FEEDBACK

The Official Newsletter of the
Georgian Bay Amateur Radio Club

October 2020

This Month

2020 Executive

President .....Tom VA3TVA
Vice-President... Frank VA3GUF
Treasurer.....Bobby VE3PAV
Secretary.....Peter VE3BBN

President's Message

Hi All. Did everyone get enough Turkey? Enough homemade pie? Enough family? Enough in-laws? I hope that everyone took a little time to reflect, and to be thankful. I'm thankful for my health, the health of my family (Both sides). I'm thankful to be in Canada. Politics are dissatisfying everywhere, our taxes are high, and lot's of other things to be dissatisfied with, but I'm thankful to be here. It could be so much worse.

Our club election is coming along. Although, I must admit that I am a little disappointed with the lack of participation of the Membership. HEY MEMBERS!!! It's your club. Vote. Not sure who to vote for? Don't know the candidates? Post a question on the forms for them to answer. Send a question to the executive and we'll forward it to the candidates. Request a call from them if you like. I'm sure they are up for it.

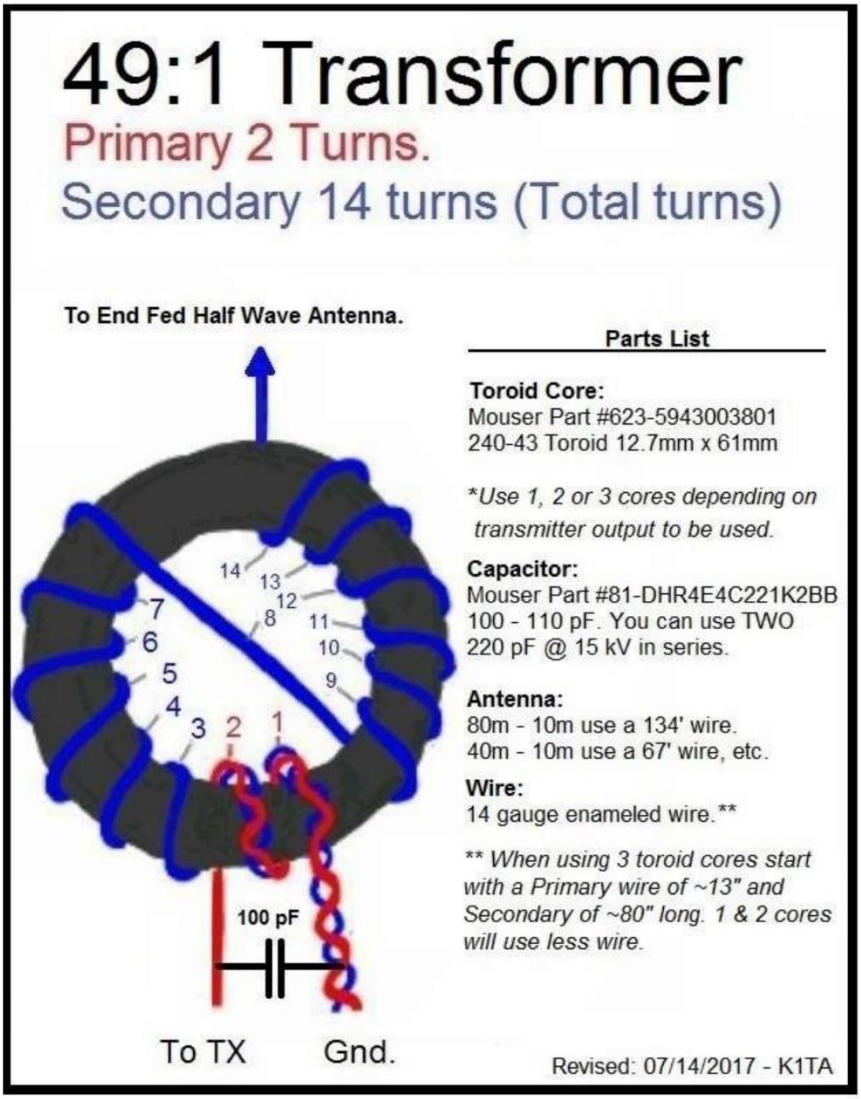
With everything that is in upheaval these days, I'm not sure what to do about the coming meeting. It's rather cool and dark rather early. Gatherings are restricted to rather small groups. I think that another outdoor meeting is in order. But where, and when? What say you Members? There are a few spots that I have in mind. Maybe I'll run it past the executive, and perceptive executive. And get their opinions? But I would love to have some input from the membership.

I would love to have some more interesting things to offer, but unless someone is interested in discussing the inner workings of combines and soy bean harvest, I haven't much to add. Life doesn't seem to leave me much time for radio pursuits. Maybe next year?

73 for now, Tom VA3TVA

The End Fed Half Wave Antenna Part 2 of 3

Thanks to Rick Reeve VE3ORY for his kind contribution to our newsletter.



- You will find this diagram by K1TA on numerous web sites.

It is a good reference when trying to remember how to wind an EFHW matching transformer.

Typical EFHW Matching Transformer

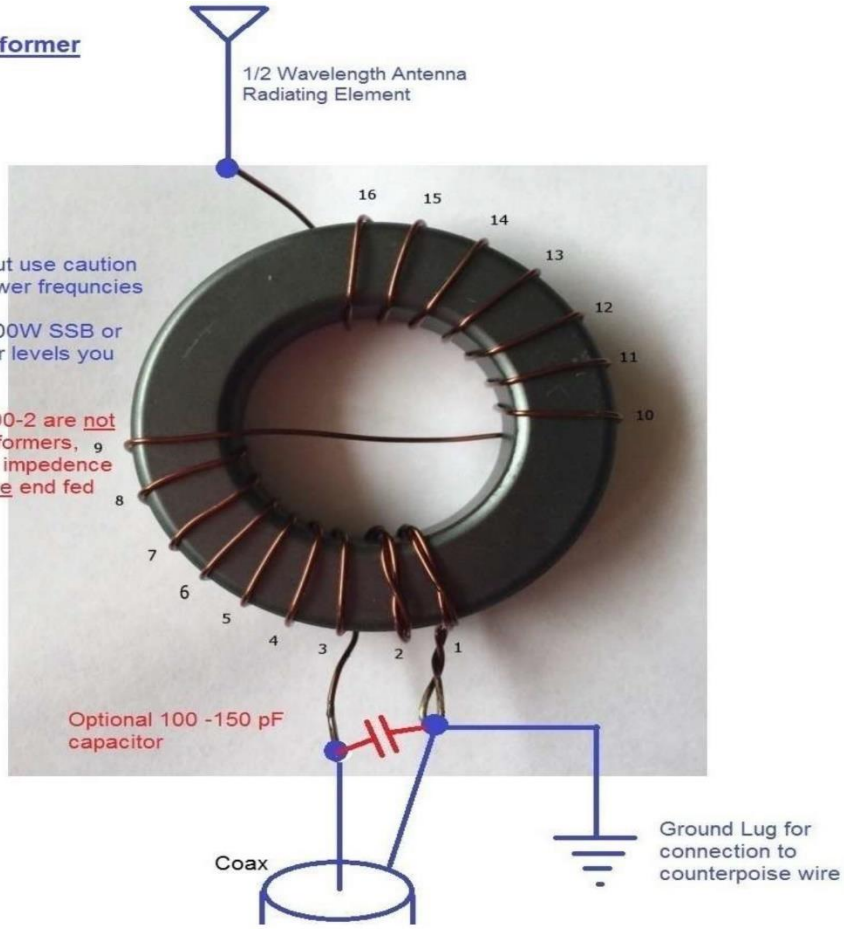
This one wound for an impedance transformation ratio of 64:1

Ferrite Toroid Core(s)
Typically FT 240-**43** or **-52** or **-61** mix

Smaller core can be used for QRP but use caution as cores will heat up,especially at lower frequncies

One FT 240 core is likely good for 100W SSB or 50W CW or Digital. For higher power levels you can stack 2 or 3 cores

Powdered Iron Toriod cores e.g.T-200-2 are not suitable for 1/2 wave matching transformers, (although they can be used for lower impedence transformers such as 9:1 random wire end fed antennas)

