GARS

Glenn Amateur Radio Society

KJ6HCG

Prez Says **_The GARS Repeater_** December 2024

Salutations from the lair of KF6OBI! – It is now Black Friday and I thought I would pop this newsletter out to you before my weekend goes a different direction than planned. We had a bit of weather this past month, not unexpected, but expectantly different than expected. For the month of November we had 3.8 inches of rain at the KF6OBI QTH. This is lower than what we really got as a bird pooped in the rain gauge. The Saint John site received some 5.15 inches of rain for the month of November. The site also received some snow which is sticking around for a few days. The site did clock up to 82 MPH winds and a low temperature of 22 degrees. Burr...

November was been a busy month with family health issues, trying to finish some projects, and finding time for myself with, and between, the rainy weather, was a bit harsh on my life. I did manage to find a few minutes here and there for some reflection and meditation. What I was able to pinch out was just enough to get me through the tough spots. Please find time for yourselves to relieve the stresses in your lives.

Sometimes I find ways to relieve stress by tucking into a project. Maybe that is why I have so many projects. I am always working on several at a time. Just completed the Rigrunner DC power control unit. I also got the new computer in the lair setup and working with two monitors. It is a used machine with more RAM and hard drive space. Oh, did I mention that is is much faster that the old machine. Way faster too!

This coming week on the 2nd of December, Gary, W6GRC, and crew will be going up to the Saint John site to install the solar mountings for his solar array. Timing works out as we have a high pressure sitting on us and it has warmed up into the 40's to 50's at the site. Jeramie, W6LND, is going to be going up with this crew to reinstall the AXS port on the Outback system and he will also be installing the DC power control unit on the Rigrunner. Jeramie will also be closing the vents and checking for any water intrusion into the shelter.

The project of designing a similar device to the Rigrunner is on hold for the time being. This project will require much time to develop so it has to take a back burner. I will be starting to ready things for Winter Field Day and have a goal in mind and hope that I can make that goal happen? I have been doing much research on LiFePO4 (Lithium) batteries. This battery chemistry looks more promising if we can find a way to protect them from the cold revenges of Saint John.

I have had a little time to revisit the EMI/RFI issues and have discovered some things that will be addressed in testing at Winter Field day. My focus this field day will be testing and collecting information on these EMI/RFI issues.

Reminders: Dues are due; if you have not paid yet, please consider doing so soon. Nominations for President, Secretary, and Treasure, plus one board are up for renewal.

Up and coming events are: –See notices are on the GARS Website <https://www.garshamradio.org/>; Winter Field day 25-26 January 2025 at the Spurlock Ranch. GARS holiday party on December 13th @ 6:30 PM at Granzella's in Williams. More information at bottom of this newsletter. This party is in lieu of our normal meeting.

This months membership meeting will be on the second Friday, the 13th December, at the Lutheran Fellowship Hall, 565 Main Street, Artois CA, at 7:00pm. Late arrivals and guests are always welcome. Also remember that one does not have to be a member of the club to participate in our membership meetings and activities. Be safe in all you do and may you all have many blessings in the days and months ahead!

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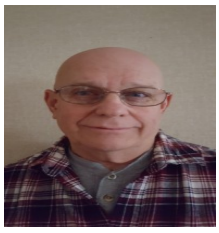

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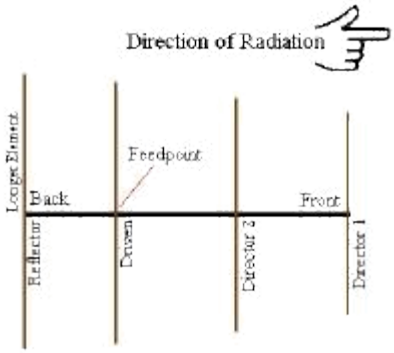
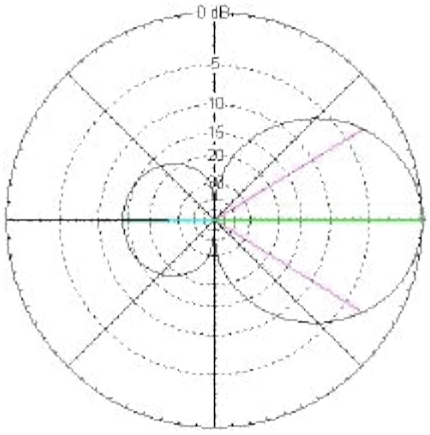
Make your own VHF/UHF Phasing Harness

Author: Frederick R. Vobbe, W8HDU **August 10, 2008**

A Yagi-Uda Antenna, commonly known simply as a Yagi antenna or Yagi, is a directional antenna. It consists of a dipole and additional closely coupled parasitic elements. A reflector is on the back, and the directors are toward the front.





When two Yagi antennas are placed at the optimum stacking distance, they usually have the following characteristics:

- The gain increases by as much as 2 to 9 dB over the single antenna.

- The beam width in the plane of stacking is approximately one half the beam width of the original antenna while the other plane is not affected.

- The first side lobes are typically 13 to 14 dB below the main lobe in the plane of the stacking.

Keep in mind that for maximum efficiency you need to design the spacing between two antennas at a certain distance. I typically design the antennas for one wavelength separation. So at 50.5 MHz the distance is 19.4 feet. You may have another way to do this but this is the way I figured this on my calculator is:

Instruction	*Result*
Enter 300	300
Press the DIVIDE key and enter frequency in megahertz 50.5 and press EQUAL.	5.940594059405940594059405941 answer is the frequency in "meters"

Press the TIMES key and enter 39.3637 and press EQUAL.	233.843762376237623762376237623762376 answer converts meters to U.S. inches
If you need to know the measurement in Feet Press the DIVIDE key and enter 12 and press EQUAL.	19.486980198019801980198019801980198

So the best separation would be 19.5 feet

I'm fully aware of other formulas for calculating frequency to inches, or feet, but I like to resolve frequency to meters first, then work from meters to the actual US. measurement.

There are several ways to separate antennas. They include:

- **Horizontal Polarization Side by Side**

- **Horizontal Polarization One on top of other**

- **Vertical Polarization Side by Side**

- **Vertical Polarization One on top of other**

The Phasing Harness

A phasing harness is basically (2) sections of 75-ohm cable cut to odd quarter wavelengths X velocity factor, transitioning to a 50-ohm cable, which is usually the transmission line.

The exact length of the cable is important as it's a matching Q section. To determine the length of the line, use this formula.

Length in feet = (246 x VF) ÷ Freq in MHz

Length in feet in the US. 1 foot measurement, or 12 inches. VF is the Velocity Factor of the 75-ohm cable. (Do not mix this up with 50-ohm cable).

Multiply 246 times the VF. For example, lets say you use RG-213 with a velocity factor of 0.66 or 66%. Your answer would be 246 x 0.66 or 162.36.

Next, divide this by the frequency. If we are operating at 7.100 MHz or 7,100 KHz, then we would take 162.36 divided by 7.1 or 22.867. So both sections of your cable would be odd multiples of 22.867 feet depending on the spacing of the antennas. IE: 1, 3, 5, 7, 9, etc.

When measuring the cable, I tend to use the braid as I have prepared it for a connector. See figure 1 below.

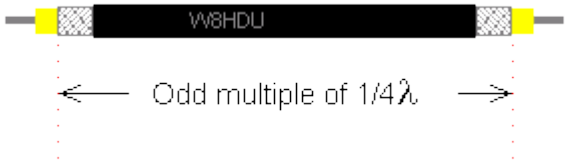


figure 1

The connector you see to the left is a PL259 connector. You can use most any type of connectors that suit your applications. I have used BNC connectors for receive only applications, or hardline connectors such as Andrew F-4PNF-C for higher power and more critical applications. Two things to remember. Make sure you use all the same connectors. For PL-259 connectors, I prefer the ones with the white Teflon centers. The older Bakelite style will work for lower frequency HF stuff, but anything above 30 MHz should be Teflon.

When combining the two sections of line, it's best to use a Tee connector with all female connections, like the one seen to the right. This way you can connect on your two phasing cables, then attach your transmission line directly to the harness. After you connect this up, remember to use coax seal or another product to seal the connections. What I have done on my antenna projects is to use vinyl electrical tape and wrap from where the connection is mated to the Tee, past the connector about two to three inches. Doing this will allow you to be able to remove the sealing rubber that goes on next. If you don't use a layer of tape you'll have a hard time removing the sealing rubber after it has sat in the sun for awhile and adhered to the connectors.

Next apply Butyl rubber, which is a soft, stretchy and moldable rubber sold at various locations. Do a search for Nashua 360-17 FOILMASTIC Butyl Rubber Tape. This is what actually does the sealing. After you have applied this, then wrap over the cable and the Butyl rubber with a couple more applications of electrical tape at a 45-degree angle. Pull tight on the tape so it presses into the rubber. Be sure that water can not get into the threads of the connector. If water gets in, it could corrode your connection. Or water will freeze in the winter and break the connector open.

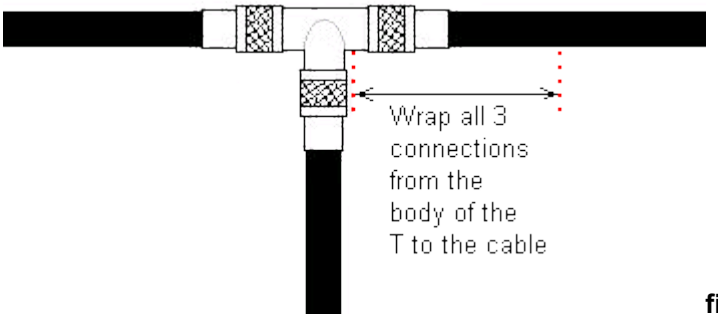


figure 2

When completed, your phasing line should look like the following in figure 3. The antennas are connected to the ends of the 75 ohm line.

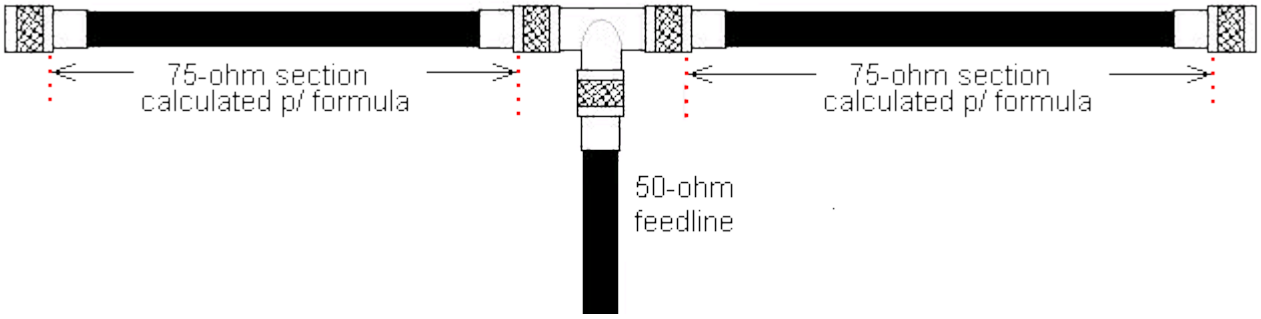


figure 3

More on Phasing

Make sure that both antennas are polarized properly. The biggest error I have seen with installations that don't work is one antenna will be flipped around causing a cancellation. Suppose you're mounting two antennas, horizontally, side by side. The feed of the left antenna is on the bottom. Make sure the feed for the right antenna is on the bottom as well.

The same applies for (2) vertical polarized antennas side by side. If the antenna has a gamma match that goes to the bottom of the antenna, then both antennas should be oriented in the same direction.

Also, make sure the antennas are straight. Use a "box measurement" and make sure the ends are the same. See figure 4

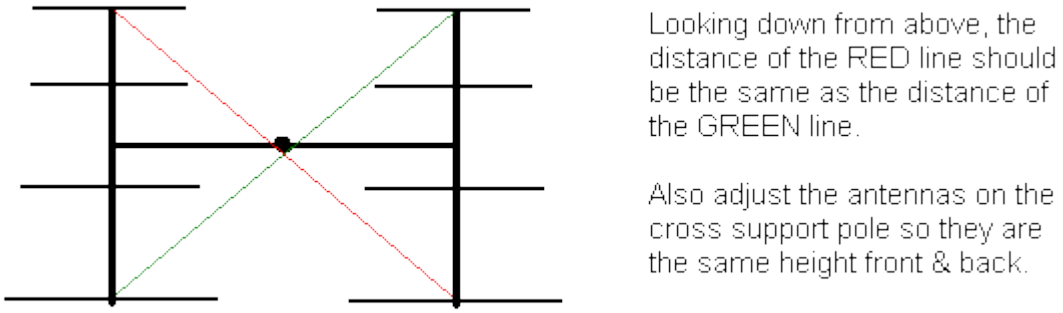


figure 4

As a side note, you can also construct multiple phase lines, and have as many as four antennas together. But unless you have specific reasons for four (or more) antennas, the results may not be worth the investment.

Addendum: June 24 2010

This chart using MS Excel, and it will also run on Sun Open Office. Here is the template. DOWNLOAD the XLS file.

INSTRUCTIONS

In cell B3, enter your center frequency.

For reference, in cell E3, enter the 75-ohm cable you will use.

Locate the cable spec on the web and enter the following.

In cell E25, enter the type of cable (ie: RG11)

In cell E26, enter the propagation factor.
Note, if it's spec'ed as .61 you would enter 61

In cell E27, enter the capacitance factor.

In cell E28, enter the shield percentage.

Look at your chart, or print it, For the distance between antennas use the EVEN multiples. Note the * next to the measurement. For the phasing cable lengths, use ODD multiples. Note the * next to the measurement.

If both antennas are matched correctly, and fed by a properly cut length cable, your match at the "T" connector should be perfect.

Frequency to Wavelength Calculation

			Belden
Frequency:	144.200000 MHz	Cable p/n:	**8238**
Wavelength:	2.08 Meters	Impedance:	75.0 ohm

Spacing between two antennas at Frequency			**Ideal**
1/4 wave	1.7060 feet	20.47 inches	
1/2 wave	3.4119 feet	40.94 inches	*
3/4 wave	5.1179 feet	61.41 inches	
1 wave	6.8239 feet	81.89 inches	*
1 1/4 wave	8.5298 feet	102.36 inches	
1 1/2 wave	10.2358 feet	122.83 inches	*
1 3/4 wave	11.9417 feet	143.30 inches	
2 wave	13.6477 feet	163.77 inches	*
2 1/4 wave	15.3537 feet	184.24 inches	
2 1/2 wave	17.0596 feet	204.72 inches	*
2 3/4 wave	18.7656 feet	225.19 inches	
3 wave	20.4716 feet	245.66 inches	

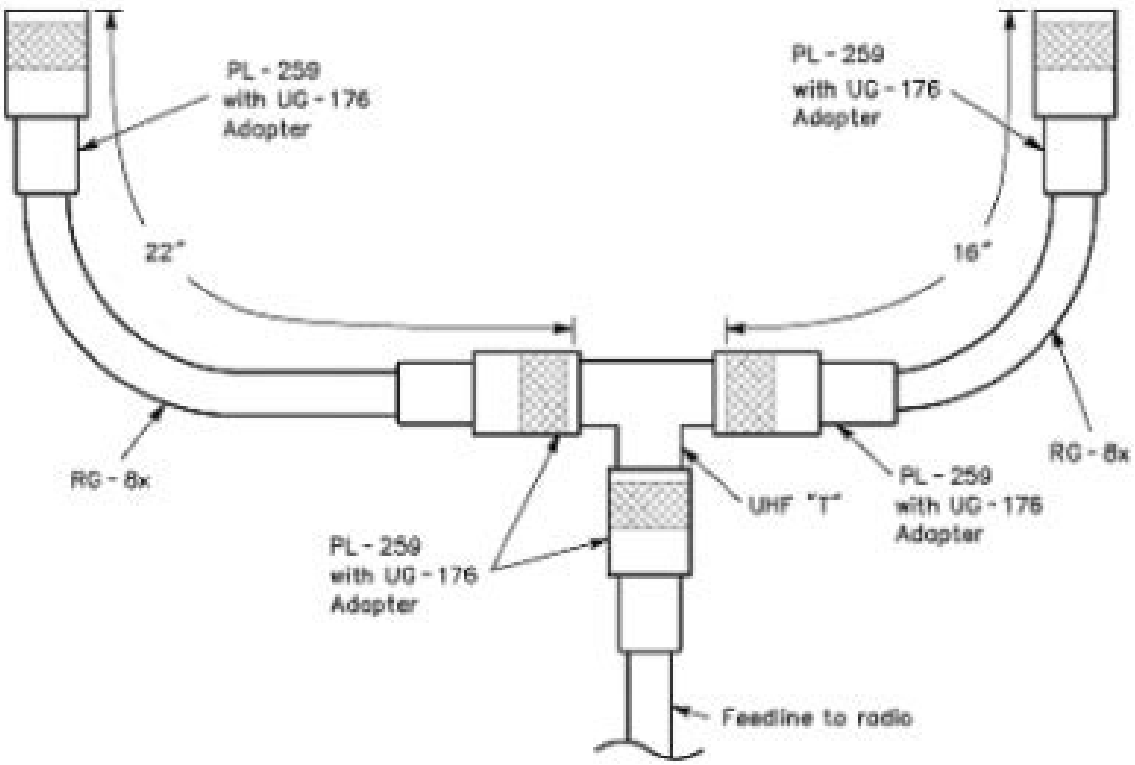
Length of 75-ohm cable used for phasing antennas

