Pacific Antenna Low Pass Filter Kit

Description

A 5 pole LC filter designed to reduce harmonics and spurious signals.

Cauer design with capacitors in parallel with inductors to resonate them on the second and third multiple of the design frequency thus further attenuating harmonic energy.

Significantly reduces the harmonics of a transmitter, amplifier or any other signal source.

Reduces band to band interference for field day, contest and multiple transmitter stations.

Cleans up the output of simple transmitters and amplifiers that may lack sufficient output filtering.

This is a relatively simple kit to build and is ideal for beginners.

Specifications

Versions available for 80, 40, 30 and 20 Meter bands.

Reduces harmonics by at least 50dB.

Insertion loss typically less than 0.2dB.

Constructed on a 1.75x 3.5 inch printed circuit board.

Designed to go inline between a transmitter and antenna.

Constructed with high voltage ceramic capacitors.

Up to 100W power under matched conditions.

Includes board mounted BNC connectors and all necessary parts.

Support

Pacific Antenna and QRPkits.com
qrpkits.com@gmail.com

Recommended Tools

- Temperature Controlled Soldering Station with small tip or 15-35 watt soldering iron with small tip.
- Solder 60/40 or 63/37 Tin-Lead
- Small Diagonal Cutters
- Small Needle Nose Pliers
- Pencil, Pen, and/or Highlighter
- BRIGHT work light

Optional Tools

- Magnifying headpiece or lighted magnifying glass.
- Multi-meter
- Solder Sucker or Solder Wick
- Small multi-blade Screw Driver
- Knife or Wire Stripper
- Small Ruler
- Cookie Sheet to build in and keep parts from jumping onto the floor.

Construction Techniques

- Please take time to inventory the parts before starting.
- Pre-sorting the resistors and capacitors can speed up the assembly and reduce mistakes.
- The Parts List has columns for inventory and construction.
- You can insert several parts at a time onto the board. When you insert a part bend the leads over slightly to hold the part in place, then solder all at the same time.
- Most parts should be mounted as close to the board as possible.
- We recommend using a Temperature Controlled Soldering Station with small tip or a 15-35 watt soldering iron with small tip.
- If you are a beginner, new to soldering, there are a number of resources on the web to help you get on the right track soldering like a pro. Google Soldering Techniques.

Printing the Manual

Note: There is no need to print out the whole assembly manual unless you want a copy.

Print the Parts List and Schematic then view the rest of the manual on a computer, laptop, or tablet.

Inventory and Parts List

Please take time to carefully unpack and inventory the parts in the kit before starting.

In the unlikely event there are missing parts, contact QRPKITS.com for replacements.

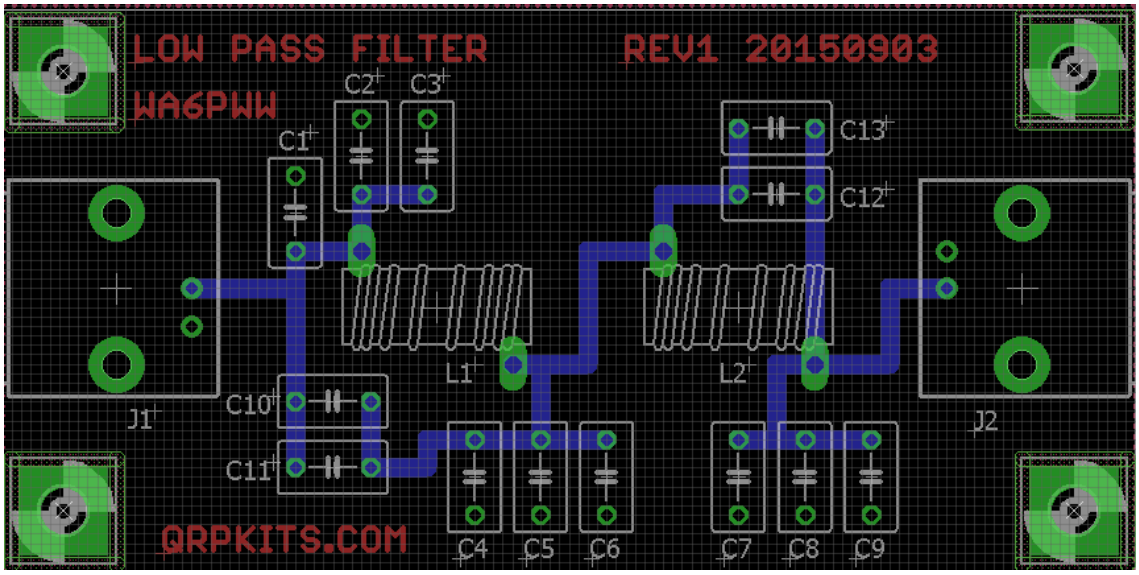
Use the first column of the table below to check the parts as you inventory them and use the second column to check the parts as you install them.

