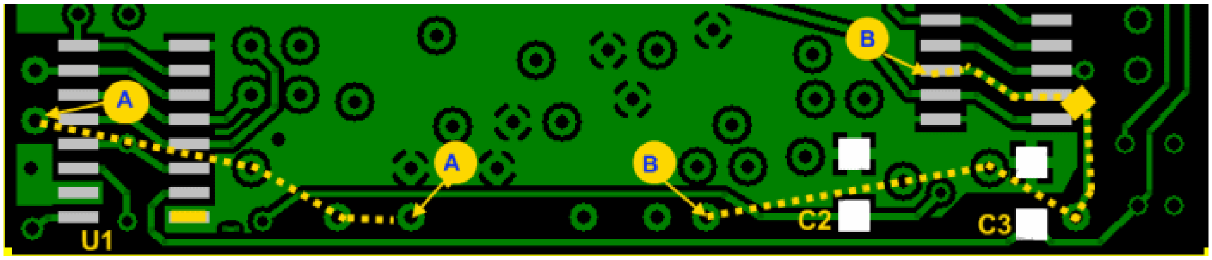
Pay especial attention to the joints on the inductors. If necessary, touch up the joints with your iron and/or some flux.

Continuity Tests

Test Setup

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**

- **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 poin "A"t	ohms	0	TBD	________
Point "A" to poin "A"t	ohms	0	TBD	________

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

HF BPF 09_Band2a 3.5-8 MHz

Home Bill of Materials Busses and Rails Switches Transformers Band 1: 1.8-4 MHz Band 2: 4-8 MHz Band 3: 8-16 MHz
Band 4: 16-30 MHz Band1a 6m Band2a 3.5-8 MHz Comments Revisions as of 1/16/2009 WB5RVZ Main Homepage

Band2a 3.5-8 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

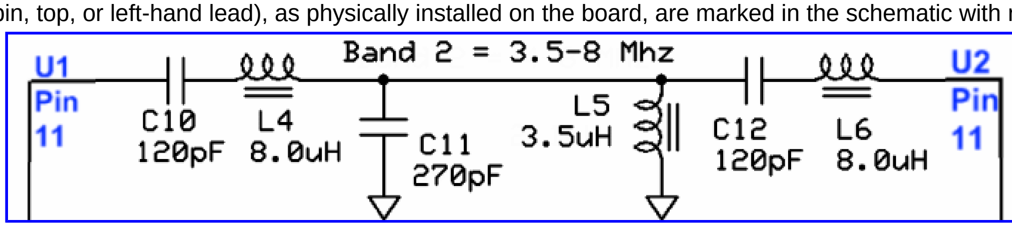
These builders notes describe 4 "bands" and the board layout permits filters for four bands. However, depending upon the option (1 or 2), the bands named "band 1" and "band 2" will be built and installed differently. The changes for Band 2 are as follows (and will be implmented somewhat more elegantly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

- Band 2 is changed between option 1 (4-8 MHz) and option 2 (3.5-8MHz):
  - C10: option 1=100 pF; option 2 = 120 pF
  - C11: option 1=390 pF ; option 2 = 270 pF
  - C12: option 1=100 pF ; option 2 = 120 pF
  - L4: unchanged
  - L5: option 1= 2.1 uH ; option 2 = 3.5 uH
  - L6: unchanged

Band2a 3.5-8 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)



Band2a 3.5-8 MHz Bill of Materials

Detailed Bill of Materials

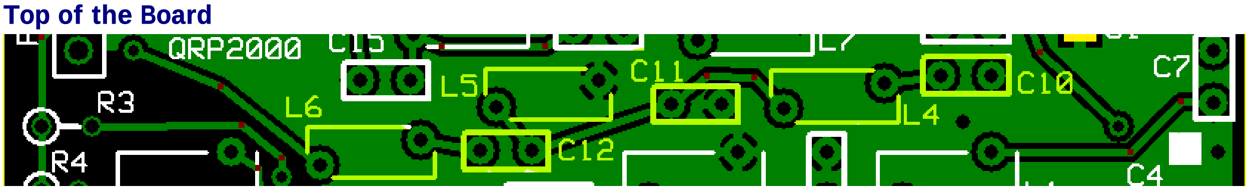
Check	Designation	Component	Marking	Category	Orientation	Notes	Circuit
❏	C10	120 pF 5%	121	Ceramic			Band2a 3.5-8 MHz
❏	C11	270 pF 5%	271	Ceramic			Band2a 3.5-8 MHz
❏	C12	120 pF 5%	121	Ceramic			Band2a 3.5-8 MHz
❏	L04	8 uH 49T #30 on T25-2 (22")	red	coil			Band2a 3.5-8 MHz
❏	L05	3.5 uH 32T #30 on T25-2 (15")	red	coil			Band2a 3.5-8 MHz
❏	L06	8 uH 49T #30 on T25-2 (22")	red	coil			Band2a 3.5-8 MHz

Band2a 3.5-8 MHz Summary Build Notes

- Install the Capacitors
- Wind and install the coils
- Test the Stage

Band2a 3.5-8 MHz Detailed Build Notes

Top of the Board



Install the Capacitors

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	C10	120 pF 5%	121	Ceramic		
❑	C12	120 pF 5%	121	Ceramic		
❑	C11	270 pF 5%	271	Ceramic		

Wind and install the coils

Check	Designation	Component	Marking	Category	Orientation	Notes
❑	L05	3.5 uH 32T #30 on T25-2 (15")	red	coil		
❑	L04	8 uH 49T #30 on T25-2 (22")	red	coil		
❑	L06	8 uH 49T #30 on T25-2 (22")	red	coil		

Band2a 3.5-8 MHz Completed Stage

Top of the Board

View of Completed Top

Band2a 3.5-8 MHz Testing

Visual heck

Test Setup

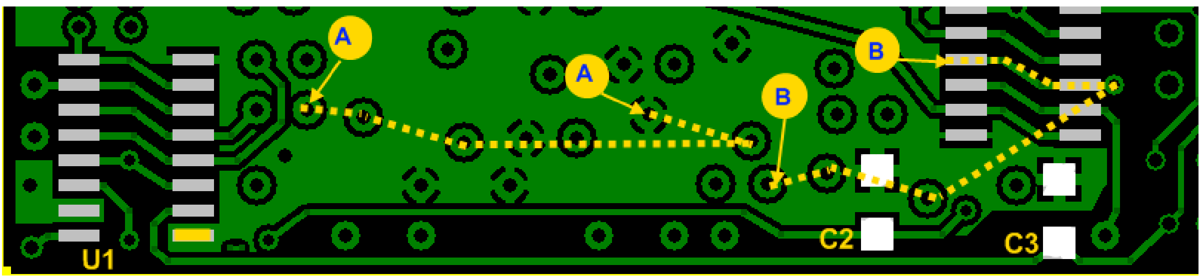
Using very good lighting and magnification, carefully inspect the solder joints to identify bridges, cold joints, or poor contacts.

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

- **This tests for continuity in the "chain" of inductors for this band**
- **The graphic below shows two continuity chains and their associated test points on the bottom of the board.**
- **The "A and B chains"are shown using lettered dots and lines. :**
- **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	TBD	________
Point "B" to Point "B"	ohms	0	TBD	________