

Cavity Filters

Yesterday we had an interesting talk from John Maudsley VK4YJV on cavity filters. He explained that the club was in the process of setting up a 6 metre repeater and in the mix a set of cavity filters were required.

He showed the filters that had been donated. These were original for 80 MHz and had been lengthened to have the capability of operating at 50~55 MHz.

John explained that he was not the only person involved in the operation which covered skill sets involving electronics to mechanical engineering. He advised that at the outset he knew very little about cavity filters. However with the help of various club members and of course Google he located some very informative information.



An example of the filter types is shown alongside. These included 6 metre to 470 MHz and higher cavity filters. (note the coffer transport container was non-resonant at all test frequencies).

A very good link can be found at :-  
<http://www.repeater-builder.com/antenna/ant-sys-index.html>

There are a number of articles on Diplexors and Duplexors (also explaining the difference between the two). This site is compiled by Mike Morris WA6ILQ with the assistance of many others. It is well worth a visit.

If you search the site there is an article on making a filters to exclude pagers.

works because of simple physics based on frequency, wavelength, the length of a 1/4 wave in coax and/or in a cavity. A cavity, depending on how it is made and used can be a peak filter or a notch filter. Different cavity designs have different peak/notch depth characteristics, and different insertion loss characteristics, and there is a very visible tradeoff between peak height/notch depth and insertion loss. Multiple cavities in series can collectively increase the peak height or the depth. This additive characteristic is what makes a duplexer possible.

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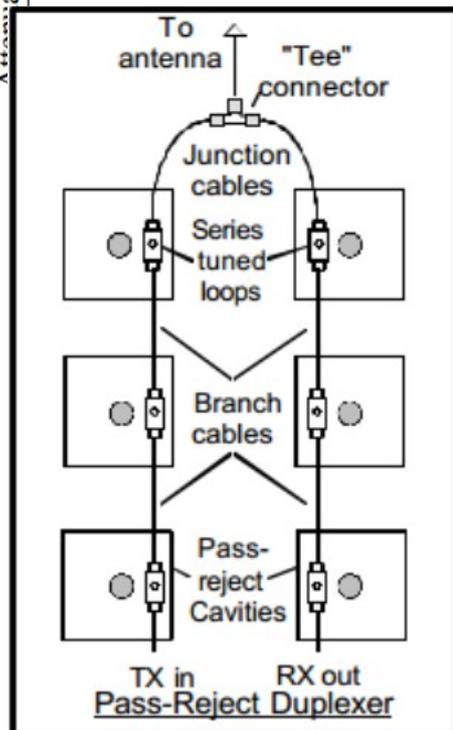
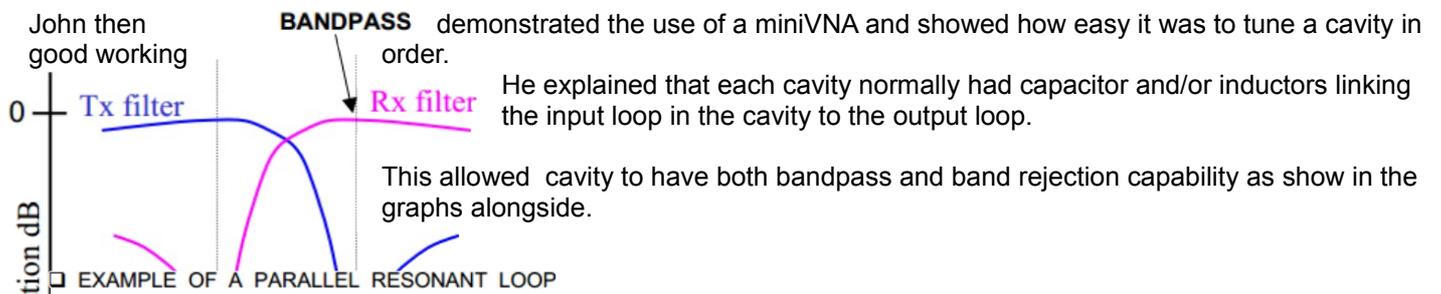
cavity works because of simple physics based on frequency, wavelength, the length of a 1/4 wave in coax and/or in a cavity. A cavity, depending on how it is made and used can be a peak filter or a notch filter. Different cavity designs have different peak/notch depth characteristics, and different insertion loss characteristics, and there is a very visible tradeoff between peak height/notch depth and insertion loss. Multiple cavities in series can collectively increase the peak height or the depth. This additive characteristic is what makes a duplexer possible.

have not had an opportunity to visit a repeater site or have not seen a cavity filter then the drawing alongside gives a good illustration of internals of such a device.

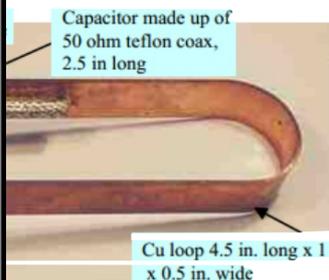
then explained the operation of the energy transfer loops inside the An example is shown in the photograph. Look carefully for the capacitor he talked about.

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cavity. A cavity, depending on how it is made and used can be a peak filter or a notch filter. Different cavity designs have different peak/notch depth



A SHORT LENGTH OF COAX



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The Duplexors used on the club repeater sites comprise 4 or 6 cavities.

Remember more information can be found at

<http://www.repeater-builder.com/antenna/ant-sys-index.html>

- The information found on this site covers a wealth of information from many sources and is well worth the time.

In the process of setting up the cavities John discovered that they were very sensitive to temperature and shifted their tune frequency greatly.

Researching what changes had been made he found that the capacitance generated the tuning pipe end surface was too small. As an intermediate step a 50 mm plate was used and whilst this reduced the temperature effect it was not enough for satisfactory operation. This he resolved by fitting an 80 mm aluminum plate to the end of the rod.

From an article on the web site the following was found

“The air space between the bottom of the centre conductor at resonance and the bottom of the barrel would normally be arranged to exceed one-eighth of a wavelength and thus diminish the temperature coefficient effect due to the barrel.”

From an article on building a Beer Barrel cavity. Editors note – empty the beer barrel and wait a day or so to sober up before constructing the filter.



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