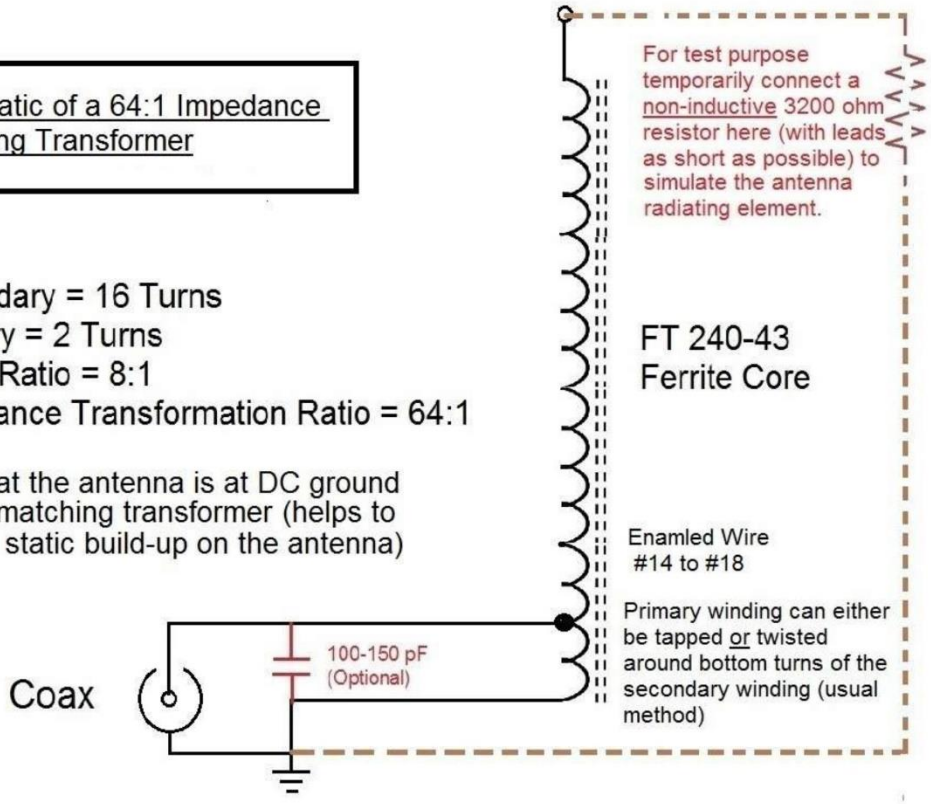


Antenna

Schematic of a 64:1 Impedance Matching Transformer

Secondary = 16 Turns
Primary = 2 Turns
Turns Ratio = 8:1
Impedance Transformation Ratio = 64:1

** Note that the antenna is at DC ground via the matching transformer (helps to prevent static build-up on the antenna)

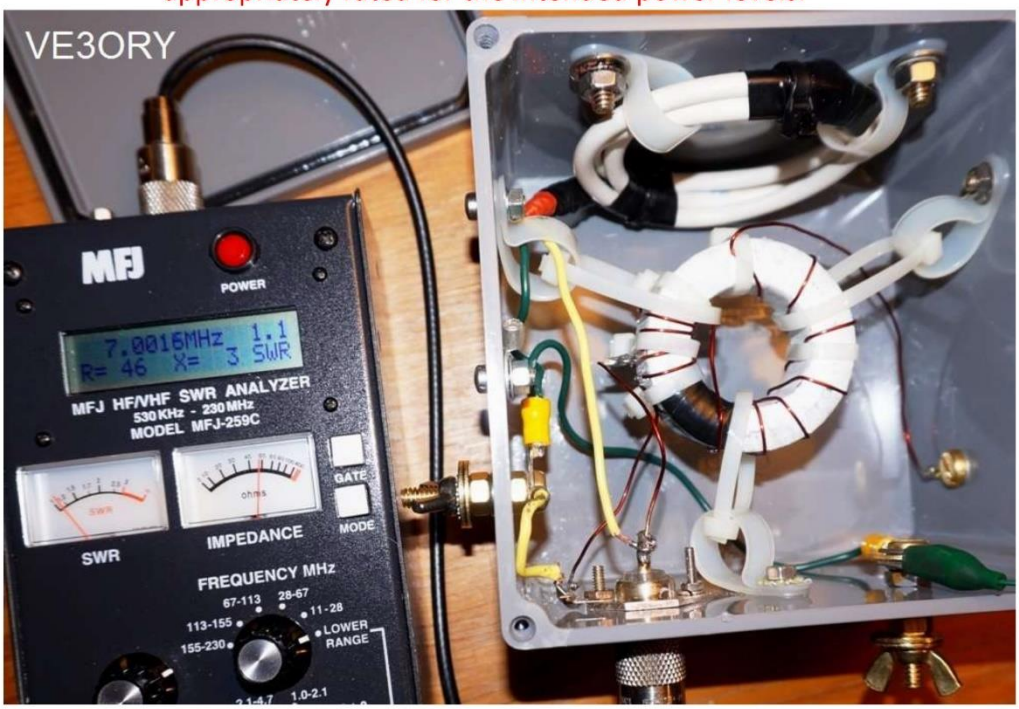


GND - Short wire or coax shield

Testing one of my single core transformers using a 4200 ohm resistive load to simulate the impedance of a ½ wave radiating element. This is a good way to asses characteristics of the transformer across the intended frequencies. The disk capacitor helps offset the tendency for SWR to increase at higher frequencies due to inductance of the transformer windings.

For this transformer I experimented with using a piece of coax cable to provide the capacitance across the input winding. You can do without this capacitor if your antenna is targeted for the lower bands (80/40m) and you don't care so much about SWR increasing at the higher frequencies.

Also keep in mind that this capacitor sees your full transmitter output so important that it be appropriately rated for the intended power levels.

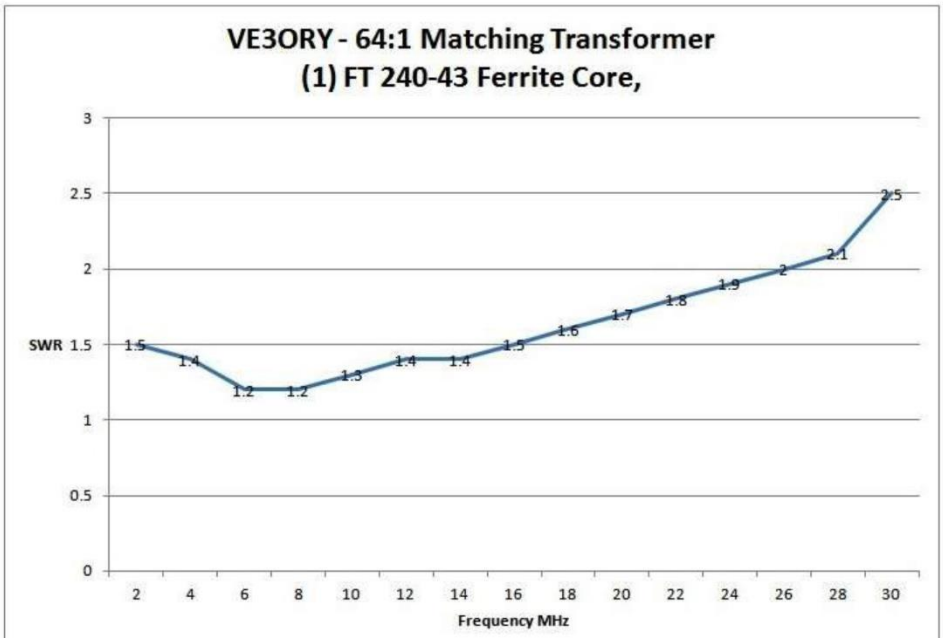


Here is a plot of SWR for one of my transformers taken using an MFJ-259C antenna analyzer. Fairly pleased with this one, as the SWR is less than 2:1 across most of the HF band. I have found it relatively easy to obtain good results when winding on a single core. It seems to become more difficult when stacking multiple cores for purposes of better power capability. I think in theory due to resulting higher inductances.

Core = (1) FT 240-43 Ferrite, Primary = 2 Turns, Secondary = 16 Turns, Turns Ratio = 8:1, Impedance Ratio = 64:1

Ideal Test Load Resistance for 52 ohm input = 52 X 64 = 3328 ohms (non-inductive)

Actual Test Load Resistance used = 3320 ohms (non-inductive)



Here is an example of what I mentioned in the previous slide. This transformer wound on a stacked pair of FT 240-43 cores. The SWR rises very quickly at the higher frequencies. The 100 pF capacitor on the input winding will not fully offset this tendency. Different core mix will make a difference. Note also for this one I chose to use a 3-turn primary and 24-turn secondary which likely compounded the problem at higher frequencies. There is still a lot of 'black art' magic about these transformers that I don't yet fully understand.

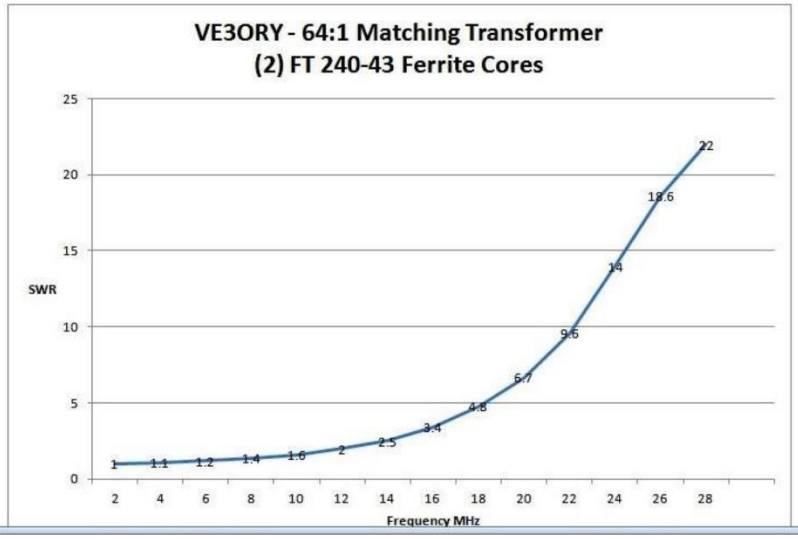
VE3ORY - 64:1 Matching Transformer, Stacked (2) FT 240-43 Cores

Construction / Testing Data

Core = (2) FT 240-43 Ferrite, Primary = 3 Turns, Secondary = 24 Turns, Turns Ratio = 8:1, Impedance Ratio = 64:1

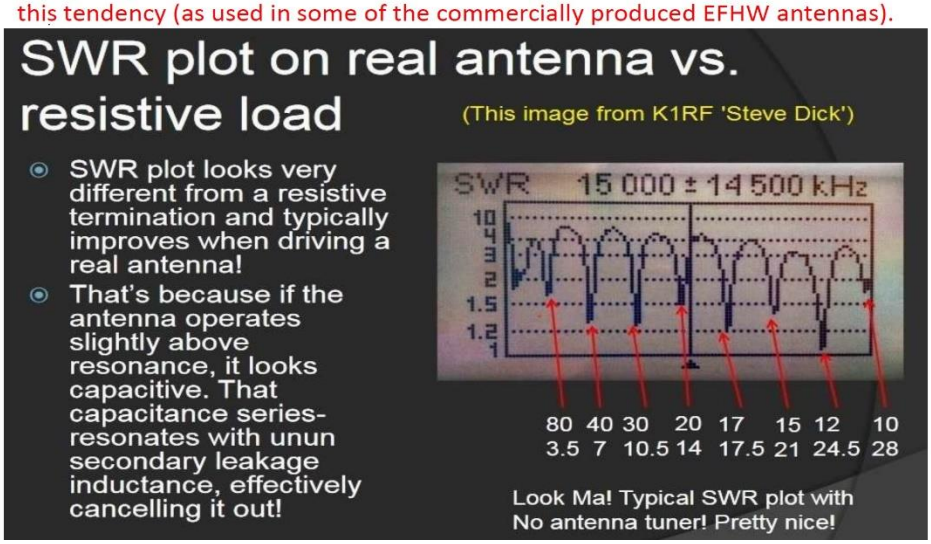
Ideal Test Load Resistance for 52 ohm input = 52 X 64 = 3328 ohms (non-inductive)

Actual Test Load Resistance used = 3320 ohms (non-inductive)



Keep in mind that the previous SWR plots shown were only looking at performance of the transformer itself, using a resistive load to simulate an ideal antenna connected to the output terminal. The real-life situation is a lot different. Primarily due to the fact that, as you change frequency on the antenna, it is in reality no longer an exact ½ wavelength, and impedance at the end of the antenna will decrease rapidly. The matching transformer is then 'over-compensating' and the result is that SWR rises rapidly as shown in the SWR plot here.

It is also for this reason that it can be difficult to get an EFHW antenna to operate on multiple bands where the higher frequencies may be close to, but not exactly, a ½ wave multiple of the lowest fundamental frequency that the antenna was tuned for. There are other tricks that can be used to offset this tendency (as used in some of the commercially produced EFHW antennas).



Core Material Data from K1RF, Steve Dick

EFHW Single FT-240 Unun 3T different materials.xls [Compatibility Mode]

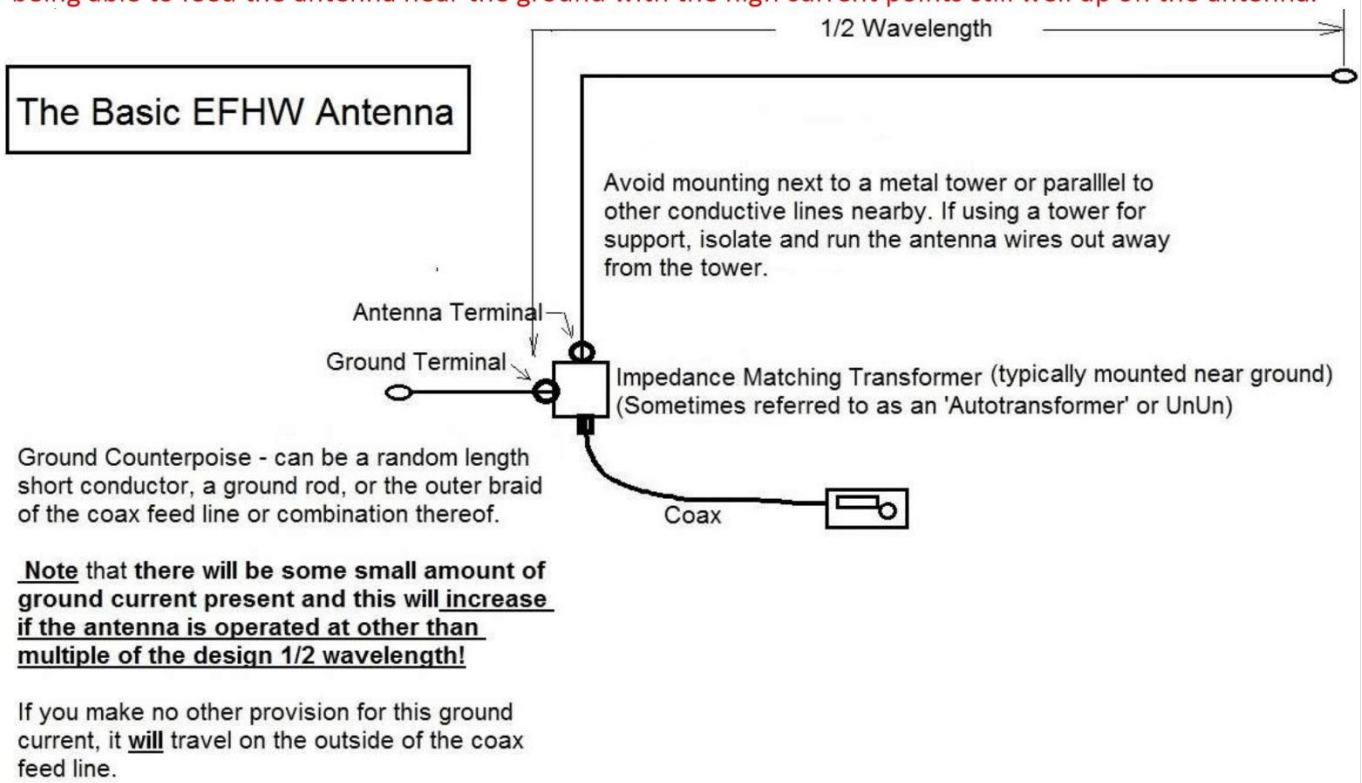
	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O
1	This EFHW core loss data generated by Steve Dick, K1RF based on on-line calculators available on owenduffy.net														
2	Computations of EFHW UNUN using different toroid core materials, number of toroids, and number of primary turns (2 or 3)														
3	Losses in the matching transformer are only part of the total system loss, and overall system efficiency will be lower than estimated here for the transformer alone														
4	Using calculator at:	https://owenduffy.net/calc/toroid.htm			assumed 2pF Cs in the calculator										
5	and an example of computing core efficiency at:														
6	https://owenduffy.net/blog/?p=12578														
7															
8	This table was generated for a single FT-240 size toroid with 3 turn primary (for use with 21-24 turn secondary)														
9	For a given material. The primary inductance for a three turn primary is 9/4 that if two turns, but Al is half that of two FT-240s.														
10	Therefore primary indctance for a single core with 3 turn primary is only about 1.125 the unductance of a two turn primary with two cores.														
11	However, the efficiency of a three turn primary has far lower core losses than two turns for the same number of cores and material.														
12	A three turn primary should likely work fine even at 28 MHz for a single FT-240 core.														
13															
14	Core efficiency tables for a single DFT-240 size core with different core materials for a three turn primary:														
15	This is assumed to be used for a 100 watt class transmitter. Assume 125 watts max and 44% duty on CW, or 55 watts average output power.														
16	Green = efficiency >90% and core power dissipation <6.5 watts (assumption)														
17															
18	FT-240 parameters: A=OD-61mm, B=ID=35.55mm, C=width = 12.7MM														

Type 43						Type 52					
MHz	u'	u"	Gs	Core Eff	Core Pwr	MHz	u'	u"	Gs	Core Eff.	Core pwr
3.6	470.2	224	0.00296	85.20%	[illegible]	3.6	278.7	7.8	0.000359	98.21%	0.98725
7.1	332	228	0.00255	87.25%	[illegible]	7.1	305.2	73.8	0.00136	93.20%	3.74
14.2	201.2	204.3	0.00226	88.70%	6.215	14.2	186.8	151.2	0.00238	88.10%	6.545
21.2	135.3	179.4	0.00216	89.20%	5.94	21.2	132.2	126.8	0.0023	88.50%	6.325
28.5	97.5	158.4	0.00207	89.65%	5.6925	28.5	107.2	109.4	0.00211	89.45%	5.8025

Type 61					
MHz	u'	u"	Gs	Core eff.	Core pwr
3.6	120.6	0.6	0.000148	99.26%	0.407
7.1	123.4	1.2	0.000143	99.29%	0.39325
14.2	136.8	6.2	0.0003	98.50%	0.825
21.2	153.7	41.5	0.000996	95.02%	2.739
28.5	124.5	76.6	0.00162	91.90%	4.455

This is the clear winner!

The next few slides show some practical examples of EFHW antennas that I have experimented with over the past few years. My computer drawings are not the greatest but they will get the idea across. These antennas have worked surprisingly well and have gone a long way towards dispelling my initial misgivings about common mode currents on the coax and RFI concerns. I have operated some of these antennas from the townhouse at times running 400 watts into a wire that terminated in the attic of the townhouse with no adverse effects. And the antennas have performed with surprising efficiency. One of the primary benefits being able to feed the antenna near the ground with the high current points still well up on the antenna.



Stay tuned for the final part 3..next month

Join us for our weekly get together "On the Air"

The club meets each Wednesday evening on VE3OSR 146.940 T97.4 hz at 7:30 pm local time, and on 3.783 Mhz +/- immediately following.

Heathkit Bug Don VE3IDS

A novel approach to vibroplex bug usage, and since it's Heathkit colours, then it's a Heathkit bug.. A nice advantage is that it takes up less desk space, which as you know is a premium with everything else at the operating position.

Utube video https://youtu.be/yGO8ivPj260

Websites of Interest Copy/Paste the urls below into your browser

The Uncertain Future of Ham Radio
https://spectrum.ieee.org/telecom/wireless/the-uncertain-future-of-ham-radio

Ottawa Valley Rambler
https://www.ovmrc.on.ca/Rambler/Archive/Ram2020-09.pdf

IF AMPLIFIER TRANSFORMERS
https://www.electronics-tutorials.com/filters/if-amplifier-transformers.htm

A Website Dedicated To Vintage Radio and Television Enthusiasts
https://www.radioremembered.org/home.html

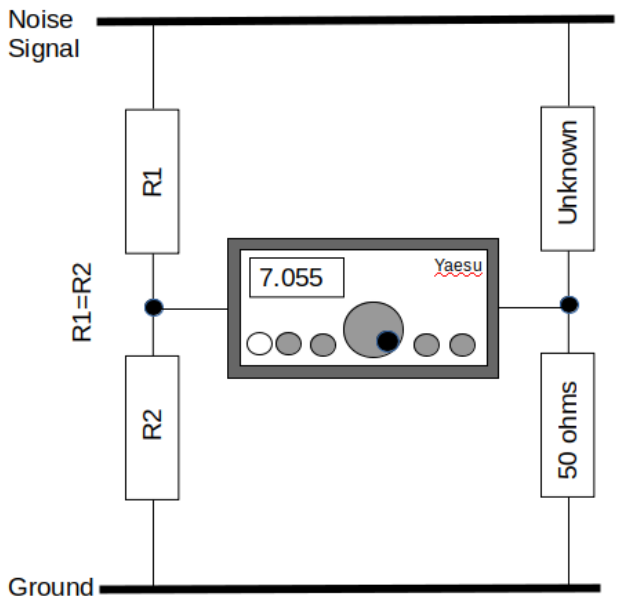
The Tube Store, Hamilton , On
https://www.thetubestore.com/

Tiny SA
https://tinysa.org/wiki/

RAC
Radio Amateurs of Canada

Noise Bridge for RF Measurements

VA3KOT John



Simplified Noise Bridge

Buying an antenna analyzer can leave a big hole in your pocket. Some cost more than five hundred dollars, but it must be admitted that the relatively new fifty dollar nanoVNA sets a new standard for the cost of these instruments.

Maybe I'll get around to buying myself a $50 device one day. In the meantime I enjoy using an old technology device that serves the same purpose. It is called a noise bridge. You can buy a noise bridge from several sources (mine is from MFJ) or you can build your own.

A noise bridge generates wideband avalanche noise using a zener diode. The noise is then amplified and applied to a bridge circuit (see simplified diagram below). One arm of the bridge comprises a known value of resistance and reactance plus an unknown – the antenna under test.

The output of the bridge is sent to a receiver which is tuned until the noise disappears. At that frequency the bridge is balanced and the resistance and reactance of the antenna is equal to the known values set on the noise bridge. In the simplest case, the known values could be R=50 ohm, X_C=X_L=0.

My MFJ-202B noise bridge allows a wide range of antenna impedances to be measured. Simpler models (such as the QRPGuys model - qrpguys.com/k7qo-noise-bridge) compare the unknown antenna to a simple 51 ohm resistor. Although you cannot perform the same measurements with this simplified device, it is quick and easy to find the resonant frequency of your antenna.

I actually acquired two MFJ-202Bs from a ham friend. I use one of them as it was originally intended. I modified the other unit by eliminating some of the components to make it a simplified noise bridge like the QRPGuys model.

When using the bridge, bypass your tuner and set your receiver so that the RF gain is at the threshold of squelching the noise from the bridge. AF gain can be boosted to make the null easier to detect. And – this is very important (ask me how I know) – you should remove any keys or microphones from the radio to prevent accidentally transmitting into the noise bridge!

A noise bridge can also be used for adjusting tuner settings by setting the desired frequency on your radio and then adjusting the tuner controls for a null in the noise.

Another use is for measurement of the bandwidth of an antenna. Just observe the frequency at which a null occurs and then tune the radio until the noise re-appears.

A noise bridge can also be used for receiver alignment. Connect the noise bridge to your radio's antenna jack and adjust the receiver's alignment controls for maximum noise.

John VA3KOT

Minutes of Meeting September 22nd 2020

Location: Bayshore Community Centre, North parking lot
Call to order; approximately 19:15
Minutes of Previous Meeting; Moved, seconded, carried
Treasures report; Club account has $995. Moved that the treasurer's report be accepted, moved Peter, seconded, accepted
Old Business:
Tom StA sale of equipment
Tom TS brought the code practice Heath kit sets as indicated on the website (some require some assembly), and a few Morse keys. For learning International Morse Code, see YouTube
https://www.youtube.com/watch?v=OB1RUBwAvbE
or
http://www.arrl.org/learning-morse-code
Tom also indicated there are a few items from silent key Dieter: a Viking transmitter, Johnson Matchbox, prices to be negotiated and a free oscilloscope which needs some tweaking.
NEW BUSINESS
Foxhunt (Frank Gufler): two possible dates, November 21-22 or November 28-29.
ARES Owing to COVID-19 Grey County will not be doing any emergency training this year
Charity Support, e.g. Terry Fox Run. All charities are going 'virtual' this year so no support is needed from us.
Courses: a GBARC student, Mary has donated a Yaesu FRG-100 radio for students to listen.
Elections: The nomination page will be available on the GBARC website
Constitution: There is an inconsistency in the pricing of membership. Annual dues are $29 and can be paid from September 01 to December 31 for the next year.
Christmas Lunch: Decision for Rockford Restaurant COVID-19 permitting - to be December 5 or 12? Moved by Frank, seconded by Dave that it be on December 12. Carried.
Repeaters: If you are interested in helping to repair/maintain the Club's repeaters, contact Frank.
Adjournment: Moved by Tom, seconded by Peter. The meeting adjourned about 2015.
Attendees:

Name	Call sign	Name	Call sign
Dan Mills	VA3DNY	Jim Wunnenberg	VE3VEX
Maureen Nightingale	VE3MIO	Tom St. Amand	VA3TS
Tom van Aalst	VA3TVA and XYL	Dave Newcombe	VE3WI
Rob Walker	VE3RWY	John Corby	VA3KOT
Frank Gufler	VA3GUF	Jim Reeves	VE3JMD
Doug McDougall	VE3DGY	Peter Richards	VE3BBN

Letters to the Editor

Sep 29
Well the M17 project has been busy this month. As you know the M17 project is trying produce a protocol to replace the Fusion, DMR, and D-Star transport protocols, and to use Codec2 as a replacement for the AMBE audio encoder used in the other radios. All the software and Gerber files will be open sourced so that anyone will be able to build the hardware that the project designs.

https://m17project.org/

It is one thing to write a specification, but the real test is to use it on air.
So to bring M17 to life the project has brought together the talent of various Hams from around the world to design a handheld and a repeater.

The project is currently working on the second TR-9 handheld prototype which will enable us to add analog FM transmission as well as digital audio transmissions. This month the prototype TR-9 handheld blank board was made and populated, and the software is being written to bring it to life. The TR-9 handheld is interesting in that it also has a WIFI connection on it, so it can act as its own hotspot to connect over the INTERNET. Blank boards have also been sent to other builders.

To help with the building of the blank boards some of the team have been working on bill of materials, so those who received the blank boards will be able to order parts to build them, which will help with finding bugs in the hardware and software.

Along with this is the development of documentation has been going on. To make the specification readable and to find any loose ends in how things are supposed to work.

The IRC channel for the project has been busy at times, as the handheld prototype is tested for various things. One test was to connect the prototype to the INTERNET via the WIFI and sends packets to another station. The FM analog audio reception was also tested. The digital audio channel was tested, but it seems some work needs to be done on the buffers for the audio sampling. There is also a lot of work going on updating the web sites and git hub setups that the project is using.

When this version of the handheld prototype is finished testing, another is planned which will have a four layer board and other upgrades.

There is a twitter feed at https://twitter.com/m17_project

73 Carl
VE3APY

Sep 25
Things have been a little slow this week, one of the TR-9 software authors has been busy at his day job. But the analog section did receive a local analog FM repeater, since I wrote you, the ADF7021 which is the RF section is now under control. In the back ground there has been work done on internet support software, such as being able to receive M17 protocol packets and determine if they are valid. One of the software developers hopes to be able to use an add on to the WireShark software to analyze the M17 packets. Also the TR-9 handheld board has sent packets over its internal WiFi connection from Poland to the USA. One of the things which the group hopes to achieve with the TR-9 is it will be its own hotspot being able to connect through its own WiFi connection to the internet. So it will not require a Raspberry Pi Hotspot setup, as is currently used for DMR. Work is also going on with a group of French hams on the development of some boards which would be used in a M17 protocol repeater. So far the M17 group has only one TR-9 board operating, but we hope some of the other blank pc boards will be soon built up so others can help with the development of the software.

73 Carl
VE3APY

Sept 11
Thought you might like to see this, one of the TR-9 boards for the handheld, is starting to show life. They still can not talk to the ADF7021, but other stuff is working on the board. Here is a link to some pictures.

https://imgur.com/a/leIDToj

73 Carl
VE3APY

Ultra Sonic Soldering
Never heard of this before, the video is quite informative.

https://www.youtube.com/watch?v=WuYdsStS1MQ

Never thought of being able to solder to glass before.

73 Carl
VE3APY

Elections 2021/22

If you are a member, you should have received a link to our online page to vote for our upcoming executive. It's not too late, elections close on the 27th of October. contact@gbarc.ca

The Last Word

A few words of appreciation to those that contribute to this newsletter by submitting news stories or interesting web links or ideas. If you have something then send it to https://gbarc.ca/mailus.php , any format, any size, anytime, but if you want it to appear in the current months newsletter, then send it by the 3rd Tuesday of the month.

Help US Out *Would you like to receive email notifications when this newsletter is posted? Sign up for our mailing list. We only send out a few mailings a month and you can unsubscribe at any time. No ads and no personal information, your email address is never shared with anyone else.* *https://www.gbarc.ca/lists/?p=subscribe*

Membership for details regarding membership in the club go to:
https://www.gbarc.ca/gbarcmembers.php

The next newsletter will be in November.

THE SIX STAGES OF A CLUB PROJECT

1. ENTHUSIASM
2. CONFUSION
3. DISILLUSIONMENT
4. SEARCH FOR THE CULPRITS
5. PUNISHMENT OF THE INNOCENT
6. DECORATION OF THE NON-PARTICIPANTS