February 2011
Volume 11, Issue 8

ANODE

Inside this issue:

Special points of interest:

- Contact details on back page (corrected & updated July 2010)
- Ham-Comp Latest on web site.

[I promise to have this updated ASAP. JB]

Anode Editor's Comments

Volume 11, Issue 8
February 2011

Don't get caught listening to aircraft communications
See:-
http://www.avcom.co.za/phpBB3/viewtopic.php?f=1&t=66398&start=180

Amateur Radio PIC Projects
http://www.amateurradio.org.za/picprojects.htm

RAE exam preparations

I was handed a beautiful bound edition of the "South African Radio League Radio Amateur Examination Manual" last Monday night. Wow! I wish I had had this "book" when I was studying to become a Radio Amateur. It is an excellent work by OM Andrew Roos. It is also available as a PDF download from the SARL web site.

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Analysis of Single Coax Stub

From K1TTT Technical Reference
An article originally written for the YCCC Scuttlebutt
By David Robbins K1TTT

Since I started entering M/M contests I have been using Coax Stubs for filters to help separate stations.

They have worked just fine and have provided around 30 to 40 db of attenuation of harmonics. I have been curious about a few points of using them though, like:

1. How much attenuation should a stub provide?
2. What kind of bandwidth should a stub cover?
3. How does the cable loss affect attenuation?
4. How much power gets dissipated in the cable? (I didn't consider this until a stub made out of RG-59 melted down in one contest.)

This 'document' was created by using "MathCAD". "MathCAD" is a program for IBM PC's and compatibles (and also Unix workstations) that provide the capability to write formulas and then plug in numbers to calculate results, solve equations, and plot results. The original equations for this calculation were from the "MathCAD" electrical engineering applications pack.

In this initial example I will attempt to answer the first two questions using a 1/4 wave shorted stub of RG-8 for attenuating the second harmonic of 20 meters that would interfere on 10 meters.

To get the calculations started I have provided the following characteristics of the cable itself:

Impedance Z.0 = 50 Ohms
Velocity Factor V = .66

(Continued on page 2)

Analysis of Single Coax Stub

(continued from page 1)
Loss a = 1 db/100'
Length d = 11.5'

Termination Impedance Z.L = 0 Ohms

The frequency range I want to plot will cover the lower end of the 10 meter band that could be covered by a 20 meter harmonic.

Now the calculations begin, this is where "Math CAD" really does its job:

Define complex wave number.

b(f) = a + 2 ipf / Vc

Define impedance as a function of frequency and distance to termination:

Z.trans(freq,len) =

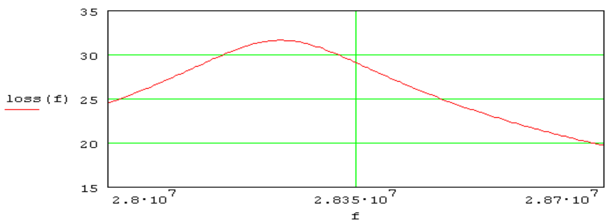
```
      ((Z.L + Z.0 tanh(b(freq) len )
Z.line (----------------------)
      ((Z.0 + Z.L tanh(b(freq) len )
```

loss(f) = 20 log(1 + ((Z(f,d) - Z.0)/(Z(f,d) + Z.0))

This is a plot of the attenuation provided by the stub. You can see that it provides about 32 dB of attenuation at 28.25 Mhz. The bandwidth seems much narrower than I had expected, but I don't really have anything to measure it that accurately. I have seen about 30 dB of attenuation in some rather crude tests here so the overall result seems reasonable.

From these results I am considering making 2 sets of stubs, or providing a way to add or remove a few inches between CW and SSB contests since there could be over 10 dB attenuation difference across the band. Using a better cable would make the attenuation better, but would also make the bandwidth even narrower.

figure 1



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Analysis of pairs of Coax Stubs

From K1TTT Technical Reference
An article originally written for the YCCC Scuttlebutt
By David Robbins, K1TTT

This is the second instalment of my article about coaxial stubs for filters on transmitters. In the first instalment I derived the basic attenuation features of a 1/4 wave length stub connected between a transmitter and an antenna. In this instalment I will attempt to answer the question about using 2 stubs together to get better rejection. Before I start this time I must make one note about the previous article... I made an over simplification in the calculation of the loss function that added about 6 dB of attenuation, the max attenuation for the single stub should have been about 31 dB instead of 37 dB as plotted.

