

THE
QUEENSLAND
VHF'er



The Newsletter of the Brisbane VHF Group

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The Brisbane VHF Group are responsible for the following:

Beacons

VK4RTT **144.440** MHz - 25 Watts – Location: QG53TC Bunya Mountains – Status: operational
VK4RBB **432.440** MHz - 8 Watts – Location: QG62MN Murarrie, Brisbane – Status: operational
VK4RBB **1296.440** MHz - 8 Watts – Location: QG62MN Murarrie, Brisbane – Status: operational
VK4RBB **2403.440** MHz - 2 Watts – Location: QG62MN Murarrie, Brisbane – Status: operational
VK4RBB **10368.440** MHz - 1 Watt – Location: Murarrie, Brisbane – Status: planned for early in 2007

Repeaters

VK4RBN **147.000** MHz (600 KHz negative offset) – Location: Mt Glorious – Status: operational
VK4RBC **438.525** MHz (5 MHz negative offset) - Location: Mt Coot-tha – Status: operational

Table of Contents

3	Editors Chat
4	2m / 70cm Diplexer - VK4OE
7	Getting the most out of Digital EME - VK2KU
10	Sic Meters – The Tragic Band? - KH2D
12	One solution to VHF/UHF field day antennas - VK4JMC
16	50MHz 500W IRF510 500W Linear - OZ1PIF
20	DSP using a computer sound card - VK4SG
22	Coffs Harbour Hamfest Report - VK4KKD
23	How Coax is made



Editors Chat

Welcome to the Fourth issue of “The Queensland VHF’er”

The aim of the Brisbane VHF Group is to promote the use of all modes of communication on all bands VHF and above. (Yes Gordon that does mean 50MHz as well!!!)

This fourth issue has been provided to all the members of the Brisbane VHF group. If you are reading a borrowed copy and wish to receive your own copy (and become a member of the group), the fees are only \$10 per annum, a bargain by any standards. So fill in the form on the back page and get your \$10 off to our Secretary. The new financial year for the club starts in May so I will be reminding you of sub renewals over the next couple of issues.

In this issue we have some interesting information from Doug VK4OE once again, with Guy starting a series on Digital EME. We take an interesting look at John VK4JMC’s field day system and have a look at a very interesting 50MHz amp built around some very cheap devices. Kev VK4KKD has turned into a roving reporter and tells us about the recent Hamfest just over the border in Coffs Harbour.

I have been given some good copy but I am always on the lookout for more. If you have anything of interest that you can share with fellow hams (Rough notes and/or photos will do - I can put the words together) please e mail me at graham.selwood@det.qld.gov.au.

Well, did you get amongst the recent openings on 50 & 144MHz? The first opening from SE QLD to Far North QLD started in early Dec, with the Xmas fortnight opening from FNQ to NZ, and VK3/7. There is a comprehensive report in the next issue of AR, and I will include a report from the QLD perspective in next issue. (Please e mail me your best contacts for inclusion in the summary)

This Fourth issue contains articles gleaned from various sources, and full acknowledgement is given to the author and source (where known). But in this age of litigation and refusal to accept responsibility for one’s own actions, I am told that some form of disclaimer is necessary to prevent the incompetent and the unwary from holding the author, editor and members of the group liable for the consequences of using any of the information contained in this magazine to injure or harm themselves, their equipment or any third party. You must accept that any consequences that occur through following any information in this magazine are entirely your own responsibility.

Having said all that, I hope you enjoy reading the following articles, and learn something of value to this great hobby of ours.

Graham VK4SG



***Worth a click:* The Strange Life of Nicola Tesla** - A primitive autobiography evidently self-published by Tesla, not likely available anywhere but on the web. An absolutely fascinating read, even if you take Tesla’s version of events with a truck load of salt. <http://www.antentop.org/005/files/tesla005.pdf>

***Worth a click:* So, you’ve acquired an oscilloscope...Now, what to do with it?**

http://www.tek.com/Measurement/cgi-bin/framed.pl?Document=/Measurement/App_Notes/XYZs/&FrameSet=oscilloscopes

is a basic tutorial on oscilloscopes that doesn’t assume you have a degree in rocket science. (A series of downloadable Pdf’s that is virtually a book when put together.)



A 2M-70cm Diplexer that's easy to build

Doug Friend, VK4OE

A diplexer for 2 metres and 70 centimeters is a small project that most VHF'ers will need sooner or later. Usually, they are used in either of two circumstances:

1. To interface a dual band radio that has one RF output connector to two separate antennas, one for 2 m and the other for 70 cm; or
2. To interface separate 2 m and 70 cm radios to the cable going to one dual-band antenna.

To be sure, most of us just go out and buy one and that is a valid solution if you want to go that way. But for those of us who love to construct things, here's a design that works really well, that's relatively simple to make, that won't cost you a bunch, and which gives you tune-it-up ability, enabling you to optimize its performance for whatever part of each band you may prefer it to be operating.

(Within each band, its useable range is still megahertz wide, but there is always one frequency where isolation is maximum.)



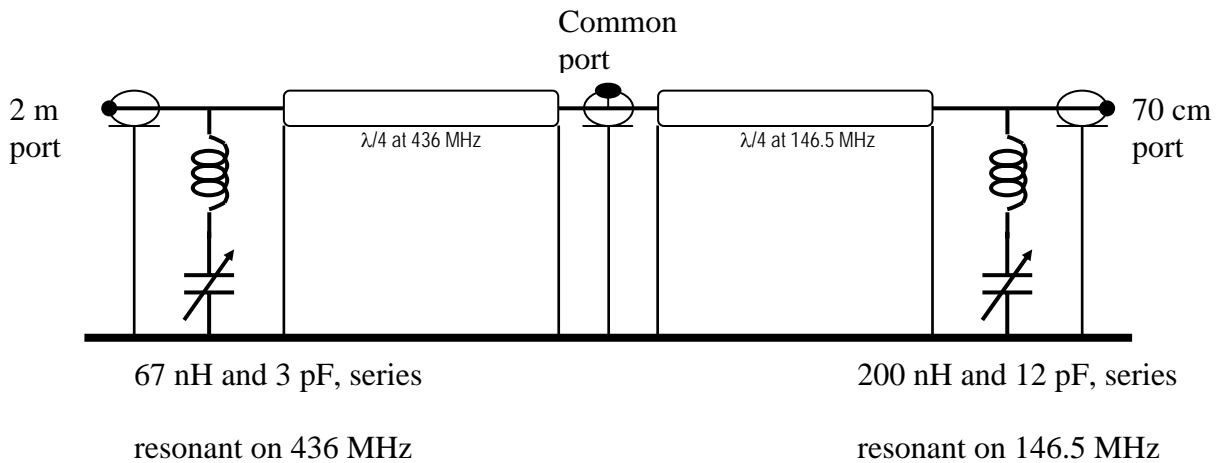
I make no secret of the fact that this is not my idea. In fact, I was inspired by a short article on this idea that appeared in the RSGB journal 'RADCOM' back in September 1994 (p.69), and that article was a report of an earlier one by PA0HVA in the Dutch amateur radio journal 'Electron'. It is only recently that I got around to making my own version and, because it works so well, I wanted to further spread the idea around.

The principle of operation of this diplexer is based on three facts:

- a) that a quarter wavelength of transmission line, when shorted at one end, 'looks like' a high impedance at the other end, but only at or near the frequency at which it is a quarter wavelength;
- b) an inductor and capacitor in series make for a low impedance path at the frequency to which they are tuned, with the efficiency of this circuit dependent upon the Q of the components used; and
- c) a high Q series tuned circuit can be used to provide a frequency selective 'short' at the end of a quarter wavelength of transmission line meaning that, at frequencies other than where the tuned 'short' is active, the transmission line (read coaxial cable) passes signals with low loss.

This diplexer combines these three facts such that 70 cm signals at the common port are severely attenuated at the 2 metre port whilst passing through to the 70 cm port at low loss, and 2 metre signals at the common port are severely attenuated at the 70 cm port whilst passing through to the 2 metre port with very little attenuation.

Here is the circuit of this diplexer:

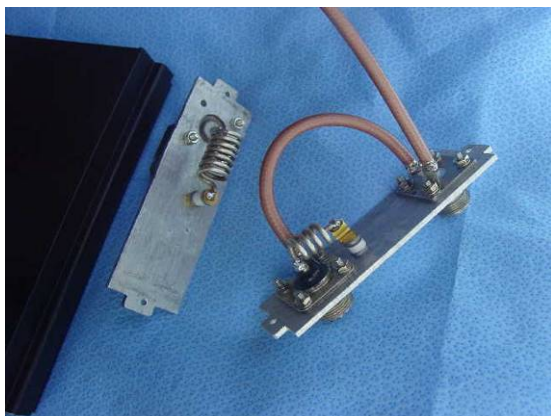


Acquiring the parts

- Connectors can be any types of your choosing. As you will see in the picture, I used ‘N’ connectors (of surplus origin) for the common and 70 cm ports, and an SO-239 (“UHF”) for the 2 metre port. The performance of many PL-259/SO-239 connectors above 2 metres is suspect!
- Coaxial cable – quarter wavelengths of transmission line are formed using coaxial cable of the best quality you can acquire. Cable with PTFE dielectric is best here because it doesn’t melt when soldered. Also, double screened coaxial cable is preferable for obtaining good isolation. I used RG316 cable but, with care, you could use just about anything – it’s a compromise between what you have available and how well the diplexer works when finished. RG223 is double screened but with polyethylene dielectric and thus should work well if you don’t melt it. Using my RG316 which has a velocity factor of 0.695, I cut lengths of 125 mm and 365 mm for the 436 and 146.5 MHz quarter wavelength lines and then trimmed only about 5 mm of braid off each end. I then removed about 5 mm of outer insulation, prior to tinning and attachment of solder lugs on the ends of the outer conductor. Other coaxial cables may need different lengths depending on the velocity factor of their dielectric. RG58 or RG 213 could also be used but they are only single screened cables
- Capacitors could be traditional air dielectric trimmers or, better still, some of the high Q ceramic dielectric ones that can be obtained on the surplus market or ‘ratted’ from surplus equipment. (These are the ones visible in the pictures.) A search on the ‘net’ revealed some available in the US at: <http://www.surplussales.com/Variables/PistonTrimmers/PistCap-4.html> Steer away from the many small plastic trimmers that are widely available – they will generally degrade this unit’s performance and will not handle much RF power.
- Inductors – these you’ll need to wind your own and, because these are part of tunable circuits, the following recipes need not be followed incredibly accurately, just something like them will suffice. The 200 nH inductor is 7 turns of 1.5 mm diameter wire wound on a 9 mm rod (end of a drill bit) then the coil is stretched to occupy about 20 mm. The 67 nH inductor is 4 turns of the same wire wound on a 6 mm rod, stretched to occupy about 10 mm. I had silver plated wire available in my ‘junk box’ (I had to straighten and re-wind an old coil), but bare copper should also be good. Tinned copper wire or enameled wire could also be use but I am not sure if the same good isolation results will be repeated – their Q is a little less than bare copper or silver plated copper.
- Box/housing – can be just about anything you have, as long as it is all-metal and can accommodate all the parts. The RG316 cable that I used is a bit of a law unto itself as far as

shaping and bending, so try how it will all fit before you start drilling your box. The box that I used was obtained on Australian eBay from a well-used Perth seller "TCENS". The likes of Jaycar and Altronics all have die cast boxes that could be used.

Construction is fairly straightforward and very dependant on the types of connectors, trimmers and box that you have. The essential rule is that the 436 and 146.5 ports should be as far as possible away from each other, with the common port located in between (obvious, when you look at the circuit!) The following two pictures are of my unit during its construction, showing the box ends just prior to final assembly. The one screw missing from the 70 cm port will shortly be used for grounding of the outer conductor of the coaxial cable that disappears out of the top of each picture. Also very visible here are the coils and high Q trimmers that were used. They are mounted all on the box end plates that I made.



Testing and tune up is quite simple and the following is a slightly adjusted quotation from the original article. With the 146.5 MHz port terminated with a 50 ohm load, and a sensitive power indicator that is also 50 ohm impedance connected to the 436 MHz port, feed a 146.5 MHz signal into the common port and adjust the 12 pF trimmer for minimum power indication. Do not readjust it. Then interchange the items connected to the 146.5 and 436 MHz ports, feed a 436 MHz signal into the common port and similarly adjust the 3 pF trimmer for minimum power indication at the 436 MHz port. That's all! Obviously, you would use the frequencies at which you actually want the diplexer to perform best – those suggested here are the frequencies I used enabling good performance across the simplex and repeater sections of our Australian band plans.

See Issue 1. of "The Qld VHF'er" (page 16) for an example of a sensitive power indicator (right) that could be used for tune-up. Take care though that it doesn't cop the full power!

Performance – When good quality components are used, isolation between ports should be in the order of 40 dB at the centre tuning frequencies, and still around 30 dB isolation up to 1 MHz either side of the optimum 2 metre frequency and 2 MHz either side of the 70 cm optimum frequency. Insertion loss from the common port to either of the other ports should be almost insignificant at around 0.25 dB on the respective bands. My measurements showed that whilst there is a selectable optimum frequency in each band, the diplexer is very useable right across either band, always being well above 25 dB isolation. - 73's Doug VK4OE





Getting the Most out of Digital EME with a Small 144MHz Station

Guy VK2KU yk2ku@clearmail.com.au

1. Getting started

Introduction

So you are thinking of trying some digital EME contacts some time soon? Good. With the advent of Joe Taylor K1JT's WSJT program, lots of stations that couldn't have contemplated CW EME are now having a great time with digital EME.

2 metres is a good band to start on too, the technology is not too demanding though effective antennas can get a bit large, and there are literally hundreds of stations all over the world waiting to work you.

I started off thinking that I would knock off a short article about digital EME for the Queensland VHF'er, but there is so much to talk about that it could easily grow into an ongoing series. So please let me know if you want more, and I'll see what I can manage! (*I have accepted the ongoing series on the readers' behalf – Graham*)

We would need to think about equipment needs, including antennas, how to arrange contacts, predicting the best times to operate, EME procedures and reporting, and of course understanding the more technical side such as Faraday rotation, Doppler shift, sky temperature, and so on. The list is almost endless.

Loggers

As with any new amateur radio activity, the first thing to do is a great deal of listening. Actually most of the time there is not much to hear because the signals are often too weak to hear, so by listening I really mean monitoring.

There are several loggers used by EME operators, but the two most popular (in order of popularity) are:

1. the **N0UK** logger at <http://www.chris.org/cgi-bin/jt65eme/> often referred to as PJ (Ping Jockey) for its meteor scatter page, and
2. the **ON4KST** logger at <http://www.on4kst.com/chat/>

The N0UK logger is exclusively for JT65 modes, whereas the ON4KST logger caters to both CW and Digital modes.

So if you haven't already done so, log onto the N0UK logger and bookmark it in your browser. You will want to have this connection running in your shack.

Monitoring EME QSO's

We will talk about how to find where the moon is on a cloudy day at another time. For the moment, point your antenna at the moon and run JT65B in Monitor mode. Use the logger to find a frequency where people are calling CQ or running a sched, and try to decode the station(s).

Keep a written list of stations you manage to decode, including callsign, greatest signal level (such as -21dB), and also the power and antennas used by the station. This list will tell you who you might be able to work. Add another column for the signal level at which you hope that the station might be able to hear you, by allowing for your own transmit power; if that comes out lower than -30dB forget it! Depending on the size of your antenna array you should find a number of stations you can possibly work. Concentrate on these, rather than smaller stations you have no real chance of working.

Before your first EME QSO

Once you start to decode EME signals, you will naturally want to have a go, but before you do this, make sure that you understand the procedure used in an EME QSO. This has evolved over many years so as to optimize the chance of completing the QSO, and it is surprising how many stations fail to follow it closely. Joe Taylor has written a concise Help entry in the program – click on Help, then What Message to Send? Study this carefully and make sure that you understand it fully – this will take longer than you think!

Stick to the basic procedure exactly until the QSO is legally complete, only then add some chit-chat if you want.

The formal requirements for completion of a QSO are:

1. both stations must copy/decode **BOTH** callsigns
2. both stations must copy/decode a signal report, normally “O”, but traditionally sent as “OOO”
3. Both stations must copy/decode an acknowledgement that the report they each sent was received, normally “R”, traditionally sent as “RRR”.

It is not permitted to send the “O” report until you have copied **BOTH** callsigns. This may seem to be an unnecessary restriction, but it avoids ambiguity under marginal conditions. If you receive an “OOO” report, you can be sure that the other station has copied both callsigns, and you need not send callsigns any longer.

In a typical sched situation, both stations start by sending callsigns. The grid locator is attached by the program, and is useful for locating stations when collecting gridsquares, but the grid is not formally required for the QSO to be complete.

When either station decodes BOTH callsigns, he responds by attaching his report “OOO” to the callsigns he continues to send. If you receive callsigns + “OOO”, then you know that BOTH stations have now copied BOTH callsigns, and that you have received a report.

So you respond by acknowledging the other station’s report with “R”, and also sending your report “O” to him, put together as “RO”. Once he receives your “RO”, the only thing missing is his acknowledgement that he has received your “O” (part of the “RO”). He therefore responds with “RRR”, and as soon as you receive that, the QSO is legally complete.

It all sounds more complicated than it really is, but you do need to grasp it thoroughly.

Notice that when you receive his “RRR”, you know that the QSO is complete, but the other station does NOT know this until you tell him this by sending “73”.

A lot of twaddle has been written by experienced operators to the effect that if both stations don’t know that the QSO is complete then it isn’t. This is obviously rubbish!

The QSO is complete at the time that one station (suppose it to be you) receives “RRR”. Now suppose that before you can send him “73” to tell him of the completion, your transmitter blows up (this really happened to me once), or your computer crashes, or the moon sets. There is no way he can know that the QSO is complete until you tell him (by email, logger post, or whatever). But the QSO was still legally complete.

There is no way out of this bind. Suppose the rules were changed to require your “73” to be received by the other station before the QSO could be deemed complete. Now suppose his transmitter blows up after receiving your “73”, but before he can tell you this.....

Now look at the list of messages provided in JT65B. Messages 2 to 4 are each sent by only ONE of the two stations, and follow in a natural sequence. Message 1 may well be sent by both stations in a scheduled situation (but not necessarily), and it is polite for both stations to send "73", but you should never respond to "RO" with "RO", or "RRR" with "RRR". It simply isn't necessary, and the wasted time may make the QSO impossible to complete. That said, if you understand the requirements then you can easily improvise if the other station gets it wrong.

For example, if you send him "RO" and he responds with "RO" instead of "RRR", then "O" and "R" have been decoded in both directions, and that is all that is required and the QSO is complete. So you can properly respond with 73s, rather than send "RRR".

Two small final things. Some computers are unable to complete the decode before the minute rolls over and you start transmitting. No matter, you can change the message in mid transmission without damaging anything. There is no need to wait for another sequence.

And do make use of the waterfall display for decoding RO, RRR, and 73. This way you can be ready for the next step long before the computer does the decode. Sometimes the computer will even fail to decode one of these shorthand messages if an interfering signal is close by.

More next issue. Meanwhile have fun on the moon. – Guy VK2KU

Footnote

I recently had the following JT65B EME exchange on 144MHz.
I have changed the callsign of the other station to avoid offence.
Each line is tagged at the start with the callsign of the transmitting station.

VK2KU : CQ VK2KU QF55
EU1AA : VK2KU EU1AA OOO
VK2KU : EU1AA VK2KU OOO
EU1AA : RO
VK2KU : RRR
EU1AA : RRR
VK2KU : 73
EU1AA: 73

Homework: List any procedural errors by either station.
Was the QSO valid?

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Manager Doug Hunter VK4ADC

Authorised **ICOM** & **YAESU** dealer. **OzGear Yagi** antennas for 6m, 2m & 70cm available

Visit us on the web www.OzGear.com.au for the latest info plus on-line ordering. **Our latest price list can be downloaded at any time.** Mention this ad for a good deal on all equipment.

I have recently discovered six meters. I have no idea why I have never shown any interest in 50 MHz in the past 35 odd years of hamming, but I guess the availability of modern HF to UHF Rigs (IC706 and FT817 et al) has increased the band occupancy to a point where a CQ on 50.110 is actually answered with frequent regularity. The first thing I did was to consult the call book to check if I could legally operate below 52MHz. The location of the exclusion sites is listed and distances can be calculated using various software. I am currently using a program called Pre-find <http://www.qsl.net/on6mu/prefind.htm> - (Be sure to get the aussie maps) I am 20 km or so safe at QG61AS so I have been having a ball over the last few weeks working all VK, ZL1,3 & 4 as well as FK8 using 5 watts into a hastily constructed 3 element beam. (I used the design in the current 2007 ARRL Handbook. It looked a bit familiar so I got out my 1981 version of the handbook...same beam... I guess the design has stood the test of time??) Anyway, whilst googling around the net looking for 50 MHz stuff I found this gem.....It appeals to my strange sense of humor - Graham



Six Meters - The Tragic Band?

by Jim, KH2D in Guam <http://www.qsl.net/kh2d/index.html>

There are, I must say, a few bands that amateurs are allowed to operate on that are not included in the list of 'my favourite bands'.

One Sixty, for example. The 'Gentlemen's Band'. Yeah, rite. Somewhere I heard 'Gentlemen prefer blondes'. These gentlemen prefer noise. Should be called the 'Static Crash Band'. All you need for 160 meters is about 400 miles of radials and beverages, a couple kilowatts, and you can work anybody who lives in the same state as you do.

But my MOST UN-favourite band has to be Six Meters. Some people call it the 'Magic Band'. Why, I dunno. I think it should be called 'The Tragic Band'. Why? That's easy to explain. I think it's tragic that some hams have nothing better to do than sit around and talk to each other for six months on ten meters so that they can talk to each other for two minutes on six meters. Sound silly? Well that's the way it works.....

So what do you need to operate on six meters? Well, the first thing you need is a personality that is not type A. Then you need patience, a ten meter radio and antenna, a six meter radio and antenna, and a baby monitor. You also need to know what TV sync signals sound like. And you have to know what grid squares are and what your grid square number is.

28.885 is the 'coordination frequency' for six meters. Why, you might ask, would any ham band need a coordination frequency on another band? Well, basically, because six meters is never OPEN. And when it does open, it might only stay that way for fifteen minutes.

So you have to find something to do while you are waiting. What you do is listen to 28.885 on your ten meter radio, make friends with all the other six meter operators you'll find there, tell them how much you'd really like to work them on six meters, and every now and then, just for practice, go to 50.110 and call CQ or call one of the other guys you talk to every day on 28.885.

What's the baby monitor for? Well, like I said, six meters isn't open much and when it is, it doesn't stay that way long. If you leave the room, you don't want to miss any openings, so you sit the baby monitor in front of the speaker on the six meter radio, clip the pager part to your pants, and then you can listen to six meters no matter where you go in the house.... If you hear a noise, immediately flush, drop dinner, stop what you are doing and RUN, don't walk, back to the shack.

Why do you need to know what TV sync signals sound like? To the seasoned six meter operator, TV sync signals are the same as the Bible is to a Born Again Christian. TV sync signals give six meter

operators something they all desperately need - HOPE. If they hear TV sync signals on 49 MHz, then they HOPE ham signals on 50 MHz will follow shortly. I imagine the average TV station runs a bit more power than the average sic meter ham operator, but what the heck, where would we all be without HOPE? The other thing about TV sync signals is that your knowledge of them makes you sound technical - you can announce on 28.885 'I'm hearing 49mhz video from WRAT in Houston' and impress the other sic meter operators with your technical expertise.

What's this bit about grid squares? Well, for most of the ham bands, we divide the world up into zones and countries. But working other zones and countries on sic meters take YEARS of patience. So in the mean time, we divided the world up into little tiny squares, so you'll have something to shoot for until a biggy like another zone or country comes along. Plus it gives you something to impress other hams with on the local DX cluster. You can put out spots like 'DX DE KH2JU 50.125 KH2D QK23JK > QK23JL'. Most of the guys on the packet cluster don't have the slightest idea how far it is from grid QK23JK to grid QK23JL, so they think you are a six meter DX'er when you are really only talking to the guy six miles up the road.

What else can you do while you wait for sic meters to open? Well, sic meters is an excellent band to monitor colour burst crystals, the birdies from your computer, etc. You can swing your antenna around and listen to weird squeals and howls emitting from electronic devices all over your neighbourhood. If you have a neighbour you don't like who doesn't have cable TV, it's also an excellent band to cause TVI, so you can practice your CQ's and QRM the neighbours TV.

OK, so what DO you do when sic meters finally does open? First, get really, really excited. This shouldn't be hard to do, because you probably haven't heard another ham signal on sic meters in six months, unless your friend up the street is a sic meter operator too. Second, go immediately to 28.885, and tell all the guys you have been talking to for six months 'THE BAND IS OPEN!!' Then pick a frequency, call your friends on 28.885 one at a time, tell them what frequency on sic meters you are calling them on, and then if you hear them on sic meters, give them a signal report and quickly move on to the next guy - you never know how long sic meters is gonna STAY open....

Well, what's the difference between talking to your friends on sic meters or on 28.885 on ten meters?

I don't know, I haven't figured that part out yet.

If you ever go on a DX-pedition, please don't make the mistake of taking along only a sic meter radio. Sic meter DX-pedition operators have been know to die from boredom on tropical islands in many parts of the world.

Anyway, is it **MAGIC** or is it **TRAGIC** ? You tell me....

73, Jim KH2D



Worth a click: "A Ham's Guide to RFI, Ferrites, Baluns and Audio Interfacing" A web-published book by engineer and ham Jim Brown, K9YC. Explodes many myths about the uses of ferrite beads etc. in the pursuit of electromagnetic compatibility. 51 pages! <http://audiosystemsgroup.com/RFI-Ham.pdf>

Worth a click: **Phasing rigs for 1296, 2304 & 5760 MHz.** Tired of tying up a 2 mtr or 70 cm rig to drive transverters for the higher bands? Matjaz, S53MV describes a series of standalone transceivers for the microwave bands that employ phasing technology. <http://www.ljudmila.org/hamradio/notune.html>



One ham's solution to VHF/UHF field day antennas

An interview with **John VK4JMC** (ex VK4ZXS)

Ok John, you decided that you wanted to build up a portable antenna system for field-day use. What bands and what type of antennas?

After much soul searching, friendly discussions and advice, I decided on Yagi antennae based on the design by DL6WU as I believed this would result in a flexible and repeatable antenna which could be varied in the field without requiring retuning. At this stage only 6, 2m and 70cm are covered.

All antennae are built using 6.5m x 25mm x 3mm aluminium square section with 10mm folded dipole and 6.4 mm elements (except 6m which is all 10mm elements)

The 2m antenna can be configured as a 20 element or 12 element unit

I see that you have a tilting system that is built into the back of your Ute. Is this only used for the antennas or does it have a more mundane use?

The “Mazda Tray Tilting Tower” was born following discussions between Kevin, VK4KKD and myself one afternoon.

Kevin set to work and designed the system and the tower was ready for trials soon after.



The tower is basic with a clevis replacing the standard Hayman-Reese towing point.

The standard rear pipe rack is replaced by a strengthened unit which has a winch and top securing point.



A “strong back” unit is pinned to the clevis and attached to the winch cable.

An 8m length of heavy wall 50mm steel pipe is inserted into the “strong back” guides.

The antennae are attached and the mast is winched to a vertical position then pinned to the rear pipe rack.

A very neat and tidy system indeed!



OK this photo shows you raising up a test? Antenna from ground level to what height?

This test is using the 8m pipe section and one of Kevin’s quad antennae.

Does it bend much as it goes through 45 degrees?

The pipe shows no appreciable bending raising a 20 element 2m and a 26 element 70cm antenna



This shows the 2m antenna in its broken down form.

It can be configured as either a 12 or 20 element antenna

The boom length of the 20 element is approx 13.5m



Now this pic shows all 3 antenna's up at what location?

The location is approx 5 Km from my home QTH, at Summerholm. This photo is taken looking North.

Do you rest the 144Mhz beam on those two stands on the ground during mounting?

Yes, the two stands are used to support the antenna while it is being assembled and rigged.



How long between arriving at a site and starting operation?

During the Spring VHF/UHF Field day it took approx one hour to assemble and rig the 20 element 2m Yagi. The 26 element 70cm Yagi was transported assembled. The 6m 5 element Yagi took approx 15 Mins to assemble. The installation of the masthead preamps and connecting cables including the operating position took a few hours due to the high winds at the time. The rope was used to guide the 2m antenna over a small structure just behind the Ute.

And is the erection a one man job?

Yes, on this occasion I setup and dismantled the whole thing single handed. During the recent summer contest I had Wayne VK4WS and Kevin VK4KKD assist with the antennae assembly but once again due to the high winds the final attachment of the antennae and the raising was left to me on the morning of the contest.

Can you tell me about your initial results, and what changes have you since made?

During the spring contest the system performed very well indeed with many good contacts. But as the antennae had to be rotated manually it was evident that some changes were needed to allow the

inclusion of a rotator facility. Kevin redesigned the “Strong Back” to allow for the installation of various rotators, and for the summer contest a Yaesu DXC-1000 was used.

Can you tell me about your transceiver/s that you are using with this system? Any linears? pre-amps?

For the Field Days I use my TS2000 for 6m, 2m and 70cm with a Tokyo Hi-power linear on 2m. On the receive side I use SSB preamplifiers on 2m and 70cm. I use a small generator to supply power for the rotator, lighting and keeping the laptop charged as well as charging the battery.

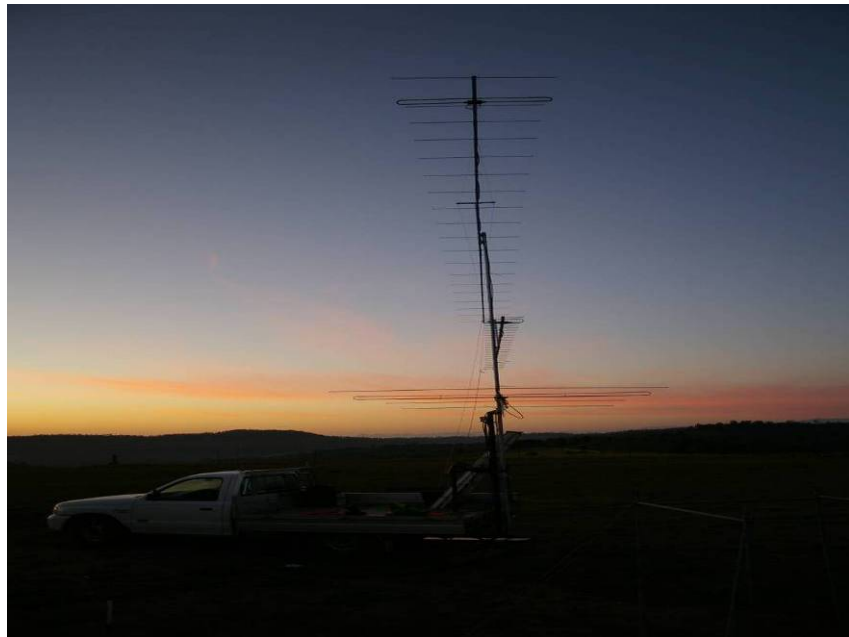
Any advice to others contemplating similar set-ups?

