

Official Bulletin



MHz to GHz

The West Australian VHF Group Bulletin

AUGUST 2009

THE WEST AUSTRALIAN VHF GROUP (INC)
PO BOX 189 APPLECROSS

Web site: <http://www.vhf.worldsbest.com.au>

e-mail committee to: committee@vhf.wirelessplanet.com.au

President	Wally	VK6KZ			
Secretary	Terry	VK6ZLT	Treasurer	Fritz	VK6UZ
Activities			Materials		
Publicity					
Museum Rep	Tom	VK6ZAF			
Councillor	Phil	VK6ZKO	Councillor	Heath	VK6TWO
Trustee	Wally	VK6KZ	Trustee	Don	VK6HK

Committee and general meetings are now held on the same night. See below for times

Aug 24 2009	Mar 24 2010
Sept 27 2009	Apr 28 2010
Oct 25 2009	May 26 2010
Nov 22 2009	Jun 23 2010
Jan 25 2020	Jul 28 2010
Feb 25 2010	Aug 25 2010

Meeting Place: Wireless Hill Museum Lecture Room. Entry via corner of Almondbury and McCallum Crescent Ardross.

Meeting Time: Committee 7pm
General 8pm.

Editors Note:

Welcome to the 2009 issue of the VHF Group bulletin.

Before continuing, the editor would like to say, he thought long and hard as to how the editorial content was to be approached. Long experience in picking through sensitive subjects generally bring no change. Whilst truthful expression, on many occasions, bring controversy and distain. Experience has also found that underlying problems need to be expressed clearly before any progress can be made. It is with that last comment in mind that I have approached the editorial content of this bulletin.

A couple of years ago this bulletin talked about the amount of free time available to members. It seemed everyone was busy with one thing and another and as a consequence, group activities had suffered and declined. It would seem very little has changed.

There has been new emphasis on trying to stimulate activity in the group, the beacon project being one and a SDR activity night being another of which I will talk about later.

The subject for discussion, this year, is the willingness of members to contribute to the group as a whole. I think this is best explained by example. A few years ago, when the editor was president, he embarked on trying to stimulate group activity by building a ham shack in the Wireless Hill Museum capable of remote access. Most certainly it was an ambitious project, however, the modules within the shack could be broken down into easily manageable parts and there was no fixed time frame, giving members every opportunity to contribute in any form they found capable of doing so. The group certainly had most of the technical capabilities and the idea was received with great enthusiasm. Expressions of interest were solicited from various members, which, again, met with positive comments. However, when it came to the vote to proceed, not a single member voted for it. To be honest I was quite flabbergasted. Not because the vote didn't pass, but because most of the members at the meeting were, up until that time, expressed interest in the project.

As disappointing as that was, it paled to insignificance a few months later. At that time the group was looking for some new power supplies for the beacons. The existing ones appeared to be having problems when the power was intermittent constantly blowing fuses. The committee was already busy with other matters and I called on the members present for a volunteer to look on the web at a couple of power supplies offered by the usual electronic stores, Dick Smith, Jaycar etc. A couple of hours on the web – tops - over the next month. The request was about as simple and basic as it gets! Again, not a single volunteer. In the end I had to express my disappointment, upon which a member finally raised his hand. To him I am forever grateful. I believe this showed the level of commitment by the group in general, which has become an all too familiar event.

So why be a member of a group at all. I, for one, am technically a member of the Beacon Group. Not because I wanted to be. I just wanted to send a donation to that group so that they could continue servicing the repeaters. A service I have used. I was just easier that way, for them and, no doubt, it looked like another member on their books. I know there are several members in the VHF Group who feel the same way about the beacons. Happy to use them - will contribute to their upkeep - but not interested in joining the group as a member. A view I respect. For the rest of us, I think there is, at the very least, a moral obligation to contribute in other ways than simply turning up at a meeting. We are not asking for a lifetime commitment – just a helping hand.

There is also the case of flogging the willing horse. A small core of members have been working behind the scenes trying to organize all manner of club duties, from keeping the accounts to organizing talks, to paying member insurance. Whilst it may not sound like much to some, it takes quite some effort to do all this, which is not helped by a depleted committee. Whilst creative and versatile, even that core of individuals has its limits. When the group is asked for input as to any ideas, they are generally met with the same blank stares and thundering silence. It would not be too bad if it were a case of “let me think about it and I will get back to you.” It is more a case of “Can't think of anything right now – end of story!” There have been several occasions where I have – somewhat sarcastically - postulated if there would be the same number of members attending the meeting, if only coffee and biscuits were served.

Back on the topic of time availability. I currently run my own small business by day, have spent several months fitting out a new office in the evening along with tutoring my high school children. My

time is already fully utilized and it is a rare moment indeed when I am bored. You can add to that the usual home maintenance and family commitments. I can swear on a stack of bibles, that, I too, do not have time to engage in group activities. Yet, here I am writing this bulletin. Why! Because I will not stand idly by and watch one of our "most willing of horses" get buried under yet another task. The sigh of relief and gratitude, coming over the telephone, when the offer was made, was singularly more of a reward than any words could ever express.

Well members it is now crunch time. All the excuses have been exhausted. The committee has been depleted to a point where it will be unlikely that the group can continue in its present form. Whilst I was writing the new list of meeting dates, I could not help but feel a sense of foreboding. Unless we can get a committee with president at this year's AGM, it will look like the group will fold. This will undoubtedly be a tragic day for those who have been members since its inception.

I would suggest a second look at the Committee Nominations forms contained within this bulletin. If you have been on the sidelines of the group for some time, perhaps now is a good time to look at joining the committee. I have been in a couple of situations where activities run by one or two people have folded and many have lamented their passing, even to the point of asking the originators to restart proceeding. In every case, this has been declined.

Remember once gone, it will not be reincorporated!

Club Activities:

Committee Nomination Form

West Australian VHF Group Inc. Annual General Meeting 28th September 2009		
Nominations for Group Representatives		
Position nominated: _____		
Proposer: _____		
Name	Signature	Date
Seconder: : _____		
Name	Signature	Date
Nominee: : _____		
Name	Signature	Date

New Beacon Project Update

Unfortunately the time issue has impacted this project quite severely, mainly in the editors area of responsibility. In some respects, this has been a good thing.

Ben (VK6IC) had suggested a change of processor to the Analog Devices Blackfin family. This has led to a change of design in the backplane and how the processor talks to each modulator. The pin configuration for the backplane has been specified and is awaiting a new schematic before the PCB layout can proceed.

The changes has also impacted the modulator design, adding slightly more board complexity, but enhancing overall performance, reliability and maintenance. Again, this is awaiting a new schematic before the PCB layout can proceed. Ben has been working on the modulation software and has some code which can be tested once the hardware is ready.

Steve (VK6SQ) has also been awaiting the modulator hardware. In the mean time he has been expanding his software knowhow by experimenting with some Motorola 6805 series microcontrollers.

Fritz (VK6UZ) has had some problems with the 10MHz frequency reference. The GPS receiver, which specified a highly accurate 10MHz reference, was found to contain a large amount of jitter, making it virtually unusable. Several methods of trying to correct for this jitter have been tried, including a PLL circuit, however the fundamental variance of the basic waveform is proving problematic.

SDR Activity Nights

With "Software Define Radio" now becoming a major part of amateur activity, a proposal was raised with the committee to solicit members for expressions of interest in having a SDR activity night.

The committee would like to bulk order a number of Softrock modules. All amateurs and non-amateurs are invited to place a deposit for the purchase of their preferred kit. Once received, a number of meetings will be devoted to assembling and testing these kits. Non-amateurs will only be limited to those kits capable of receiving signals, but it is felt this is a good introductory activity.

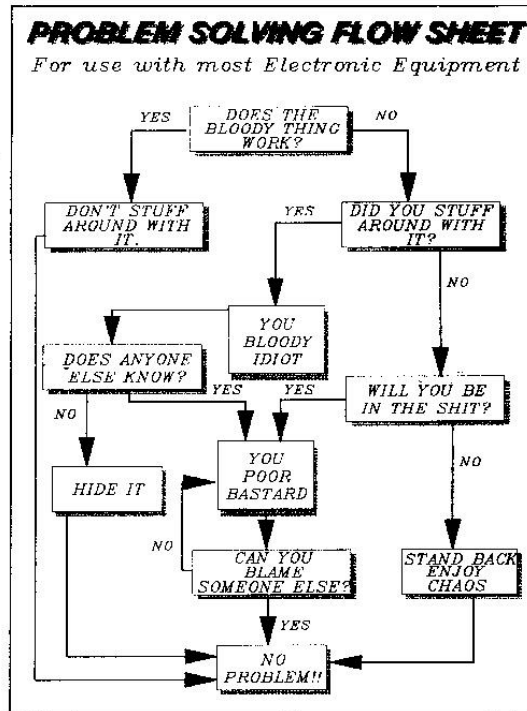
The view is to stimulate activity in the group and possibly bring in new outside members.

New Web Site

Ben (VK6IC) has been working on a new Group web site. The group is looking at registering a new domain name to coincide with the launch of the new site. Details will be released as the project proceeds.

Technical Articles:

The following guide to solving technical problems was submitted by Bob (VK6KW). An oldie but a goodie. Hope you enjoy it.



FIELD STRENGTH METERS

By Terry (VK6ZLT)

As the amount of information on DIY field strength meters is vast to say the least, here are some websites from which the for going circuits have been obtained.

<http://pe2er.nl/index.htm> WiFi antenna measurement.

<http://vk1od.net/calc/mtfslucr.htm> antenna measurements

http://www.qsl.net/n9zia/wireless/pics/LED_sig_meter-1.png LED rf signal meter

<http://www.zen22142.zen.co.uk/Circuits/rf/fsm.htm> simple fsm using fet transistor

http://homepages.nildram.co.uk/~baker/FSM1_Overview.html

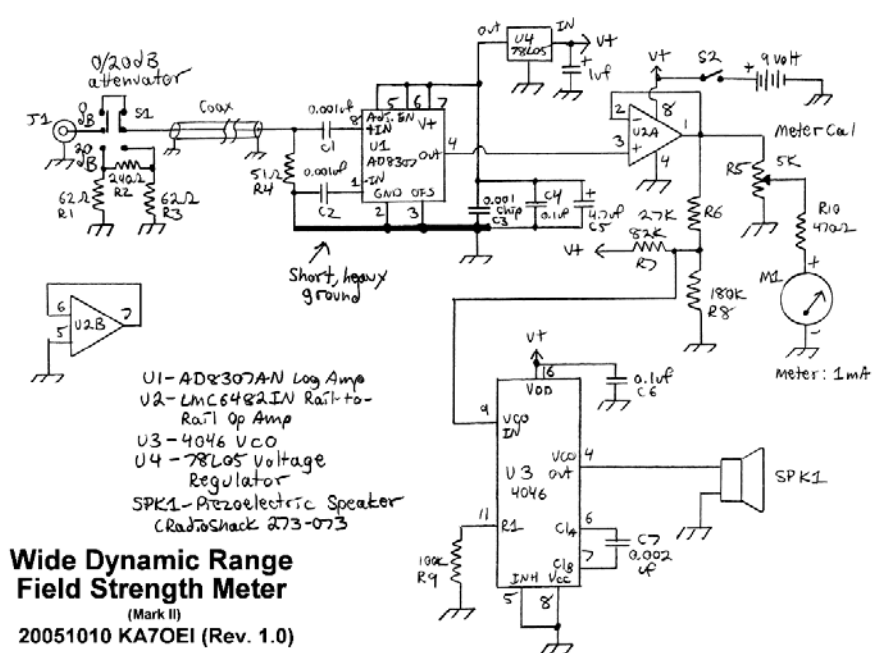
Local suppliers such as **Altronics**, **Jaycar**, **WorldWide** or national suppliers such **Farnell** or **RS Components** can supply all the components necessary for any type of FSM you decide to build. It should be noted that the supply of general purpose point contact diodes has all but dried up so GP schottky diodes have been substituted in place of.

Note: If diode requirements (detector or mixer) are in the microwave regions GHz & above do not overlook the schottky HSMS -8xxx series of surface mount devices or equivalents. They are available in various configurations such as single, series pair, unconnected pair, ring quad or even cross-over. These are available from RS or Farnell.

Some of these devices have amazing switch on voltages in the order 120mV – 150mV. Other points of interest to note is the use of analogue meters, DVM, Led indicators, Aerials and means of calibration. Innovative DC converter such as the AD8307 are contained in the following two circuits.

Note - the schematic below has an analogue meter and a tone generator indicator. This type of metering system is very handy especially when tuning aerials (yagi) as the driven element can be positioned for maximum performance.

The PCB layouts are included in this document. They are not to scale but can be scaled to fit in this word document by clicking on the corners and altered to suit the physical dimension of the DIL pin connections. The parts layout can be obtained from the:

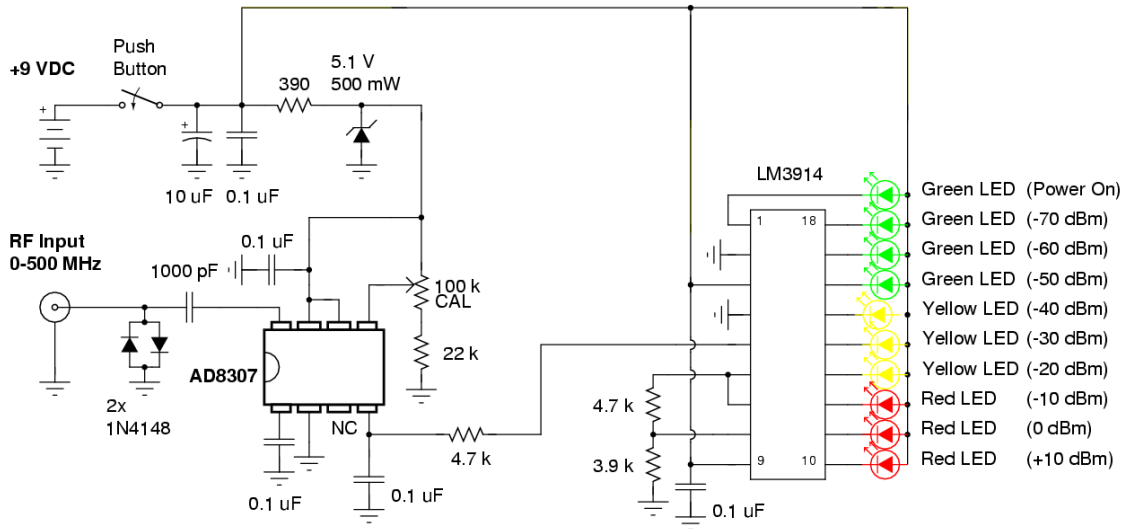


http://homepages.nildram.co.uk/~baker/FSM1_Overview.html

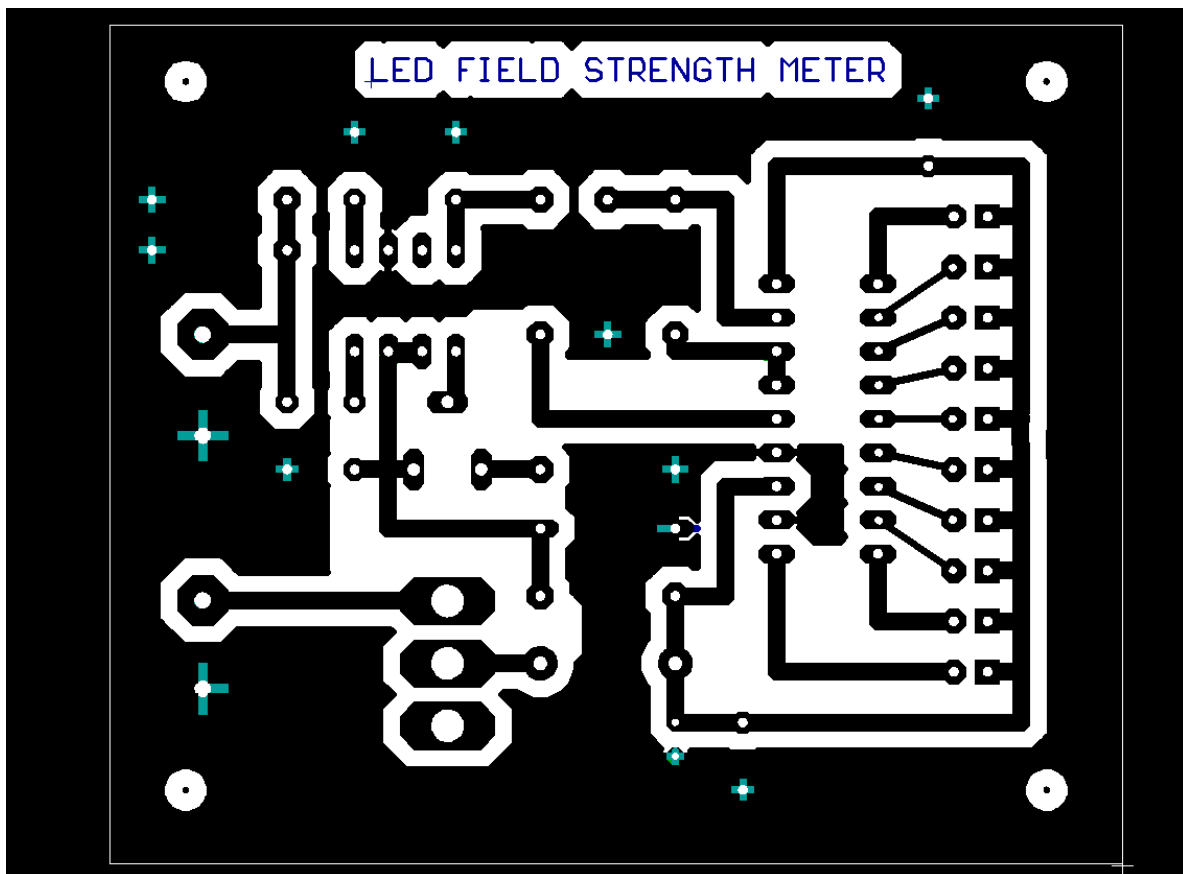
LED RF Signal Meter

August 2000 QST Version

www.gbppr.org



All the info required is within this website



Rod Antenna Design

By Luigi (VK6YEH)

The author had an application where he needed a small monitoring antenna for some short range work. To keep the dimensions small a rod antenna was used.

What is a rod antenna?

Consists of a ferrite rod with a coil around the centre.

Mainly used as a compact antenna for low frequency receivers

Tuned Circuits

Basic, parallel resonant, tuned circuit

$$(2 \pi f)^2 = 1 / (LC) \quad \text{Eqn 1}$$

Circuit Q

Q is the quality factor. Normally given by

$$Q = f_c / BW \quad \text{Eqn 2}$$

Where:

f_c is the centre frequency

BW is the bandwidth

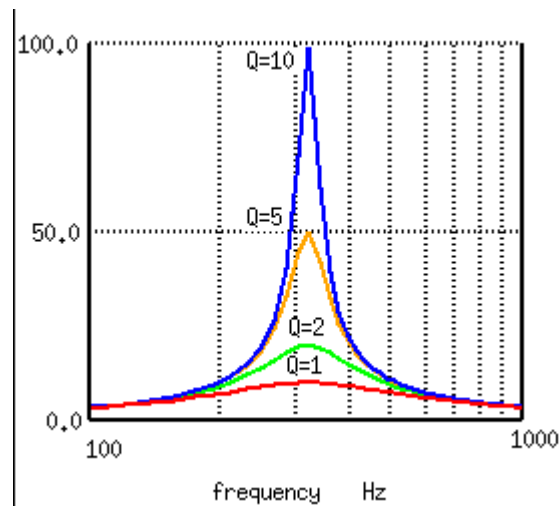


Figure 1 – Relative Circuit Q

Q_u is the unload $Q = X_L / R_S$

Eqn 3

Q_L is the loaded $Q = X_L / R_P$

Eqn 4

Where:

X_L is the circuit inductance

R_S is the series resistance of the inductor.

R_P is the added parallel resistance to the tuned circuit.

Example design

20 meter band 14.00MHz to 14.35MHz

Centre frequency is 14.175Mhz

Bandwidth = 350kHz

I had a 5-56pF trim pot. Selected centre capacitance as 33pF.

$$\begin{aligned} L &= 1 / [(2 \pi f)^2 C] \\ &= 1 / [(2 \pi \times 14.175 \times 10^6)^2 (33 \times 10^{-12})] \end{aligned}$$

$$= 3.82 \text{ uH}$$

I have a rod which is 0.635cm on diameter and 5.08 cm long

The inductance of a rod antenna is given by the following formula

$$L(\text{uH}) = k \mu_0 \mu_{\text{rod}} N^2 A_e 10^4 / \text{length} \quad \text{Eqn 5}$$

Where:

- k Inductance modifier
- μ_0 Relative permeability of free space $4 \pi 10^{-7}$
- μ_{rod} Rod permeability
- N Number of turns
- A_e Cross-sectional area of the rod (cm^2)
- length Length of the rod (cm)

The equation can be rearranged to work out the number of turns needed.

$$N = \sqrt{(L(\text{uH}) \text{ length}) / (k \mu_0 \mu_{\text{rod}} A_e 10^4)} \quad \text{Eqn 6}$$

The inductance modifier (k) is derived from the chart in Figure 2. One first calculates the ratio of the winding length over the rod length.

$$l_c / l = 0.64 / 5.08 = 0.126.$$

The chart is then used to find the final inductance modifier. In this case the inductance modifier is approximately 2.7

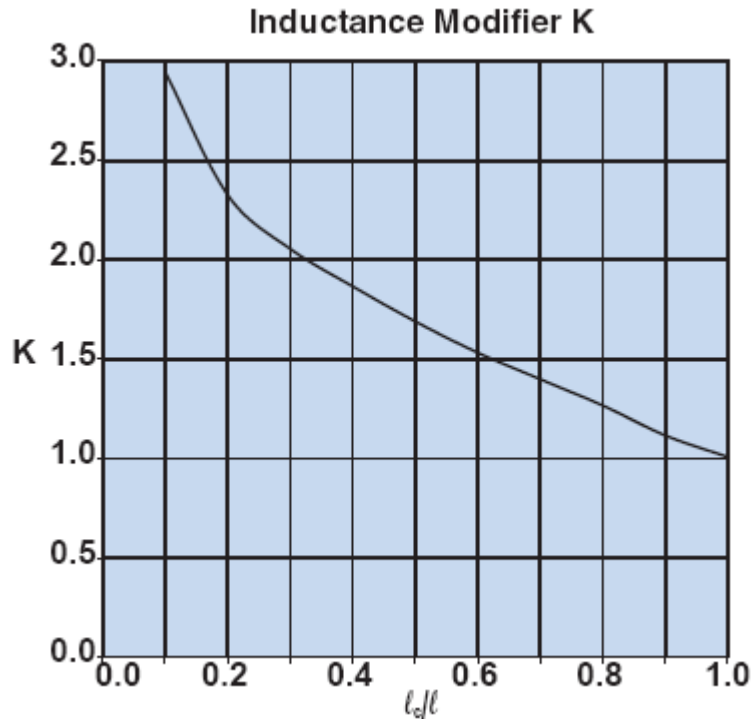


Figure 2 - Inductance Modifier Chart

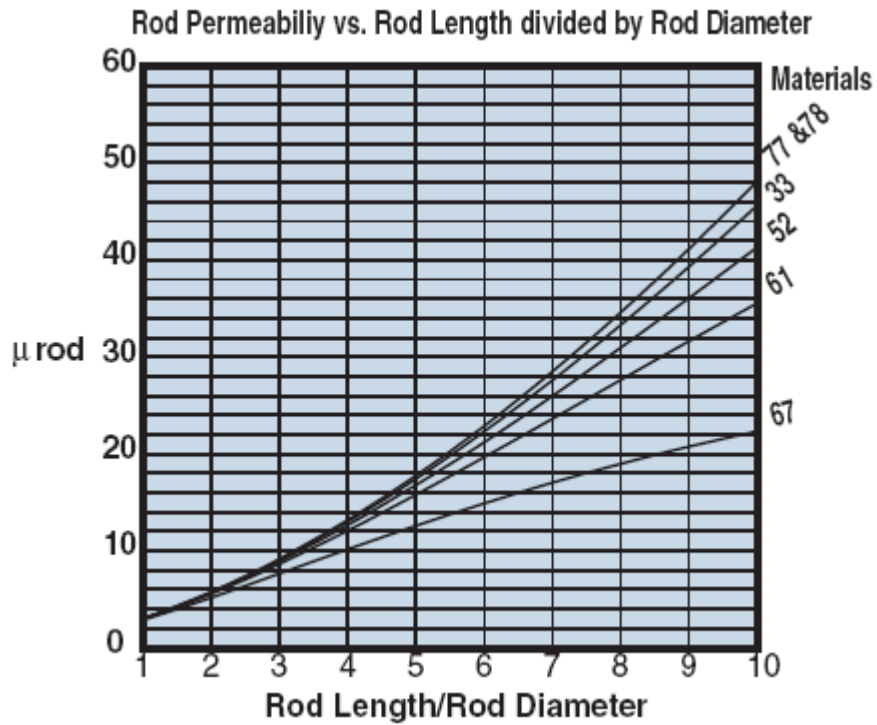


Figure 3 - urod Chart

The rod permeability (μ_{rod}) is derived from the chart in Figure 3. One first calculates the ratio of the rod length over the rod diameter

$$\text{Ratio} = 5.08 / 0.635 = 8$$

By tracing the material type to the ratio point the chart is then used to find the rod permeability. In this case the rod permeability is approximately 28.

Placing all the known parameters into the equation 6 the number of turns can be calculated.

Rod Length (cm)	5.08	Winding Length (cm)	0.64
Rod Diameter (cm)	0.635	Rod Permeability (μ_{rod})	28
L/D Ratio	8	Inductance Modifier (K)	2.7441
Required Inductance (μH)	3.82	No of Turns (N)	8
<input type="button" value="Calculate Rod Parameters"/>			

Figure 4 - Calculated Number of Turns

I selected 0.8mm wire as this will give 1 layer of 8 turns across the length of the bobbin.

The diagram below shows the measured parameters of the inductor.

Note: The figure given for R_s is not correct. The measured DC resistance is less than 0.1 ohms.

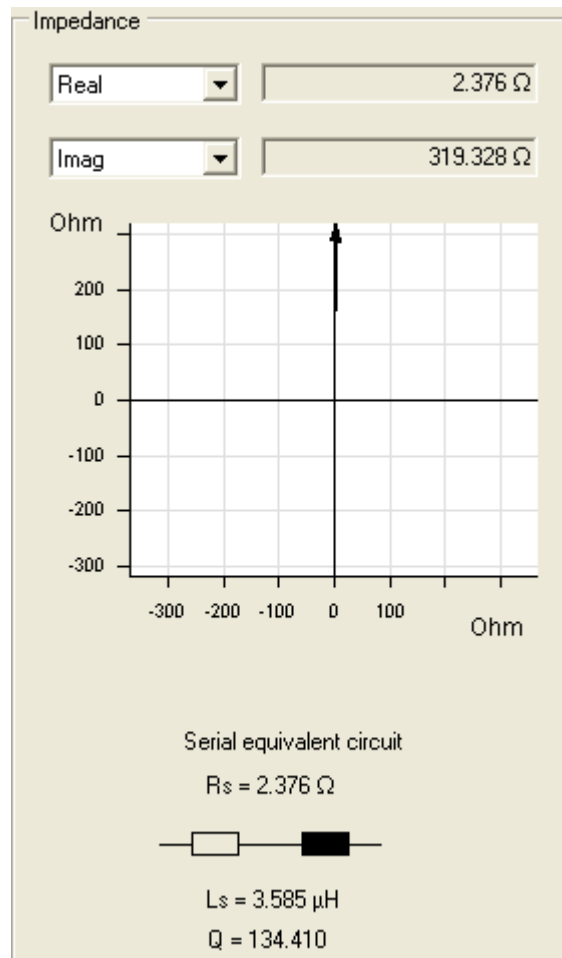


Figure 5 – Measured Inductance

Now calculate the impedance of the inductor at the centre frequency.

$$X_L = 2 \pi f L = 2 \pi \times 14.175 \times 10^6 \times 3.82 \times 10^{-6} = 34022 \text{ ohms}$$

We now try and work out the required circuit Q

$$Q = f_c / \text{BW} = (14.175 \times 10^6) / (350 \times 10^3) = 40.5$$

Next the unloaded Q is measured

$$Q_u = X_L / R_s$$

Here we strike a problem. There are so little turns, the series resistance of the inductor is virtually 0 ohms. That being the case Q_u tends towards infinity. This makes for a very narrow band circuit.

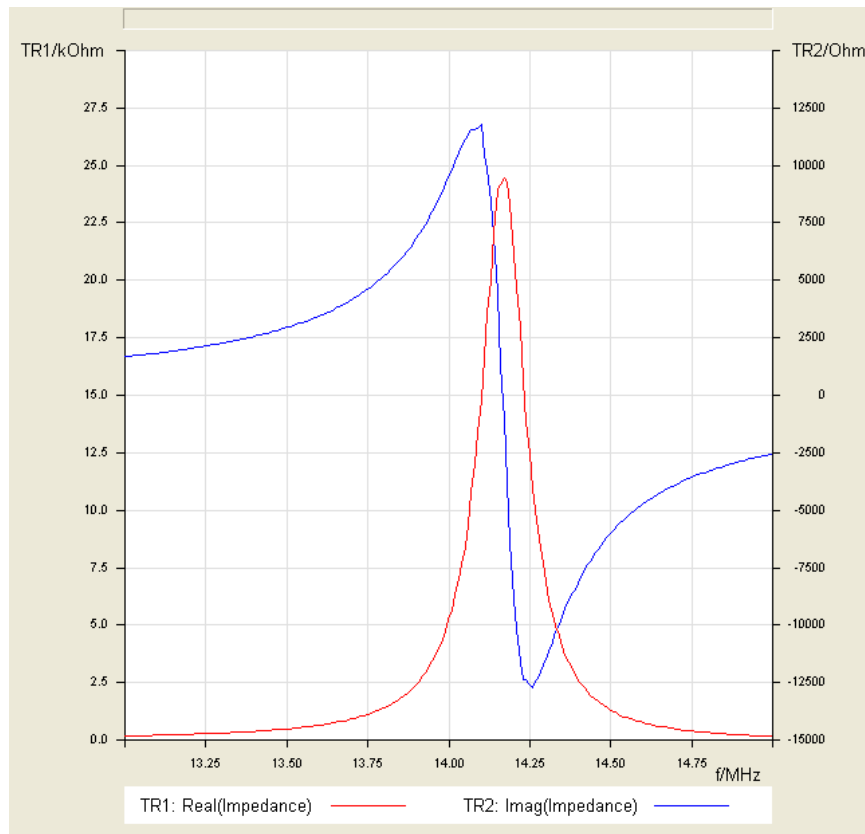


Figure 6 – Unloaded Q

The Q is reduced by adding a parallel resistance to the tuned circuit. This parallel resistance acts in conjunction with the equivalent parallel resistance of the inductor. We, therefore, need to calculate the equivalent parallel resistance.

$$R_p = (X_L)^2 / R_s \quad \text{Eqn 7}$$

Again, R_s is so small, R_p is close to infinity or an open circuit. In this case we can disregard this resistance.

The loaded parallel resistance is given by equation 8

$$R_p = Q_L X_L \quad \text{Eqn 8}$$

$$R_p = Q_L X_L = 40.4 \times 340.22 = 13.74\text{k ohms. Use 14k ohms.}$$

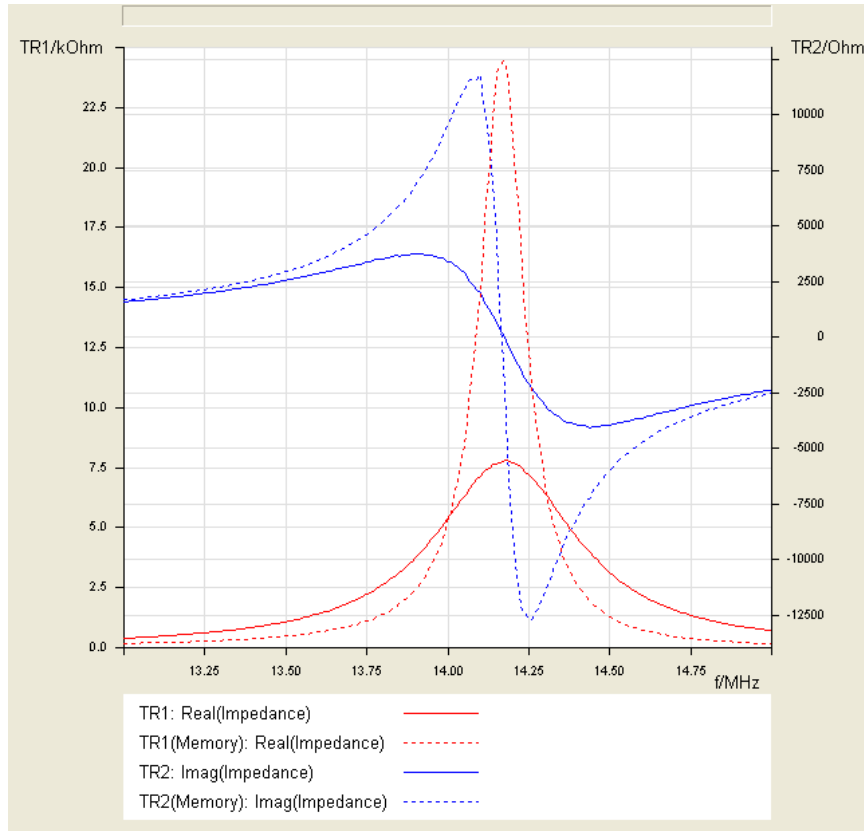


Figure 7 – Loaded Q

References:

“The ARRL Handbook,” 2003 edition. By the ARRL

www.allaboutcircuits.com

Fair-Rite Catalogue, 15th edition. By Fair-Rite



WEST AUSTRALIA V.H.F. GROUP (INC.)

P .O. BOX 189 APPLECROSS
WESTERN AUSTRALIA 6953

<http://vhf.wirelessplanet.com.au>

MEMBERSHIP INFORMATION AND APPLICATION FORM

The VHF Group is an association of persons interested in the encourage and scientific development if V.H.F. Radio communications in all its branches, including satellites, Earth-Moon-Earth, long distance (DX), microwaves etc etc etc.

MEETING PLACE Wireless Hill Museum lecture room. (Entry via corner of Almondbury and McCallum Crescent Ardross).

MEETING TIMES General meeting on fourth Monday of each month except December, 8.00 pm at Wireless Hill. Council meeting one hour beforehand at 7.00 pm.

ACTIVITIES Monthly meeting.
Swap-meets, junk sales, components sales,
Regular technical lectures at the meetings.
Club station at Wireless Hill Museum with HF and VHF antenna systems.

SUBSCRIPTIONS Metropolitan \$20.00 per year payable before the end of June for the next financial year. Country \$18.00 per year for those residing more than 60km from the Perth GP0.

APPLICATION FOR MEMBERSHIP

SURNAME.....OTHER NAMES.....

ADDRESS.....

..... POST CODE

CALLSIGN.....PHONE(H).....

(W).....

NOMINATOR.....

SECONDER.....

SIGNATURE.....

DATE.....

Monthly meeting.

APPROVED FOR MEMBERSHIP..... (PRESIDENT)