I am now using the new version of MathCAD for Windows 3.0, it is much nicer than the original and I highly recommend it for anyone seriously planning to work on anything like this. (for you legal eagles out there: MathCAD is a product of MathSoft, Windows 3.0 is from Microsoft)

In working on this document I changed it quite a bit from the last version, I added separate

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Analysis of pairs of Coax Stubs

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parameters for the cable for the stubs so I could look at using different cable for the stubs than for the transmission line. I also added the formulas to vary the distance between the two stubs as well as the length of each stub. This results in a much more complex problem and it becomes very difficult at times to visualize what is happening. I will attempt to show the various relationships by the use of plots of attenuation vs. frequency and the distance between the stubs. First I will define the parameters for the feedline.

Z.0 is the characteristic impedance of the line

V is velocity factor,

a is loss in dB/100'.

The values used here are:

Z.0 = 50W

V = .66

a = 1 dB/100'

Now for the stubs.

Z.stub is the characteristic impedance of the stubs,

V.stub is the velocity factor and alpha.stub is the loss for the stub.

d.1 and d.2 are the lengths of the stubs and Z.L is the termination impedance.(0 ohms is of course a shorted stub).

Z.stub = 50W

V = .66

a.stub = 1 dB/100'

d.1 = 11.5' d.2 = 11.5' Z.L = 0 W

These values are for a pair of shorted 1/4 wave stubs on 20 meters. These will of course reject the second harmonic that would fall in the 10 meter band.

The formulas for Z.trans and Z.par are defined at the end of the document. What they do is simple, Z.trans just uses Smith Chart formulas to transform an impedance from one end of a line to the other. Then Z.par uses the basic formula for paralleling two impedances. The index values (n) and (m) added to some of the variables enable me to vary them over a range of frequencies (for (n)) or to change the gap between stubs (for (m)).

The basic flow of calculations is as follows:

* 1. Calculate Z.1 which is the impedance at the end of the first stub

* 2. Parallel first stub with main line = Z.a

* 3. Transform Z.a to connection point of other stub = Z.gap

* 4. Calculate Z.2 for impedance of second stub

* 5. Parallel second stub with Z.gap to get Z. net

* 6. Use Z.net to get reflection coeficient and then 'loss' value

Z.1(n)=Z.trans(Z.stub,V.stub,a.stub,Z.L,f(n), d.1)

Z.a(n)=Z.par(Z.1(n),Z.0)

Z.gap(n,m)=Z.trans(Z.0,V,a,Z.a(n),f(n),gap(m))

Z.2(n)=Z.trans(Z.stub,V.stub,a.stub,Z.L,f(n), d.2)

Z.net(n,m)=Z.par(Z.2(n),Z.gap(n,m))

Now we can play with fancy graphs to see what we have. First lets plot attenuation vs frequency for a gap of 0' (i.e. the two stubs are connected to the same point).

This shows the attenuation as the frequency is swept across the 20m band. Note that the max attenuation is about 6 dB better than a single

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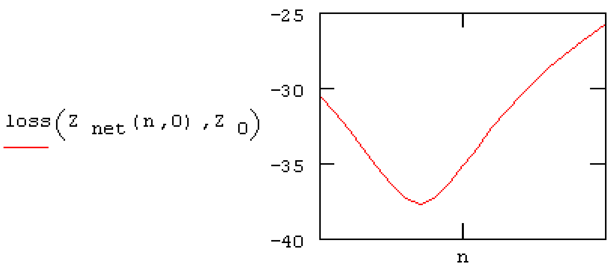
Analysis of pairs of Coax Stubs

(Continued from page 3)

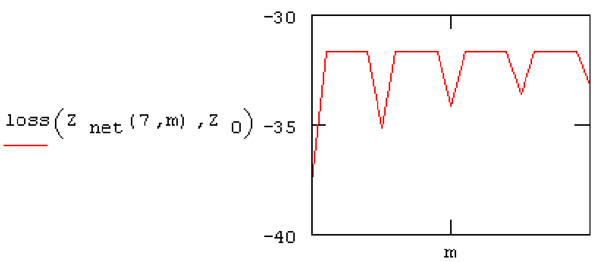
stub.