Parts for kits using ceramic disc capacitors

Check	Installed	Part #	10M/12M	15M/17M	20M	30M	40M	80M	160M
		PCB	1	1	1	1	1	1	1
		BNC J1, J2	2	2	2	2	2	2	2
		C1			180pF	180pF	390pF	1000pF	
		C2							
		C3							
		C7			180pF	180pF	390pF	1000pF	
		C8							
		C9							
		C4			180pF	180pF	390pF	1800pF	
		C5			180pF	180pF	390pF		
		C6							
		C10			10pF	27pF	47pF	100pF	
		C11			10pF				
		C12			47pF	33pF	120	270pF	
		C13			10pF	33pF			
		L1			11 turns T50-2	14 turns T50-2	15 turns T50-2	17 turns T68-2	
		L2			10 turns T50-2	14 turns T50-2	14 turns T50-2	16 turns T68-2	
		#22 Wire			3ft	3ft	3ft	4ft	

Note: This table is for kits using high voltage ceramic disc capacitors. These are typically tan or blue. If you have an earlier version kit that uses the dark red silver mica capacitors, use the parts table at the end of this manual.

In some cases, multiple capacitors are installed in parallel to achieve the needed value. This will be noted in the table above and on the board below and the schematic where there are multiple positions for capacitors to allow multiples in parallel when needed. Not all positions are filled in most cases.



Inserting the Parts

Install the components listed in the table for the band chosen as indicated below. The parts layout on the previous page shows the locations.

Install BNC connectors

Note: If you plan to mount this kit in a case or build into another assembly where input and output connectors will not be needed or mounted on the case you may not want to install the on board BNCs.

Solder the supplied BNC connectors on each end of the board in the positions marked J1 and J2. Be sure that the connectors are fully seated and then solder the support pins one at a time.

After the first support pin is soldered, recheck that the connector is seated on the board. If not, reheat the connector support pin while pressing down on the board to fully seat it. Once the connectors are seated and both support pins are soldered, go ahead and solder the two signal connection pins (smaller) on each BNC.

Wind and Install Toroids for L1 and L2

Wind the toroids to create inductors L1 and L2 to the specified number of turns specified in the parts list.

Remember that each pass through the center of the toroid counts as 1 turn.

Spread the turns uniformly around the toroid, leaving space for the ends of the winding to align with the circuit board holes.

The wire supplied is heat strippable and you can tin the ends of the wires using either the solder blob technique or by first sanding or scraping the insulation from the wires to expose the bare copper and then tinning with solder.

Install L1 and L2 in the circuit board holes and pull the wires gently to remove slack and hold the toroids close to the board.

Solder L1 and L2 in place.

Capacitors

Note: not all positions will always be filled with capacitors. The additional capacitor locations are there so that multiple capacitors may be paralleled to give the needed value for a particular frequency of operation.

Install the appropriate value capacitors in positions C1 through C13 as indicated in the table for the version you are building.

Use the board layout and schematic as a guide as to which positions are paralleled on the board.

Checkout:

Inspect the board for any bad solder joints, shorts or other problems and correct before use.

Using a multimeter in resistance mode, measure the resistance between the center pins of input and output BNC connectors (or pads on the board if BNCs are not installed). The value should be low, usually less than 1 ohm and confirms that the components are in place and leads connected.

Check from the BNC center to shell (or across the input or output pads if BNCs not installed). There should be a very high resistance, probably infinite reading on the DMM resistance scale. This confirms that there are no shorts to ground.

Congratulations!

This completes the assembly of your low pass filter kit!

Packaging

Packaging is left up to the builder. The kit can be used inline as is, built into another assembly or installed in a case.