Specification:		Cable Type:	RG-11 coax	
		Cable Propagation Factor in %:	67.00	%
		pF ft:	20.5	
		Shield:	97.0	%
1/4 wave	1.1430 feet	13.7160 inches		*
1/2 wave	2.2860 feet	27.4319 inches		
3/4 wave	3.4290 feet	41.1479 inches		*
1 wave	4.5720 feet	54.8638 inches		
1 1/4 wave	5.7150 feet	68.5798 inches		*
1 1/2 wave	6.8580 feet	82.2957 inches		
1 3/4 wave	8.0010 feet	96.0117 inches		*
2 wave	9.1440 feet	109.7276 inches		
2 1/4 wave	10.2870 feet	123.4436 inches		*

2 1/2 wave	11.4300 feet	137.1595 inches	
2 3/4 wave	12.5730 feet	150.8755 inches	*
3 wave	13.7160 feet	164.5914 inches	

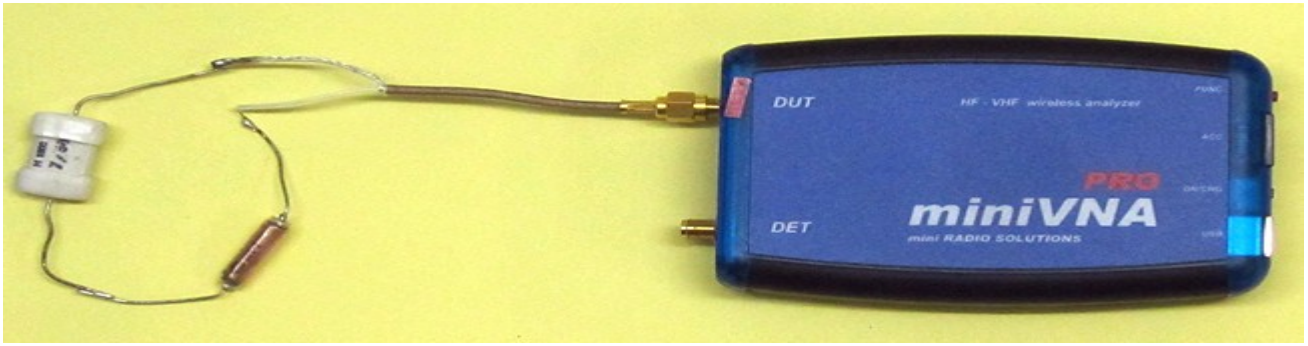
W8HDU

* = Optimum value



Find the value of a capacitor or an inductor with the miniVNA

How to find the value of a capacitor, an inductor or the resonance frequency of a serial L/C circuit with the miniVNA using the vna/J software from DL2SBA. – **Setup:** Connect the capacitor and the inductor to the miniVNApro 'DUT' SMA port as shown on the photo. The vna/J software is running in 'reflection' mode. For this test a 47 pF capacitor (C) and a 22 uH inductor (L) have been used. In theory the resonance frequency of this L/C circuit should be 4.949 MHz.

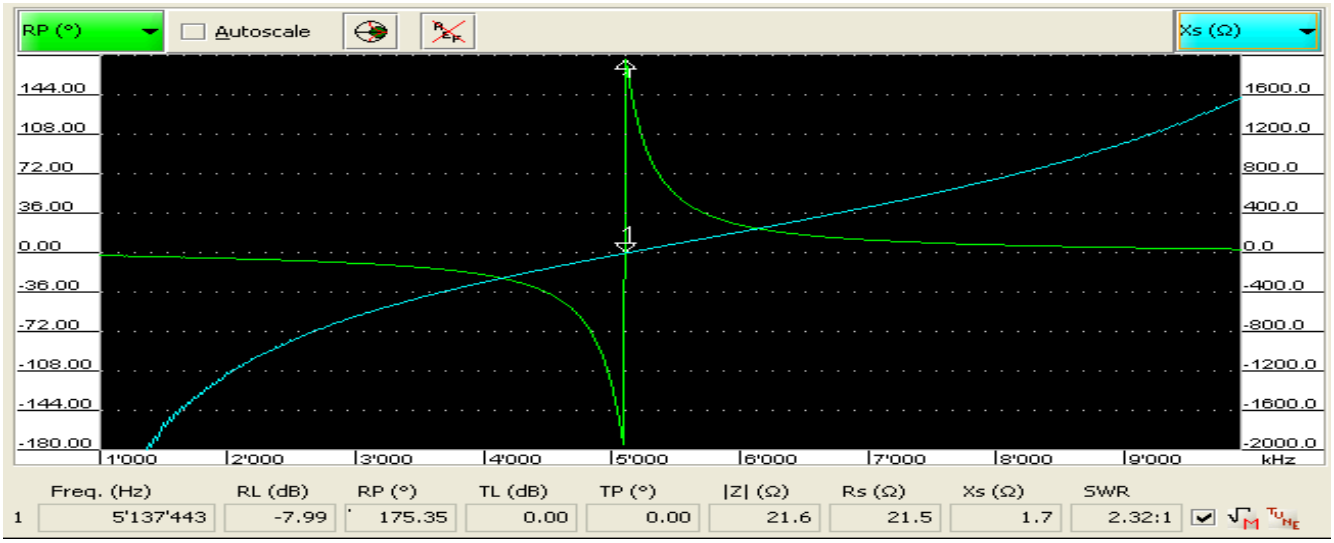


Find the resonance frequency of the L/C circuit – You can download the EXCEL sheet and use it as below.

	A	B	C	D
1		Find the resonance frequency (F)		
2				
3		Enter capacitor value in pF	47	
4				
5		Enter inductor value in uH	22	
6				
7		The frequency value is:	4.949	MHz
8				

Frequency = | Inductor = | Capacitor =

Or run the vna/J software in 'reflection' mode. You should get something like the graph below. The resonance frequency is where 'XS' equal to zero and where 'RP' is equal to +180 or -180 degrees. In this case the resonance frequency is 5'137 MHz because the inductor and the capacitor used for this test are not very precise, probably +- 10%

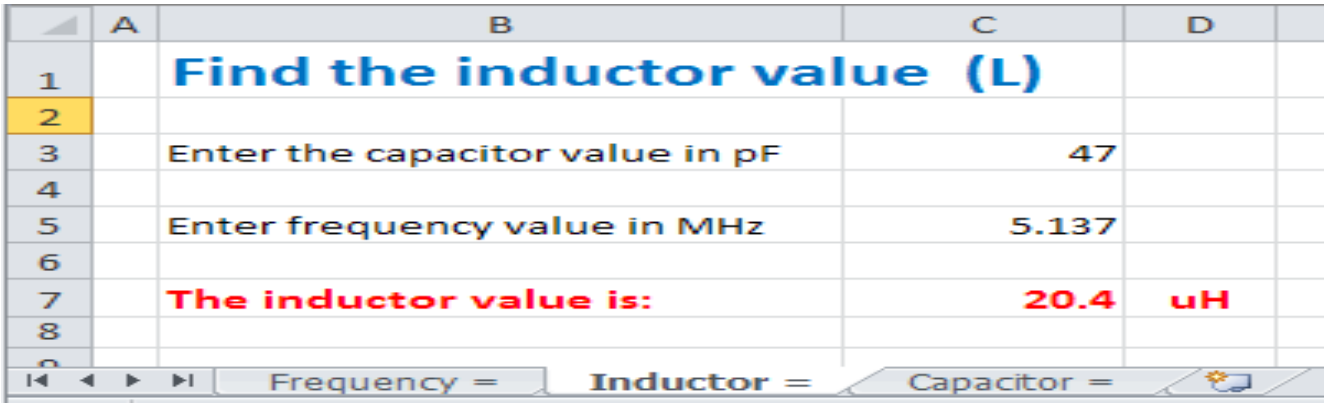


Find the value of an unknown capacitor (C) – The value of the inductor is known (22 uH) and the value of the resonance frequency taken from the vna/J chart is also known (5.137 MHz). Fill the Excel sheet with those values, then you will get the capacitor value.

	A	B	C	D
1		Find the capacitor value (C)		
2				
3		Enter inductor value in uH	22	
4				
5		Enter frequency value in MHz	5.137	
6				
7		The capacitor value is:	43.6	pF
8				

Frequency = | Inductor = | Capacitor =

Find the value of an unknown inductor (L) – The value of the capacitor is known (47 pF) and the value of the resonance frequency taken from the vna/J chart is also known (5.137 MHz). Fill the Excel sheet with those values, then you will get the inductor value.



This method is not very accurate, but it can give you an approximate value of the unknown element. Is much better if you can use a capacitor or inductor meter.

GARS Officers: (Board of Directors)

President ……. Michael A. Ellithorp, KF6OBI
Vice President ……. Bob Wirth, KC6UIS
Secretary …….. Jeramie Finch, W6LAD
Treasurer …….. Phil Zabell, KI6SMN
Past President ……
Board …….. Ryan Elliott, AG6VA
Board …….. Mike "Smitty" Smith, WB1G
Training …….. Russel Doughty, KE6PMT
Publications …….. Vacant
Webmaster / Social Media — Mike "Smitty" Smith, WB1G
Radio Officer …….. Phil Zabell, KI6SMN
Emcomm Officer ……. Vacant

Board Meeting, 2nd Wednesday of each month, meetings starting at 6:30 PM via Google Meets
General Membership Meeting, 2nd Friday of each month, meetings starting at 7:00 PM

GARS Meeting locations: Main site is the Lutheran Fellowship Hall, 565 Main Street, Artois CA, our alternate meeting site is the Willows Seventh-Day Adventist Church, 543 1st Avenue, Willows, CA.

GARS Net: Mondays, 8:00 PM Primary: 147.105 (N6YCK) (+) 110.9 PL; Secondary: 145.170 (AF6OA) (-) 110.9 PL

GEARS Club Net: Tuesday, 7:30 PM 146.850 MHz-PL 110.9

Sacramento Valley Traffic Net: Nightly 9:00 PM 146.850 MHz-PL 110.9

ARES Nets:
Butte Mondays 20:00 146.850 MHz-PL 110.9
Yuba Sutter Thursdays 19:00 146.085+MHz PL 127.3

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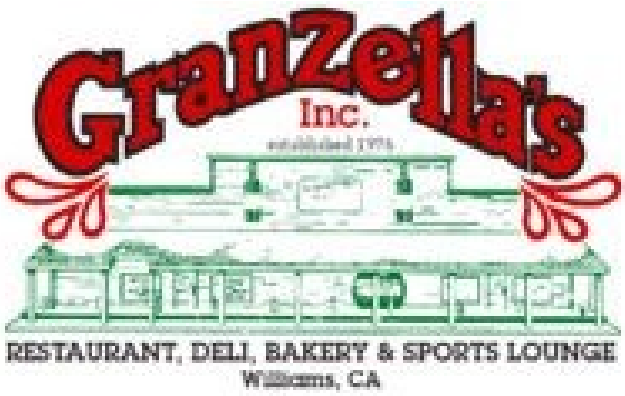
Editor ……..…….. Michael A. Ellithorp, KF6OBI **Distribution—via email—monthly**



This year, the Glenn Amateur Radio Society will be getting together for a holiday party on December 13th @ 6:30 PM at Granzella's in Williams. In order to plan effectively and reserve space, we'd love to know if you and your guest(s) plan to join us? Please go to the GARS website athttps://www.garshamradio.org/ to RSVP if you have not already done so. On the Home page of the website is a link to a map to Grandzella's.