figure 1



Now lets see what happens when the distance between the stubs changes. For this plot I will hold frequency constant and vary the spacing. This shows the change from a spacing of 0' to 46', or about 1 wave length at 14.1 Mhz. Note the dips at 0, 1/4, 1/2, and 3/4 wavelengths.

figure 2



This is a very interesting result, nothing at all like I had expected. But after long contemplation it seems to make sense. Consider first the farthest stub from the transmitter. It presents a very low impedance to the harmonic that is trying to be rejected, this low impedance is then moved along the transmission line toward the second stub. As this impedance is transformed along the 50 ohm line it changes from low to high and back over each 1/2 wave of the line so that after each 1/2 wave it is back to the original low value. At a point 1/4 wave along the line it presents a very high impedance. When the second stub is added it also presents a low impedance, but the total impedance seen by the source is a parallel combination of the transformed impedance from the first stub and the impedance of the second one. If they are both low at the same time the net impedance is even lower and better rejection results. When the transformed impedance of the first stub is high at 1/4 wave from its connection then the 2 stubs are fighting each other and the rejection is lower.

Now lets take a look at the pass band characteristics, in particular the impedance presented to the radio.

This shows the frequency dependence of the impedance at a spacing of 0' between stubs. Note how it changes over the width of the 20m band. It shouldn't be enough to affect most transmitters, but it does add another factor to tuning.

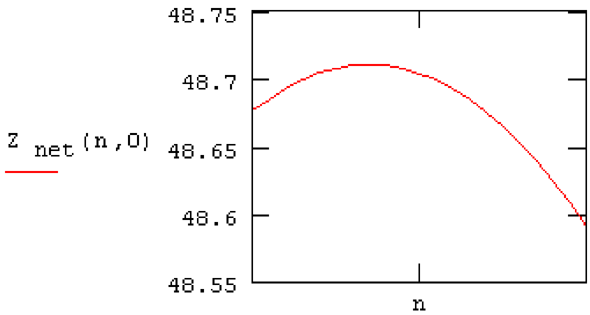


figure 3

Now we take and hold frequency constant and vary spacing. Note that at 1/4 wave and 3/4 wave spacing the impedance is almost exactly 50 ohms.

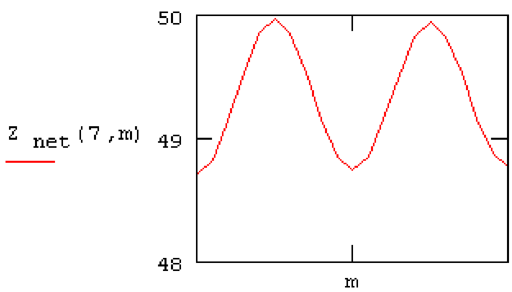


figure 4

(continued on page 5)

Analysis of pairs of Coax Stubs

(Continued from page 4)

And now lets sweep the frequency across the band at a spacing of 1/4 wave to see how this arrangement behaves. This change shouldn't bother any of today's transmitters or amps.

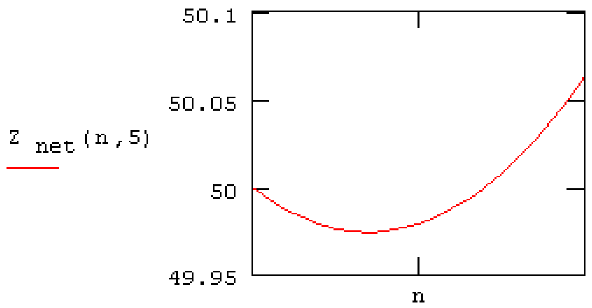


figure 5

Now the trade off... For best rejection of harmonic, as I showed above, put the two stubs at the same point. For least effect on tuning of radio/amp put the two stubs 1/4 wave apart. Personally I put both stubs at the same point, it is easier to build, and I don't feel the change in impedance is severe enough to spend the extra time and effort to space them out.

Formula definitions for use above.

For parallel impedances x and y. This can be used to figure net impedance of stub connected to feed line

Z.par(x,y) = 1 / ((1/x) + (1/y))

Reflection coefficient given impedance of transmission line Z.0 and impedance of load Z.load.

r=(z.load - z.0)/(z.load + z.0)

Complex wave number, given f=frequency, V=velocity factor, alpha=loss of line. Constant c=velocity of light

b(f,V,a)=a+2ipf/Vc

Formula for transformed impedance along length of coax cable.

Input values are:

Z.line = characteristic impedance of transmission line
V = velocity factor
a = loss of line
Z.start = impedance at starting point(far end of line)
freq = frequency
len = length of line (in feet)

Z.trans(Z.line,V,a,Z.start,freq,len) =

((Z.start + Z.line tanh(b(freq,V,a) len)
Z.line (--------------------------------------)
((Z.line + Z.start tanh(b(freq,V,a) len)

This is formula for loss due to reflection from mismatched load. Used here to figure reflection from intersection of stub with main transmission line.

loss(Z.load,Z.line) = 20 log(1 + r(Z.load,Z.line))

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A 'Veteran' Transmitter

A 'Veteran' Transmitter

A 'Veteran' Transmitter

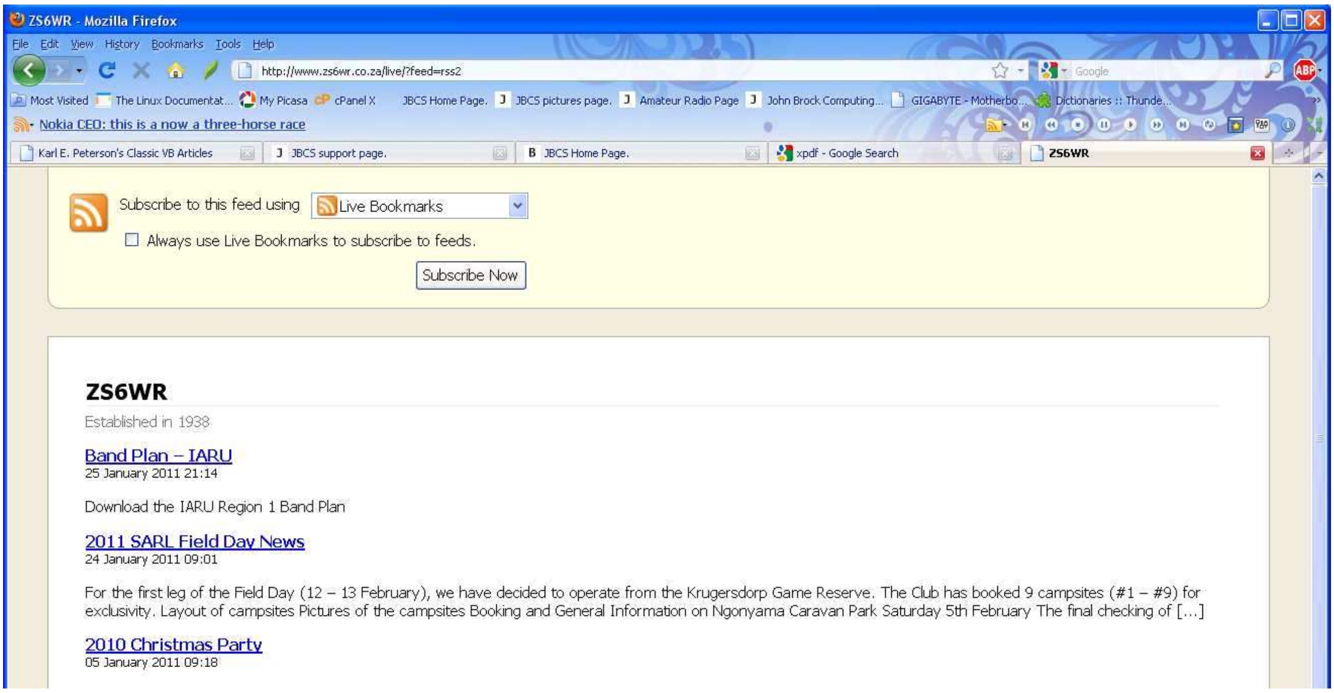
Editor's Comments (contd.)

(Continued from page 1)

The West Rand Amateur Radio RSS feed and how to use it.

One of the most useful methods of keeping up to date with information from the web is called RSS. Real Simple Syndication works with your modern browser to present any changed pages on any web site that you are interested in. They used to be called "channels" rather like tv stations. At least that's what Microsoft thought. The BBC and the Southgate Amateur Radio web sites have them. Look for the symbol icon below and click on it.