Usage

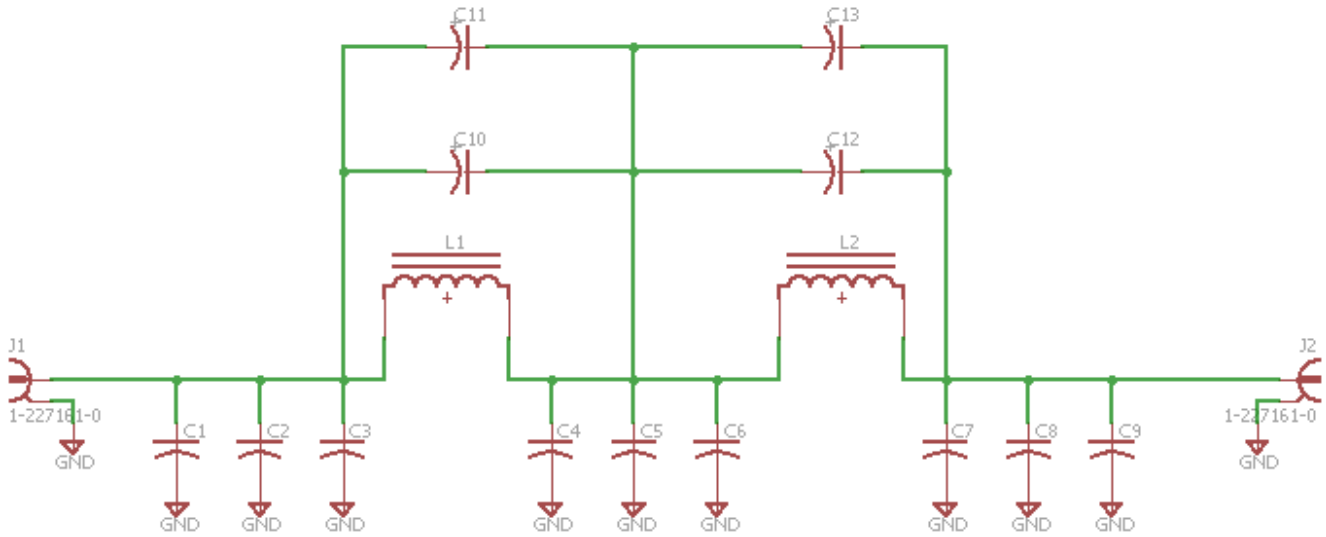
The low pass filter is placed in the coax line following a transmitter, transceiver or other signal source. It has minimal attenuation of signals below the designed cutoff frequency and will provide high attenuation above the design frequency with notches at the second and third harmonics to provide additional attenuation.

Adding a low pass filter tuned to the band of operation will clean up a transmitter or amplifier that has little or poor filtering or which can benefit from increased attenuation of signals above its operating frequency.

This can be very helpful for reducing interference between nearby stations on different bands such as during field day or contests.

For example, using the 40M LP filter on a 40M station will reduce harmonic energy and reduce its interference to other nearby stations operating on higher bands such as 20M.

Schematic Diagram



Alternate Parts List for older kits using silver mica capacitors

Inven.	Installed	Part #	10M +12M	15M +17M	20M	30M	40M	80M*
		PCB	1	1	1	1	1	1
		BNC J1, J2	2	2	2	2	2	2
		C1, C2 or C3	TBD	TBD	150pF	180pF	270pF	1000pF
		C7, C8 or C9			150pF	180pF	270pF	1000pF
		C4, C5 or C6			300pf or 2x 150pF	360pF or 2x 180pF*	560pF	1800pF*
		C10			22pF	27pF	22pF	100pF
		C11			N/A	N/A	22pF	N/A
		C12			51pf	33pF	51pF	270pF
		C13			N/A	33pF	51pF	N/A
		L1	T50-6	T50-6	11 turns T50-2	14 turns T50-2	16 turns T50-2	21 turns T50-2
		L2	T50-6	T50-6	11 turns T50-2	14 turns T50-2	16 turns T50-2	19 turns T50-2
		#22 Wire			2ft	2.5ft	3ft	5ft

Note: Do not use this for building your kit unless you have an older kit using the dark red silver mica capacitors. An example is shown in the photo below: