CARC

CRAWLEY AMATEUR RADIO CLUB

News Bulletin October/November 2018

In This Issue:

Note from the Editor

The cover picture on this issue was taken at Hut 18 during this year's very popular Microwave Round Table. Play spot the member – I think I got 4…

The deadline for articles to be included in the next issue (due for publication 1st December) is 23rd November, all contributions gratefully received and many thanks to those who contributed to this edition:

G3VKW

M0TZZ

G3ZIY

M0WID

M0KGW

73 Phil

Chairman’s Chatter

Hi all,

Here we are past the Autumn Solstice so things should hopefully improve marginally on the HF Bands, however we are still heading down towards the bottom of the cycle so do not hope for too much Dx. I have just returned from our family holiday in Florida - W4 land, where the temps for Sept and Oct have been in the 90s F, so a shock to land back to a foggy Gatwick. I turned on the HF rig on the 6th and worked ZD7 Tristen de Cuna / Gough Island in the south Atlantic, followed by a 9X Rwanda, so there is Dx to work so maybe we will see some HF band enhancements as we head towards winter.

The club house Kitchen area is looking very dated, so we have had a Kitchen Man come and checkout to see what we can do to modernise the area courtesy of Phil M0TZZ and also give us a price. The committee will be discussing this at our next meeting. One of the reasons this has come up is that if we wish to replace the fridge, the more modern ones are all wider, as they are constructed with more insulation.

Some of you may have noticed the Steppir HF beam has been looking a little lopsided recently: this was due to an issue with one of the Beryllium copper element Tapes on the Reflector element. Mike KAD has repaired it. Mike is also undertaking some coax cable replacements, so that the Club on site stations remain competitive.

A reminder that the Reigate and Redhill scouts are putting on a JOTA (Jamboree on the air) station very soon, on the 19/20/21 of October as GB0RS. If you wish to give them a hand, which they would be grateful for, then please contact Graham Mountain directly or David Wilde M0WID who can give you his details. We had about 5 Club members last year to assist, but several of us are unavailable this year.

We are into the RSGB Club Contest time, these are held weekly on various bands and modes, and are a good place to get your feet wet in Contesting, and any score you make adds to the club’s overall score, several members are quite active on these short sprint 1.5 hour contests, if you need more info, there is info on the RSGB Contesting site, or have a word with Mike G0KAD, Stewart G3YSX, Phil M0TZZ or myself.

I have been approached regarding the next club construction project, if you have an idea of what will be fun for members to build, or you think maybe useful in the Shack, please have a chat with me, I have had a few ideas put forward already.

All the best

Keith G3VKW Chairman.

Re-Visiting the Resonant End-Fed Antenna (The Little Dutch Girl)

Brian Minnis (M0KGW)

Like many newcomers to the amateur radio hobby, I had to find an HF antenna design that would work well on as many of the HF bands as possible, be small enough to fit into a sub-urban garden and meet with approval from my XYL. My attention was drawn to this practical antenna by a fellow amateur G3VJM who had already obtained good results with his home-brew construction. I don't pretend to bring anything new to the design as a great deal has already been written about it and widely published on-line. References 1, 2 and 3 are just a few examples. Instead I want to just review the basics, report on recent results obtained with my own new antenna and offer encouragement to anyone else who may be interested.

The "Little Dutch Girl" or "Olandesina" antenna has found widespread use in The Netherlands, dating back to before 1940. A variant of it called the "Zepp" was also used on German airships. The antenna is essentially an end-fed length of wire, half-wave resonant on a particular frequency of interest, in this case 7.1 MHz, driven at one end by a 1:64 autotransformer and loaded at the other end with a 110uH coil and short wire extension. An illustration of the configuration is given in Figure 1 and details of the autotransformer given in Figure 2.

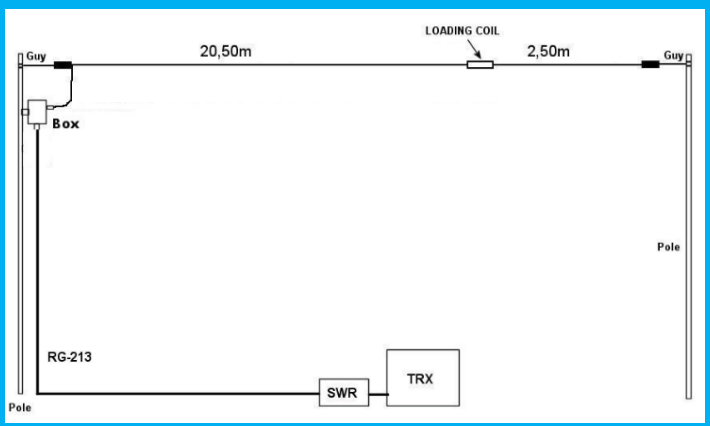


Figure 1 Antenna Configuration

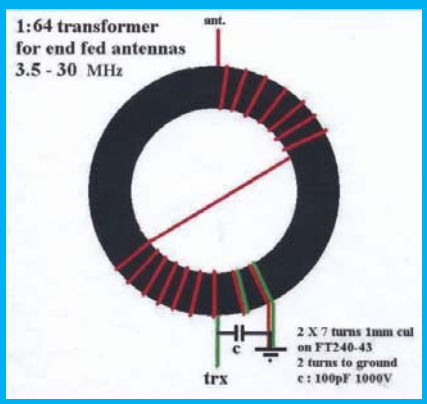


Figure 2 1:64 Transformer Details

As the antenna is unbalanced, ideally the common end of the autotransformer should be earthed. However, a real earth at the box is difficult to apply when the box is on the top of a 10m pole. The option I used was to earth the outer of the coax feeder at a distance of 10m down from the box (i.e. at the bottom of my pole). This stops any significant currents flowing further back down the feeder to the rig whilst turning the top part of the coax outer into an effective counterpoise. An additional choke can also be used to prevent RF leakage back to the rig but its positioning will affect the antenna behaviour, particularly on the high bands. It should not be placed at the box as this would remove any effective counterpoise. A distance of about 2m has been recommended meaning the top 2m of the coax outer becomes a counterpoise. An important point to note is that the impedance of the driving point is so high that ground currents are very low indeed. This leads to low ground losses and good immunity to ground-induced noise on Rx. The Rx noise levels for this antenna compare well with a dipole.

After assembly of the antenna and its component parts, measurements were made using a portable VNA firstly of the autotransformer alone and then of the complete antenna in service. With the autotransformer terminated on the output with a discrete 3.3k ohm resistor, the measured VSWR and reflection coefficient at the input are plotted in Figure 3 and the corresponding values of input resistance and reactance plotted in Figure 4. These confirm that the transformer has very good performance over a frequency range of about 3 to 30 MHz. The desired transforming effect down to near 50 ohms is clear from Figure 4.

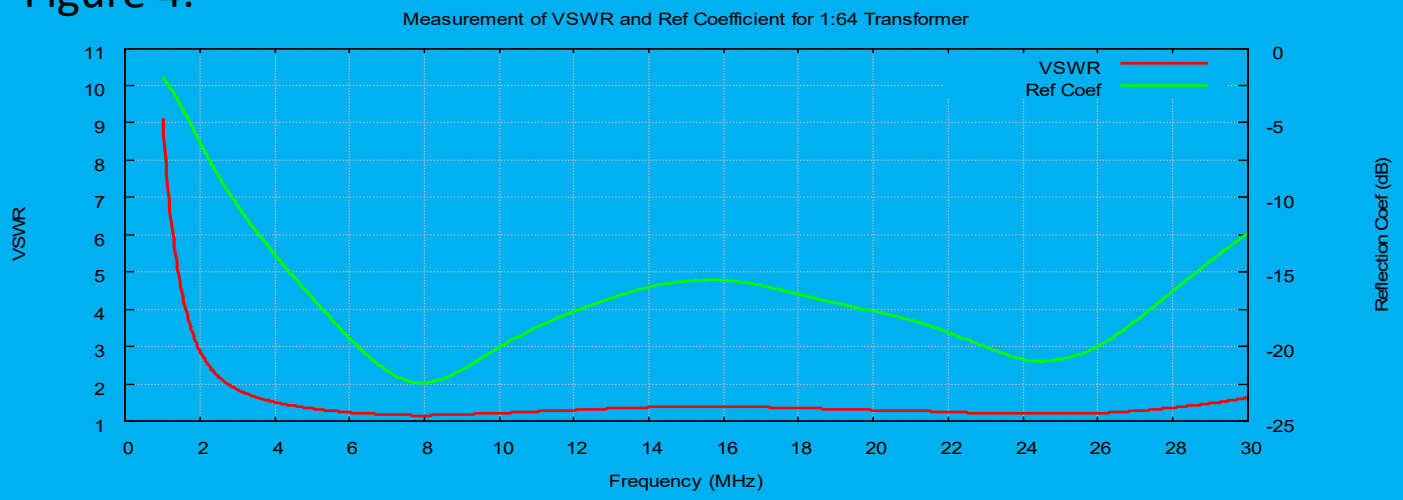


Figure 3 Measured VSWR and Ref Coefficient for Terminated 1:64 Transformer

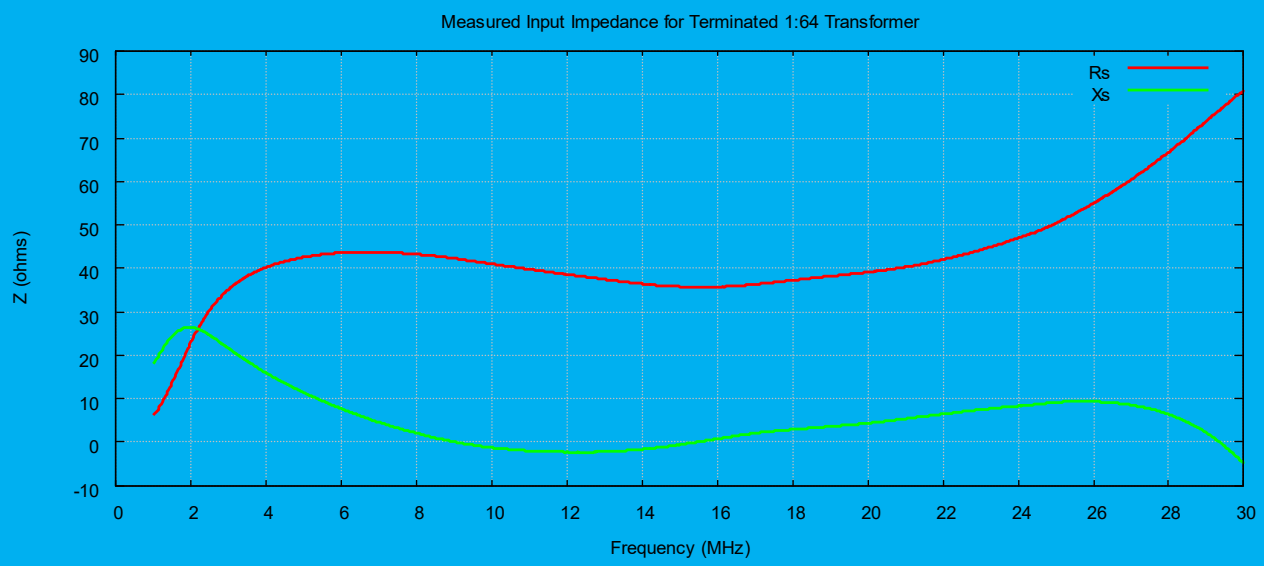


Figure 4 Measured Input Impedance of Terminated 1:64 Transformer

The measured performance of the finished and fully installed antenna is plotted in Figure 5 in terms of VSWR and reflection coefficient. The relevant band limits are also indicated in the plot. In short, the VSWR is better than 2:1 over substantial parts of all the 5 classic amateur bands. The usable bandwidth in 80m is about 100 kHz but the VSWR falls to near 1:1 at 3.72MHz. This frequency can be adjusted to suit by adjusting the short wire length. The antenna covers all of the 40m and 20m bands, most of the 15m band and the lower 1 MHz of the 10m band without the need of an ATU! This is pretty impressive performance from a single antenna. Recent on-air experience of using the antenna is equally pleasing. I worked a station in The Falkland Islands on 20m on the first day in service! Most of the WARC bands are also accessible with the help of an ATU.

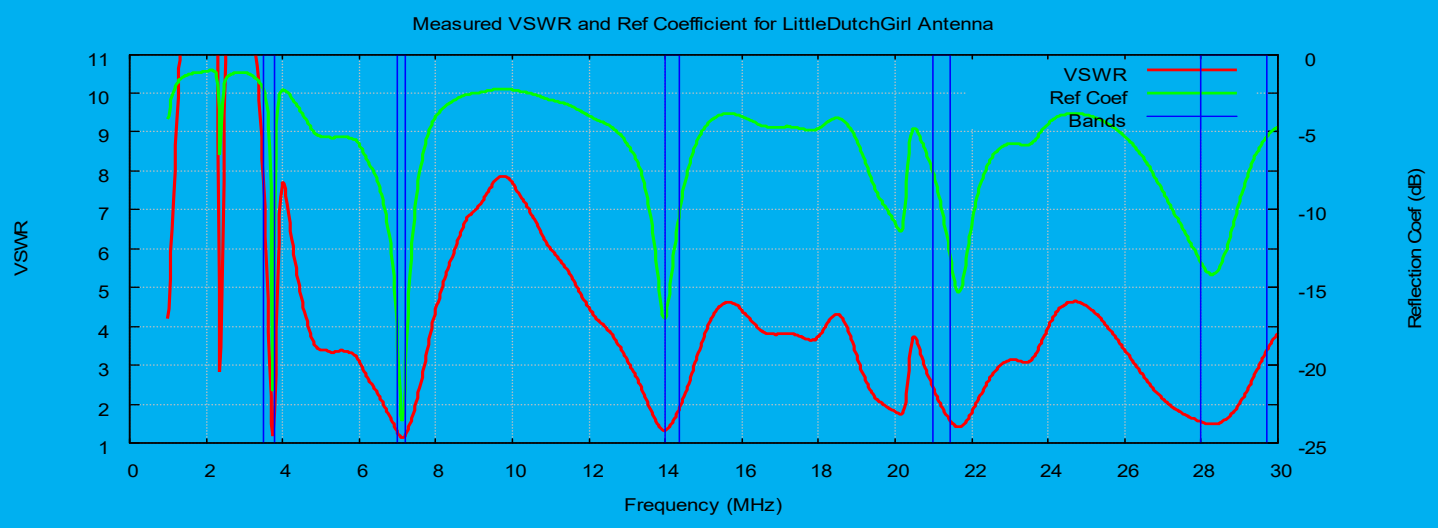


Figure 5 Measured VSWR and Ref Coefficient for "LittleDutchGirl" Antenna

By contrast I want to conclude by showing how well the LittleDutchGirl antenna compares with the G4YKB end-fed antenna recently acquired by CARC. Figure 6 shows the performance of my own G4YKB antenna measured with a VNA connected to the SO239 input port (i.e. no feeder). Basically it is a very poor match in all the amateur bands and necessitates the use of an ATU. No contest! The G4YKB uses a 9:1 transformer, the idea being to bring the matching of the wire within range of an ATU. But it doesn't work well.

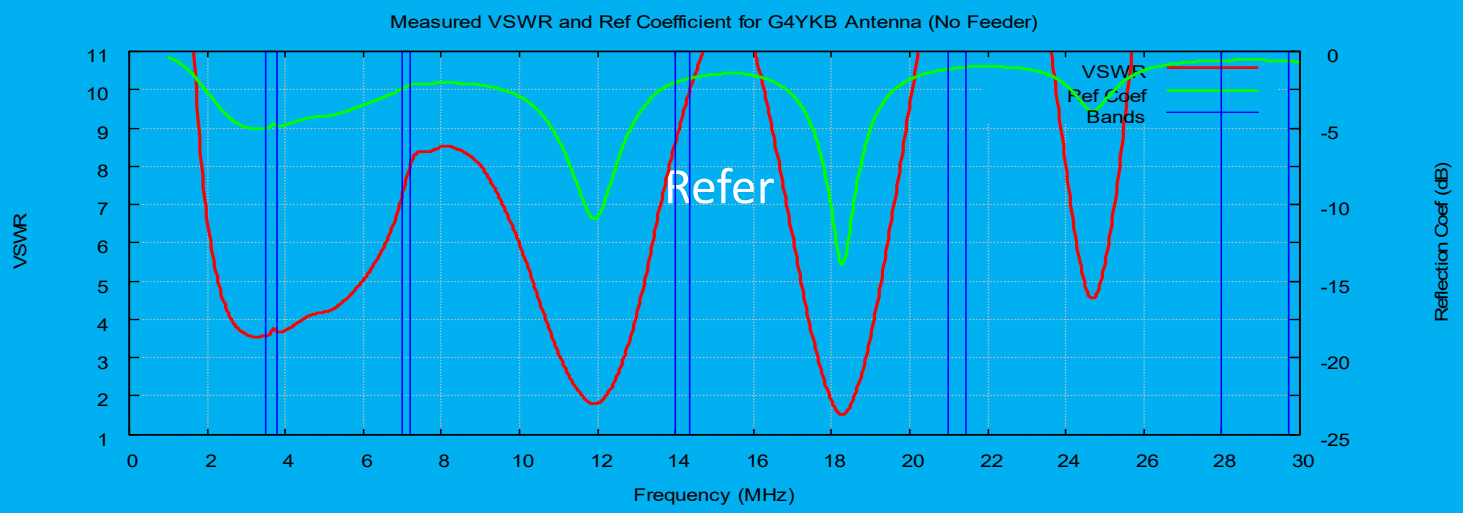


Figure 6 Measured VSWR and Ref Coefficient for G4YKB Antenna (No Feeder)

References

[1] http://pa-11019.blogspot.com/2012/04/149-transformer-for-endfed-antennas-35.html
[2] http://nuke.ik0ixi.it/Antenne/LOlandesina/tabid/606/Default.aspx
[3] https://www.nonstopsystems.com/radio/frank_radio_antenna_multiband_end-fed.htm

David M0WID's Projects

I've been busy with various projects, meaning less time for making QSOs. Main activity on air has been the 2m UKAC in the low power sections with only 5W from the FT817. Highlight was 988km QSO with SK7MW in the July event, when there was a fabulous opening to the east.

Most time has been spent on a power meter project, using an ESP32 processor and a small 1.3" hi resolution colour IPS LCD display.
The ESP32 is an interesting little processor, designed for IoT (Internet of Things - whatever that means) applications. It has two cores running at up to 240Mhz and a third low power core to save battery life, if that is important. Also included in the module is bluetooth and WiFi, 12 bit A-D, D-A and inputs for touch sensors. It has 4mB FLASH and 520k RAM, so loads of space compared to a normal Arduino. All for around £4.50 delivered from China. The A-D is a bit noisy however, so samples have to be averaged a bit to smooth things out.

The software I have developed currently has a choice of three meter styles (trend, analogue style meter, or a bar graph) and shows average and peak power values. The ranges are freely configurable by the user, and can be quickly selected using the touch buttons. The attenuation value between the system and the detector can also be configured and changed by the user.

David M0WID's Projects

The detector I am using is an AD8307 log amp, and I have a 40dB tap as in the EMRFD book to sample the RF. This method only gives good results if the system is well matched to 50R.
The WiFi feature in the processor is used to get NTP time, so it also doubles up as a handy shack clock.
Future developments will include adding characteristics for a diode based probe, and also adding inputs for reflected power so that SWR can also be calculated and displayed.
The meter is currently assembled on a bit of MDF and I was using over the weekend to monitor the station while making a few HF contacts, including a couple of special event stations for the 2018 World Cycling championships in Austria, but nothing outside Europe other than HZ1BL, though T71C in San Marino was quite nice to get.

David M0WID's Projects

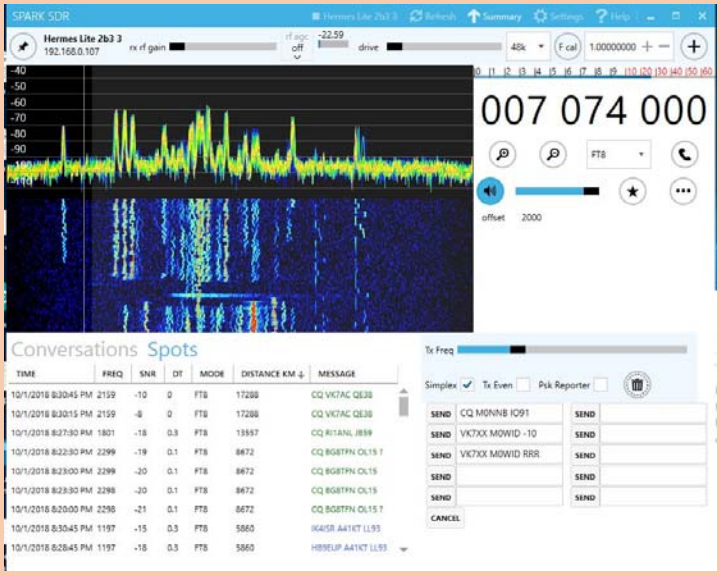
Just arrived today is a new Hermes Lite 2 SDR transceiver. This is a direct sampling SDR that covers the HF bands from 160m - 10m. It is capable of having three simultaneous receivers, and has an output of 5W. More details can be found at

The main board is preassembled, and is ready to go as a receiver. For transmission a transformer has to be wound and fitted, along with T/R relay and connectors. There is a companion filter board to sort out the harmonics when transmitting and also provide some filtering for receive.

So tonight I have just soldered a temporary bit of coax on to connect to an antenna, loaded up some software and set it decoding FT8. See screen capture showing FT8 decodes on 40m. It seems to work! Audio also sounds good. It will be a few evenings work before I get to transmitting, so looking forward to that.

73

Dave M0WID



Checking FM deviation without a modulation meter

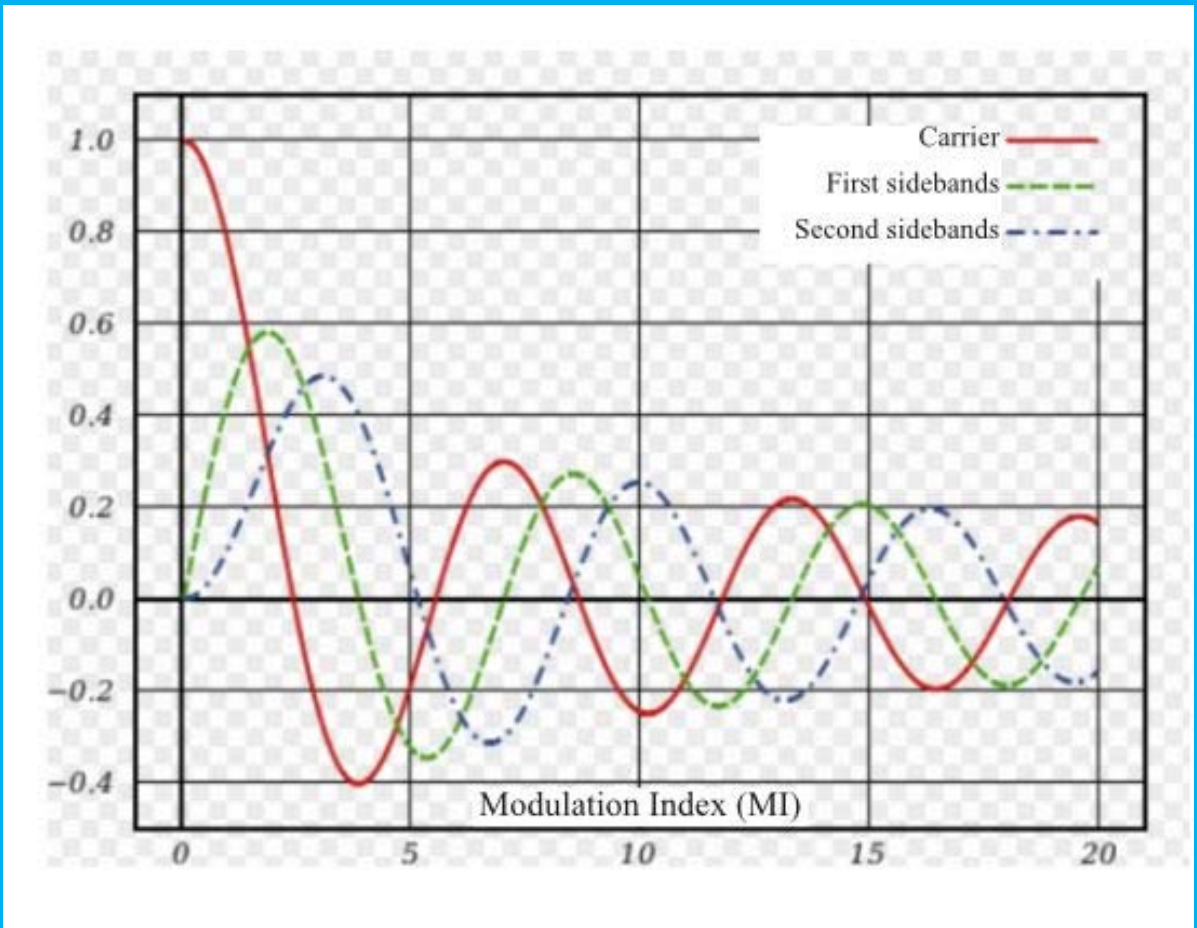
(not that recent☺)

by Richard, G3ZIY

The method I am about to describe will accurately determine the peak FM deviation of a transmitter without using a modulation meter. But first some background information.

Long before radio was developed a Swiss mathematician and physicist called Daniel Bernoulli, FRS, described the Bessel function, which occurs in many natural systems. Wikipedia has a comprehensive explanation of how they are derived, for the curious amongst you! [https://en.wikipedia.org/wiki/Bessel_function]

The Bessel function is shown graphically below (from Wikipedia).



This is an infinite series, so theoretically there should be an infinite number of curves... However only the first few are of interest to radio engineers.

FM modulation is saddled with the same units being used for both the frequency modulating the transmitter, and how much the carrier is deviated from its nominal frequency, the hertz, and this is where beginners can get confused. So the transmitter could be modulated with a 1kHz tone of a certain amplitude which deviates the transmitted carrier exactly 1kHz away from its nominal frequency. So it's important to use the correct terms when talking about FM deviation.

So MI=fd/fm, where MI is the modulation index, fm is the modulating frequency, and fd is the peak deviation. As the approximate bandwidth of an FM signal is 2(fd+fm), for amateur NBFM operations in a 12.5kHz channel, the recommended deviation is therefore 2.65kHz for a maximum fd of 3.6kHz. [2(2.65+3.6)=12.5kHz]

Looking at figure 1, the carrier voltage (red line) is maximum when MI=0. (i.e. no modulation). As the MI increases, the carrier voltage starts to drop, and the voltage of the sidebands start to increase. Bearing in mind that FM transmitter power is constant whatever the modulation level, this makes perfect sense.

If the carrier from your FM transmitter is monitored on a CW receiver with no modulation applied, there will be a tone audible in the receiver. If a sine wave tone is applied to the audio input of the FM transmitter and the audio level is gradually increased, the level of the CW note will drop away, until it is zero. If the audio input level continues to be increased, the CW note will start to sound louder. At the point where it is zero, this is where the red line crosses the zero value, and is when MI=2.401.

So what frequency modulating tone is needed? If MI=2(fd+fm), then fm=(MI/2)-fd. In a 12.5kHz channel width, if the first carrier null is used at MI=2.401, then fm=(2.401/2)-3.6kHz. This is a negative number, so the first zero is not suitable for this NBFM system. Similarly for the second zero around MI=5.5, but the third zero is very suitable at MI=11.79. As fm=(11.79/2)-3.6kHz, an audio tone of 2.295kHz will work well in most NBFM transmitters. So using one of the free online audio signal generators to generate an accurate 2.295kHz, and gradually increasing the audio level will decrease the level of the tone heard on the CW receiver until it fades to zero.

Continue increasing the audio level until the carrier fades for the third time. Note the peak to peak audio level at this third zero. This audio level is the maximum that should be input to the FM transmitter's modulator for peak deviation..

An alternative way is to observe the signal on the spectrum display from a spectrum analyser or software defined radio for example, and observe when the carrier goes to zero the third time.

If you do have a modulation meter, this is a definitive way of checking its calibration. If the sine wave tone is pure, and the transmitter free of distortion, this method is absolute.

73 Richard G3ZIY

Dates for your diary:

Wednesday October 24th – FPGA's by Alister G3ZBU (TBC)

Wednesday November 28th – HARC/CARC Challenge

Friday December 7th – Annual Fish and Chip Supper

Weds Jan 23rd 2019 – Annual General Meeting

For Sale or Wanted

- Monochrome Laser Printer Brother HL-1212W
  https://www.brother.co.uk/printers/mono-laser-printers/hl-1212w ,
  and a Canon K10395 photo quality 5 ink inkjet printer with some spare cartridges
  https://www.canon.co.uk/printers/inkjet/pixma/pixma_mg6450/
  Both these printers are in excellent working order, but are now surplus to my requirements as I have upgraded my printing arrangements.
  Sensible offers please to Richard at richardg3ziy@gmail.com
- Icom IC7100 with dedicated LDG IT100 antenna tuner, both in perfect condition with manual and box £700

also

- Yaesu FT857 with DSP, Collins SSB filter, extended coverage (60m), remote microphone MH-59A8J with manual and box £450

Dick Lupton M0RXZ (often behind tea bar on a Sunday!)
dicklupton2@gmail.com

Interesting Reads or Watches

What went wrong with Maplins (article)
https://www.retailgazette.co.uk/blog/2018/03/maplin-what-went-wrong/

The ICOM 7610 In Depth(video)
https://www.youtube.com/watch?v=IW-I-_5Hlro&feature=youtu.be

TX Factor (video series)
http://www.txfilms.co.uk/txfactor/

This week's GB2RS news on the web (audio)
http://www.txfilms.co.uk/txfactor/podcasts.html

Propagation and Solar Data (website)
http://www.hamqsl.com/solar.html

National Grid Dashboard – see how the country's energy is being created and used in real time
http://www.gridwatch.templar.co.uk/

Digital archives of Radio related magazines –

https://www.americanradiohistory.com/Radio_News_Master_Page_Guide.htm

Info Page

Local Repeaters

GB3MH: 145.625/88.5(FM) GB7MH: 439.6375(D-Star/DMR)

GB3NS: 439.675/82.5(FM) GB7NS: 439.1625(DMR) GB7ID: 430.975 (438.575)(FM/Fusion)

GB3HO: 430.8875/88.5 (438.4875)(FM) GB3HY: 430.900/88.5 (438.500)(FM)

Local DX Cluster GB7DXS : Telnet 81.149.0.149 Port 7300

Committee Members:

Keith Evans G3VKW - Chairman

John Pitty G4PEO – Vice Chairman, QSL Manager

Phil Moore M0TZZ - Hon. Secretary, Newsletter Editor, Exam Secretary

Howard Palmer G4PFW – Hon. Treasurer

John Longhurst G3VLH - Programme Secretary

Richard Hadfield G4ANN

Alex Sheppard M1YAP

Lead Training Instructor – Vacancy