With modern browsers, you will be given a page like the one below:-



If you click on the subscribe button, your built-in RSS feed reader will kick in and you will see the links displayed one after the other. Clicking on any of those links will take you directly to the relevant page.

Alternatives

There are plenty of alternative 'News Readers' and plenty of browser based ones as well. So the choice is entirely up to you. However the Microsoft browser, Internet Explorer, has no trouble managing your 'news feeds'.

There is one alternative that might be of more use to you. That is the 'stand-alone news reader'. Such as the gadget in Windows Vista and 7 that shows the RSS feed in the small gadget as a scrolling display. This is a 'catch penny'. If you don't want to use the standard Microsoft feed, you will have to pay for the privilege of adding ZS6WR to the list.

For a suitable "free" RSS news reader that scrolls the news across the screen, go to:- http://www.newsrssticker.com

Up to the minute news like:

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Editor's Comments (contd.)

(Continued from page 9)

The London Stock Exchange moves to Novell Linux

http://www.zdnet.com/blog/open-source/the-london-stock-exchange-moves-to-novell-linux/8285?alertspromo=&tag=nl.rSINGLE

"September 8th 2008 was one of the worst days ever for the London Stock Exchange (LSE), and high-end Windows server-based applications. That was the day that the LSE came to a crashing stop. What happened? While the LSE has never come clean on the whole story, my sources told me that the LSE's Windows-based .NET TradElec stock exchange had crashed. What we do know is that the CEO who had brought Windows and TradElec in was fired, TradElec was dumped, and a Novell SUSE Linux-based platform was brought in to replace it."

"Today, February 14th, the LSE's Linux-based Millennium Exchange took over and everything just worked. It did take longer to switch to Linux than expected, because of what the LSW first called "sabotage" but later put down to "human error" in late 2010. On its first day, out LSE ran like a charm."

"It's not the only stock exchange that's found that Linux worked better. The Johannesburg Stock Exchange in South Africa is moving to Millennium Exchange. The LSE's parent company is in the process of acquiring the Toronto stock exchange so it will soon be using Linux as well."

{for more info see:- }

London Stock Exchange suffers .NET Crash

http://practical-tech.com/infrastructure/london-stock-exchange-suffers-net-crash/722/

NYSE places buy on Linux, hold on Unix

http://www.computerworld.com/s/article/9053008/NYSE_places_buy_on_Linux_hold_on_Unix

"So what really happened? I doubt we'll ever get a detailed, nitty-gritty explanation, but I have friends in London and… Well, let me just make the following points about TradElec. First, TradElec runs on more than a 100 HP ProLiant servers in several locations in London. These servers are running Windows Server 2003.

On top of this runs the TradElec software itself. This is a custom set of C# and .NET programs, which was created by Microsoft and Accenture, the global consulting firm. Its back-end databases, believe it or not, run on Microsoft SQL Server 2000. The goal was to maintain sub-ten millisecond response times. In short, it's meant to be a real-time system. "

Let this be a lesson to you. If you want to run programs or processes on low cost hardware, use an "efficient" operating system and programming language. JB

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Email: **zs6wr.club@gmail.com**
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Bulletins (Sundays at …)
11h15 Start of call in of stations
11h30 Main bulletin start

Frequencies
439.000MHz 7.6MHz split
Input: 431.4MHz (West Rand Repeater)
145,625 MHz (West Rand Repeater)
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Radio Amateurs do it with more frequency!

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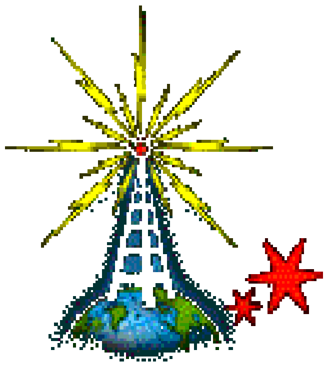
West Rand members - we need your input!

To make this the best ham radio magazine in South Africa we need your input. Please submit articles, comments, suggestions etc.

Please send plain text with no formatting to the email address below.

See Club website at www.zs6wr.co.za for all ANODE back issues.



We need your input! Email us articles, comments and suggestions please. zs6wr.club@gmail.com