I don't believe I am yet suitably qualified to offer advice to others other than to have fun putting it together and make it as flexible as possible.

I think it's appropriate that we leave as the sun sets in the west. Not much DX in that direction John....

Well there is me I guess.

Thanks for sharing your set-up with us John it would have to be one of the most mechanically efficient and tidy field day systems I have seen



Actually, that comment of mine about being one of the few hams out to the West (South West) of Brissie is not quite correct. Long time VHF group member and enthusiastic VHF/UHFer David VK4DH is finally getting some real antennas up in the air at his new house at Tannymorel. (Near Killarney)

Yes, I know we have all been waiting for quite a while for this to happen.....But here's proof!

Doug should remember this spot quite well; he operated from just about right here during a field day last year, with only the view and a few sheep to keep him company during the long night.



The devices used in this amp (IRF510) are currently priced at around \$4 each, which makes for an economical amplifier...



50MHz 500W IRF510 based Amplifier

By OZ1PIF <http://home24.inet.tele.dk/oz1pif/index.htm>

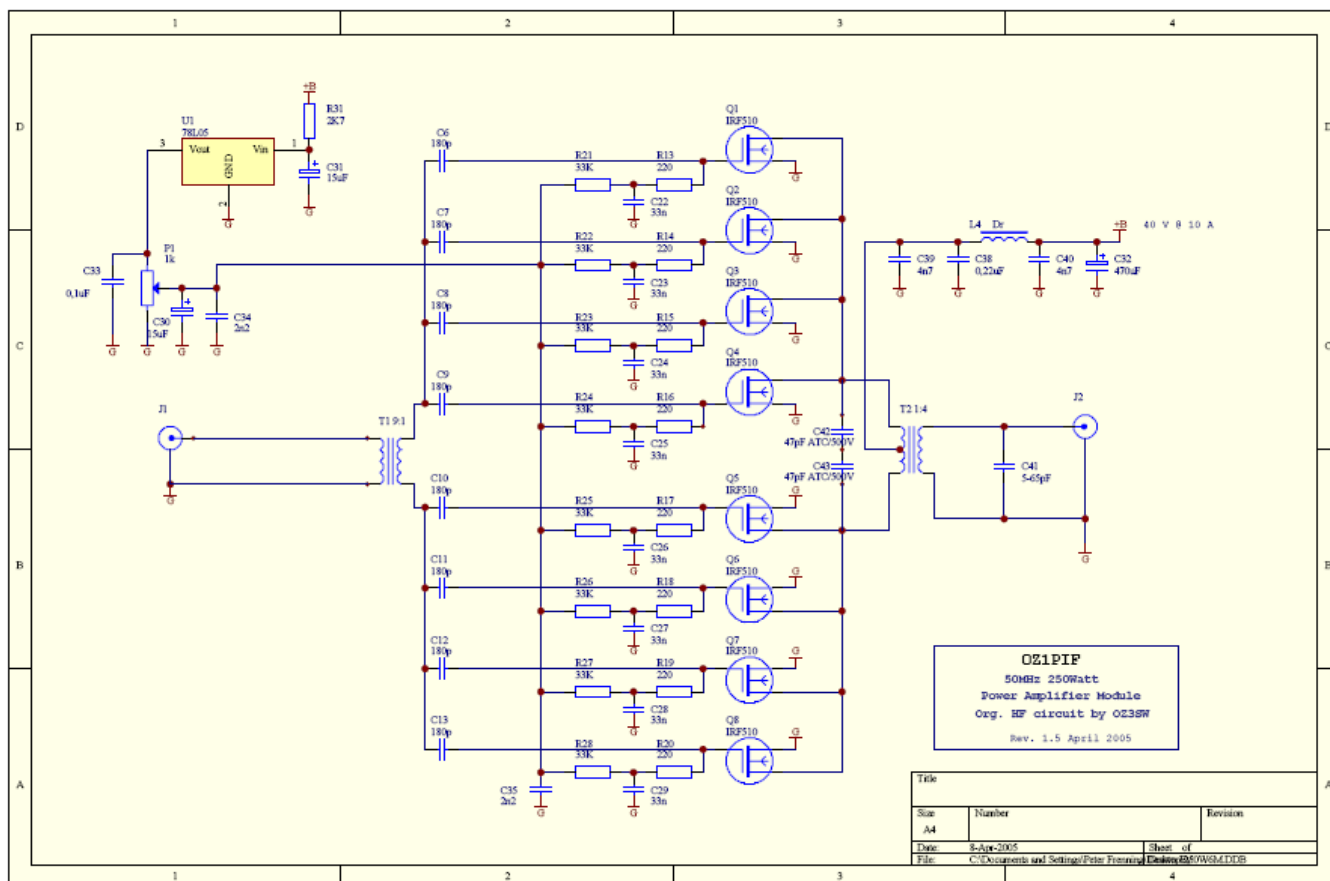
This amplifier project was based on a prototype circuit developed for the HF-bands by OZ3SW, Steen Moller.

The HF project was eventually scrapped because of widely varying gain from 160m to 10m.

It looked sufficiently interesting, for me to mature the basic circuit design into a single-band 50MHz amplifier.



[Schematic here \(in PDF format\)](#)



The basic building block is a 4+4 push-pull configuration, biased at 500mA, delivering 250W out for 10W in at 40V/10A. To make life easy on yourself, use devices from a single batch, as these are most likely to be closely matched. I've used devices from Intersil (Fairchild). These are no longer being produced, but there should be an ample supply in the distribution channels. The FQP7N10 device looks to be a very suitable (and somewhat better) alternative, but have not (yet!) been tested, one interesting

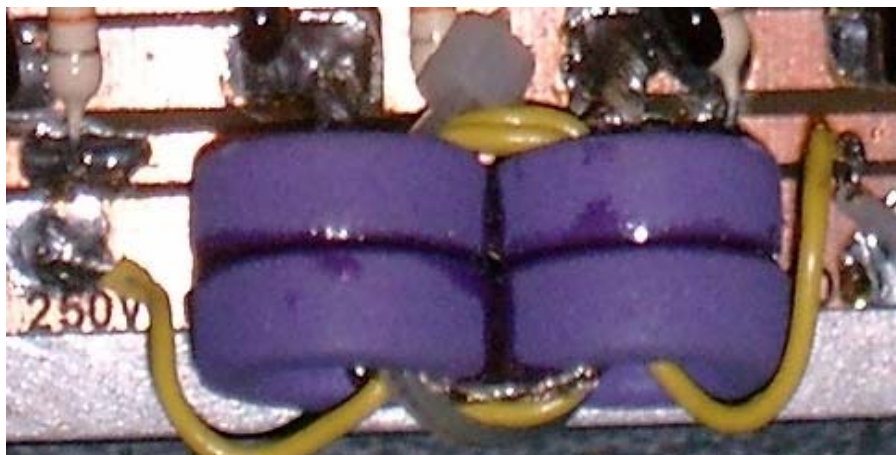
comparison would be IMD3 figures! I'm currently trying to obtain sample devices to build a test amplifier.

The individual IRF510s are mounted on the heat sink using Aluminium Oxide heat-transfer isolation bricks and silicone grease, for sufficiently low coupling between the MOSFETs and the heat sink to insure stability.

The input transformer (9:1) uses 4C65 cores, and the output transformer (1:4) uses thin air!

L4 is just a choke, and thus fairly uncritical, a couple of turns of the supply wire on any available piece of ferrite, see the photos, it's just below the electrolytic cap on the module photo.

T1 is made by threading a piece of wire three times (the primary) through a piece of coax outer conductor (the secondary) around four 4C65(*See note below on core material) cores glued together using Cyanoacrylate (Superglue), thus creating a 9:1 impedance transformation and a very reasonable input match. See also fig. 4 & 5 in [AN749](#)



**I've used 4 x Ferroxcube core Material TN14/9/5 (4C65); Part No: 4322 020 9718 an equivalent Amidon would be Material Type 61 Part No: FT50-61*

A very thorough description of construction of HF-transformers can be found in: [Motorola Application Note AN749](#)

The output transformer is made from two pieces of Teflon coax (RG316) 14.5cm in length, the outer conductors joined at the middle and the ends, for the primary, and the inner conductors in series as two windings (the secondary) giving a 1:4 ration and a close match to 50 Ohms (fine tune with C41), the B+ supply must be as near the midpoint of the primary as possible!



The combiner used, is a simple $1/4\lambda$ combiner made from 750ohm Coax, input splitter made the same way. The end result is then passed through a [low loss Elliptical LP filter](#) with a 70dB notch at 2nd harmonic and 80dB at 3rd. Bias is 500mA pr module; IMD3 has not been measured, but reports on the band have been uniformly good.

More than 2000 QSO's have been made so far with this amp. Only mishap was during an F2 opening to NA in 2001, when I forgot to reduce TCVR output to 20W, I still made 4 and a $1/2$ QSO's before things went awry (12 of 16 IRF510 blew loudly and smelly) These were quickly replaced (at less than 30c a piece!) and no one ever commented on the output, despite the vast overdrive.

This event taught me never to rely on manual throttling of drive to an amplifier - things will go wrong, and Murphy taught us that it'll happen when most inopportune, e.g. when in the middle of a humongous

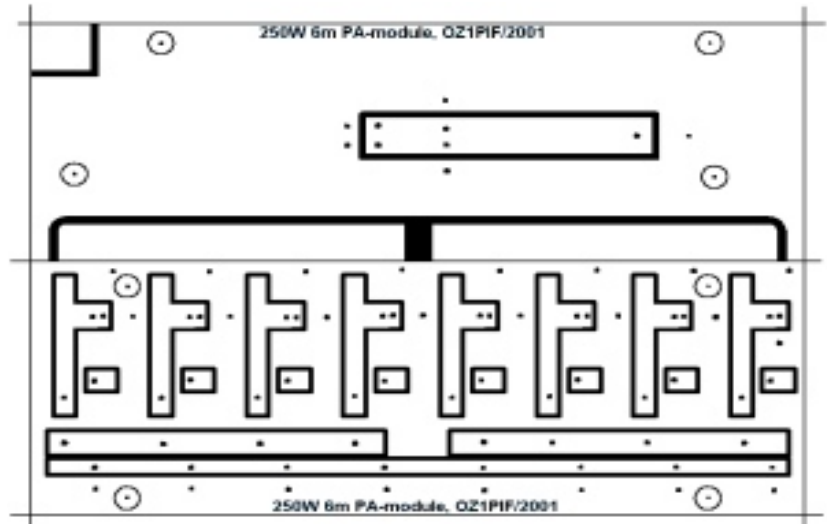
pile-up for the rarest of Dx! This amplifier now has a power attenuator built-in, to reduce the 100W from my FT-847 to the 20W required for full output. (As do my other amplifiers - all of them!)

An added benefit is the reduction of splatter produced by the overshoot from the transceivers output regulator, the more you throttle back the worse it gets - some modern transceivers produce spikes of more than 150W on VHF - and the FT-847 is far from the worst of the bunch!

You can, of course, combine an arbitrary number of the 250W modules to obtain your desired output level; my reason for deciding on 500W was the availability of a suitable power supply.

PCB lay-out (click to obtain full resolution image), Size of PCB: 118mm x 85mm split along the horizontal line. Etched on double sided material.

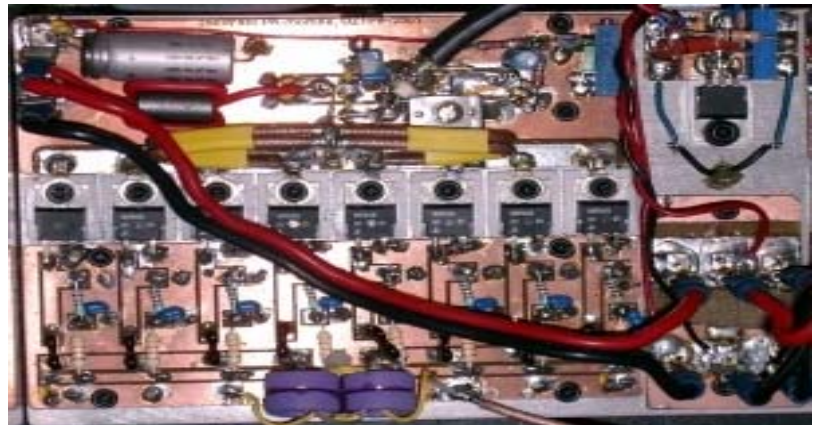
All drill holes for component mounting to be counter-sunk on the back-side, the rest are being used for "through plating" to connect the ground areas on both sides of the PCB.



The finished module

(since the PCB design, I have added the bias circuit in the upper right corner - dead bug fashion)

Click to see hi-res version. The small circuit added to the heat-sink, next to the bias circuit, is a fan-speed controller (see [elsewhere on my homepage](#))

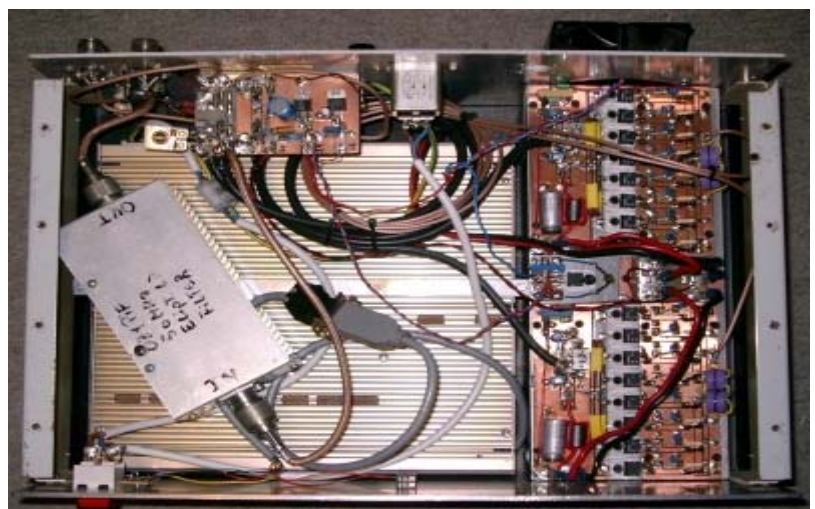


The completed amplifier (as usual click to get hi-res version)

The large finned object is a surplus commercial 800W Switch Mode PS. On top of that the Elliptical LP filter.

The small PCB over the PS, contains 12- and 24V regulators and changeover relays (not seen, but cheap 20A Washing machine type, but still better than -20dB return loss at this freq!)

The coils of coax cable are the splitters and combiners



Last, but not least, the whole thing - ready to plug in - weighs just under 12.5Kg (< 30 pounds, if you don't understand metric), ideal for /P use or DX pedition travel - and that's with the present heavy duty steel cabinet, I could probably shave off another 3-4 Kg with an Aluminium enclosure.

73,s – OZ1PIF



Australian Enterprise Industrial.

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Self erecting - free standing - heavy duty - small footprint.
10m 12.5m & 15m.
And the

OzSpid Antenna Rotator

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Contact Kev. VK4KKD <http://www.spin.net.au/~aeitower/index>

"FOR SALE - Single long length of LDF 5-50A cable, 220 metres long, belonging to the Brisbane VHF Group. Although it has been in storage for a number of years and has some minor soiling on the inside coils of the roll, there has been no water ingress and its attenuation figures are exactly on spec. Offered for sale as one lot - say \$1000. [Connectors are not included, but two borrowed ones were temporarily attached to measure its performance.] Interested? Contact Doug Friend VK4OE, 07 3391 5526." Or friends@squirrel.com.au

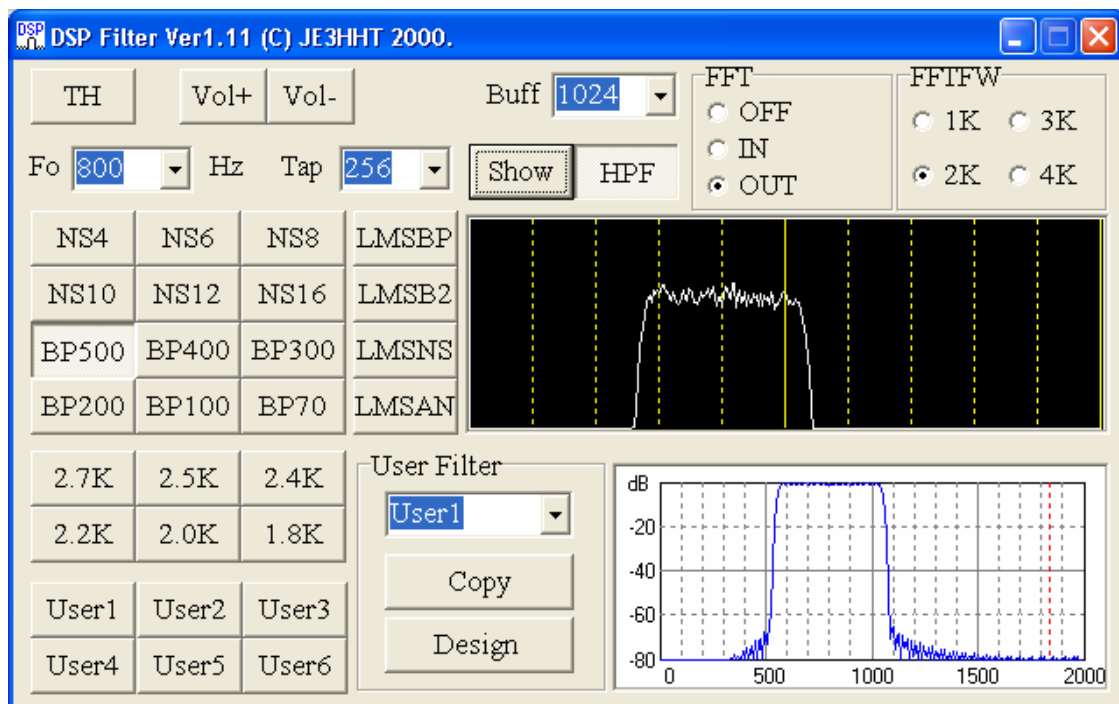


Using Digital Signal Processing with a computer sound card

By **Graham VK4SG**

In my recent journey into discovering the delights of 50MHz, I also discovered the pitfalls of power line noise, receivers with no narrow filters, barely adequate noise blankers and very wide accommodating front ends. But its holiday time for me, can't afford a \$185 narrow filter for a few weeks so what alternative can I come up with? I've used the digital filters a bit on Spectran and they certainly help so I go trolling the web once again.....Typed in **DSP** and amongst the multitude of results comes up a familiar web site <http://mmhamsoft.ham-radio.ch/> which is the site of JE3HHT Makoto Mori – The writer of my favorite PSK program MMVARI, as well as MMSSTV and MMTTY. Mako writes great software so if he's written DSP stuff that's good enough for me. (And its freeware)

The program looks like this:



The image shows a Band pass 500 Hz filter selected with a center frequency of 800 Hz. Now the beauty of this program is that you can just use one of the 22 filters in the program, or you can copy a filter and then modify any parameter to customise it to your taste, or you can start from scratch and design your own.

NS filters are comb filters using moving average. The filter does not use a simple averaging calculation but uses subtractions for 1/2 periods. Thus, the even harmonics are suppressed, but the odd harmonics can be passed through. I think this filter gives the best performance particularly for weak signals.

BP filters are band-pass filters using an FIR filter. It uses x3 over sampling. The physical sampling frequency is 11025Hz; while the application sampling frequency is 3675Hz. If the number of taps is increased, the filter becomes sharper.

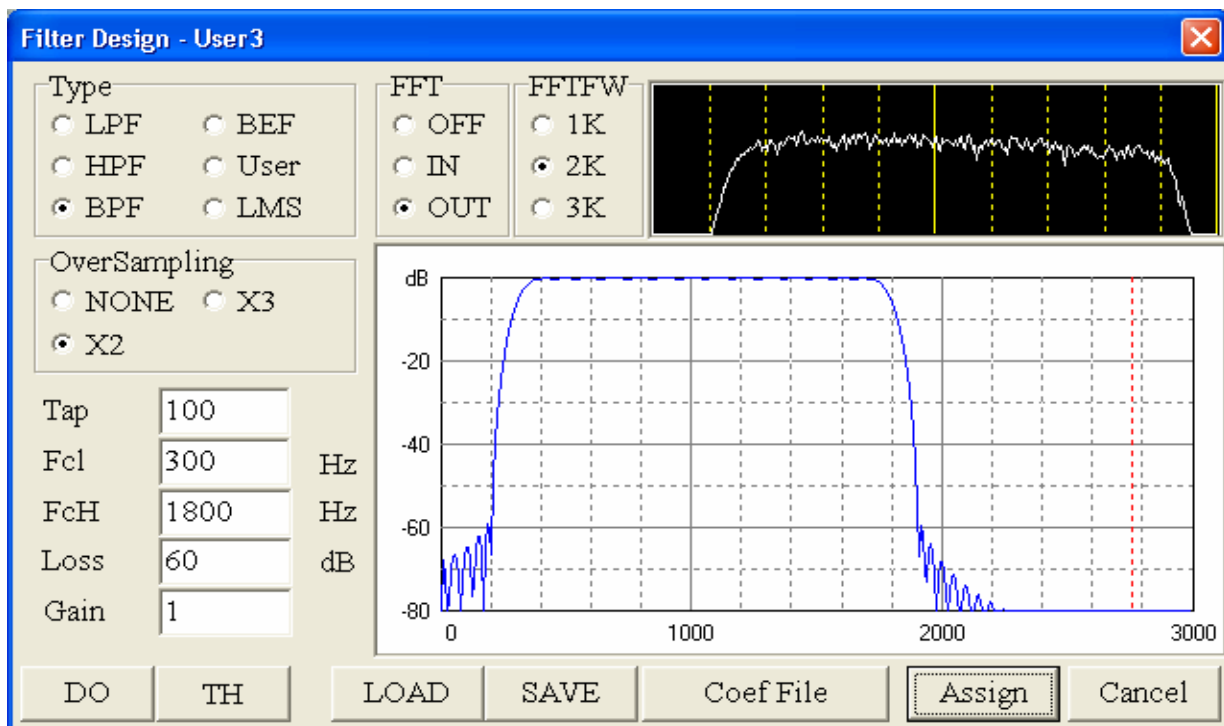
LMSBP & B2 filters are adaptive band-pass filter for CW. The frequency-domain graph in the lower right corner shows the frequency characteristics of the transversal filter calculated with the coefficients, which are changed by LMS. You can see how the adaptation is performed by changing the frequency of the input signal. In case of weak signals, the filter coefficients tend to be small, which would result in a low level output. To compensate this, LMSB2 leaves the AGC turned on to increase the volume for the weak signals. *Watching these **adaptive** filters “lock in” on the signal and let the noise floor either side of the signal fall away, even if you are still tuning the signal is like magic!!*

The **LMSNS filter** is a noise smoother for SSB. This is also an adaptive filter. The SSB filter has smaller autocorrelation than the CW filter, with small values in the correlation delays.

The **LMSAN filter** is an automatic notch filter for SSB.

The **2.7K to 1.8K filters** are fixed frequency BPF for SSB. The low-cut frequency is fixed to 200Hz.

When you enter the design screen you are able to modify the parameters on the blue outline on the graph, and then compare it with the real-time received signal in the top window. It is all quite logical and there is also a handbook of sorts (txt File) that comes with the downloaded program.



You can also test filter coefficients that are calculated with other filter design software, by using the following steps.

1. Push DESIGN button in User1 to User 6
2. Select User and push Update
3. Push SAVE button and make a filter definition file.
4. Exit DSPFIL.
5. Edit the filter definition file using a text editor.

This program works with most computers that are fitted with a sound card with the full-duplex mode. (All post 97 computers & some earlier. Speed should be 400 MHz+) Just a lead from the phone/speaker output from your rig to the line-in socket of your soundcard, and a speaker fitted to the audio out socket. (Or use your digital modes interface) Enjoy-Graham



Graham, A quick report on the Coffs Harbour Hamfest (*in NSW but close to Queensland*)

VK4KKD attended with UHF/VHF antennae on a 7.5m trailer mounted tower.

104 visitors came to the show (a total of 120 counting exhibitors) on Sunday 21st. Jan. and from the comments it would seem all had a good time meeting old mates and browsing the various new and second hand equipment on display.

The weather stayed fine albeit with a stiff breeze. Those who did attend seemed to stay at the show for more than 4hrs on average and circulated between my outdoor display and the many attractions put on by the organizers throughout the day. Various competitions were run and some lucky person won a pretty nice lucky door prize.

Andrews Communications and TET-Emtron as well as Australian Enterprise Industrial were among the commercial suppliers who attended with a variety of new equipment.



I set up my outdoor display with an FT-847 – MSI laptop – OzSpid rotators for azimuth and elevation of the antennae a 7el quad for 2m and a 15el yagi (DL6WU pattern) for 70cm.

Several stations were heard on various satellites during the passes – but the most excitement was generated - among those assembled at the time – by a direct path contact to VK4JMC at Laidley on 144.100 SSB. Barefoot FT-847(50w) into the 7el quad.

The contact with John did not appear to be either ducting or AE – rather it appeared to be a direct path contact which was subject to QSB over a fairly extended period. Many of the hams present were very surprised and I feel this contact might have some influence on several more decent VHF/UHF stations being activated in the region.

While returning to Brisbane on Sunday evening VK4KDD was heard 5/9 at Casino (but he could not make out who was answering his cq call hi hi) and a good solid contact was made with VK4OE from the top of the border range – on the FT-817 (5w) and mobile whip antenna both on 144.100 SSB.

It was a pity that so few Brisbane hams lent their support to the people at Coffs Harbour. The show was well organized with good catering and good motel accommodation just across the road.

Kev. (Roving reporter)



HOW COAX IS MADE! - Anon

Hi, I have the answer to how Coax is made, or rather grown. The Coax Plant (genus *Heliopsis* Vulgaris) is thought to be a distant relative of the Spaghetti Plant, first grown in this country in the London hothouses of Kew Gardens in about 1892, after being brought back from the wilds of Peru by the intrepid explorer and botanist Sir Hubert Andrews, RGS.

The native plant has never really responded well to man's intervention and despite the best efforts of the experts first at Kew and later round the world, the hardiest and fastest growing variety is the ubiquitous 50ohm. Some 75ohm strains exist, but whilst yield has been improved, quality has remained elusive.

Coax plants live for very long times, up to 70 odd years and in that time can produce up to 50km of top quality cable. Of course it would be impracticable to wait that long for such a length and early on growers soon learnt to graft plants together to produce runs of sufficient length with end to end consistency. Whilst this was merely regarded as a technical exercise for the growers, worthy of the odd prize or two at the local village hall fete, the true worth of all these efforts were not realised until WW2 when, for obvious reasons, anything to do with radio was of use.

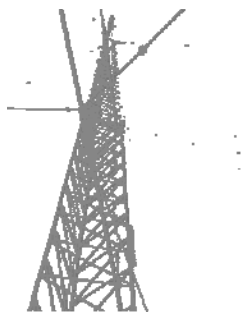
Quite how the long strands of coax had been found to be useful for RF is not clear, though it is rumored that early radio listeners, perhaps tired of plant growing and fascinated with the new hobby of radio, were using dried pieces in the 1920's. Until then no one had seemed to care that as the stems matured and ripened, the copper braid and core emerged fully formed. Then of course it was obvious, though entirely NOT understood and many burnt out their precious collections with bad miss-matches if they were foolish enough to try putting RF power down them.

During the war Coax plant production was put under the Ministry Of Food, which despite the best interventions of the engineering establishment, was where it stayed until rationing ended in 1952. This inappropriate line of command probably explains why the Americans were the first to develop the most famous type of Coax plant of them all, *Heliopsis Splendiferous*, which concentrated the latent structure of the *Vulgaris* to produce the lowest loss cable of all time. A high proportion of Japanese emigrants might also explain why they were so successful at producing the solid type microwave cables, cropped from Bonsai's plants! Modern technology has made many changes since the war and there are now more versions than ever. Simple botanicals, however, still applies and if you want 5 cm feeder it takes longer to grow and hence it's more expensive. Like a good malt whisky, good things take time and care and PLENTY of patience! However battery production has led to the emergence of UR43 and UR67 as cheap, commonly used, good quality cable, which is just as well because some of the more esoteric varieties can cost upwards of 90 pounds per metre!

Commercial brands are a closely guarded secret; you will never see a field of Coax plants, which would be kept out in the open. No, they spend their lives instead in closely monitored nurseries, where a vigil is kept on conditions to ensure consistent quality. However, all is not lost. You can buy a Coax plant from most Garden Centres, though it will probably be by order. Let's face it Coax plants are not the most attractive of things in the world. Indeed they are plain ugly. They went out of fashion by the turn of the century, having a brief respite on the death of Queen Victoria when the black ribbons were 'a la mode'.

Sadly that is how Sir Hubert Andrews ended his days, supervising the removal of the 13 foot high monster from the Kew gardens, which he'd donated to them some 20 years earlier, as it had come to dominate the floor of the arboretum where it was kept.

So there you have it. Next time you trim the end off some RG213, you can wonder at the marvel of nature that gives us Coax as we know it. Take a close look and see if you can spot the tiny swirling pattern of the inner that was later to be spotted and developed into *Heliopsis*.



10 Geraldine Street, Wavell Heights
Brisbane, Queensland, 4012

The Brisbane VHF Group

2006/2007 Membership fees have been set at: Full Member \$10

Detach below and send cheque or money order to the Brisbane VHF Group at the address shown above.

Jason Morris VK4YOL

Honorary Secretary of the Brisbane VHF Group

Phone 07 3256 8712 JV.MORRIS@bigpond.com.au



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