The Modulator

Newsletter of the Newport County Radio Club, August 2017

JOTA

JOTA—Jamboree on the Air—seems comfortably in the future, October 20-22, but clearly preparations start sooner.

Each year that NCRC has hosted JOTA, it has become more refined with more scout troops participating. Along with HF, VHF, and satellite stations for on-air contacts, we've assisted scouts in earning the Radio Merit Badge.

Streamlining the Merit Badge

In the past, we've tried to cover the merit badge on-site during the weekend, but there is simply not enough time. This year we'll start the merit badge before scouts arrive and set up cafeteria-style desks under the pavilion so that scouts can move from desk to desk to complete each requirement.

Volunteers are needed Saturday morning for these desks. Sound like worthwhile fun? Contact:

editor@w1sye.org

Winter Field Day

The First Pancake

Last year Paul, N1PSX, lead his crew to a very impressive second place showing in our first Winter Field Day. They made 766 contacts with a multiplier of 16, plus 3000 additional points for operating outside and without grid power. That set a high bar—could we do as well next year?

Typical station set up

Setting up again at The Glen in Portsmouth, the team settled down for anything but a long winter's nap.

The Glen in Portsmouth

When the dust had settled, the ops felt that they had done well. What they couldn't know until much later is how *well* they had done! W1SYE finished <u>first</u> with 55,356 points, more than double the scores of both the second place outdoor station and the second place home station!

Working the ether

A Growing Problem

As first place finisher in Winter Field Day and consistent top finisher in spring Field Day, "that dink club from Rhode Island" has become a presence to be reckoned with. Can we keep up the pace? If you've not been radio-active, come on down, the water's nice.

Why are these hams smiling?

Thanks all around

Paul thanks all of the operators and volunteers who worked to make Winter Field Day such a success. W1SYE thanks Paul for leading this effort and making all of us proud.

Call for Tinkerers

Bob day, AA1LG, is closing his HF station and has donated all sorts of radio and general electronics odds and ends to NCRC. All of this will be placed on tables at the next monthly meeting for your inspection with the hope that much will find a good new home. The only item that will be offered for a price is an antenna rotator complete with controller and cable. Anyone who works with kids, makers, tinkerers, or just likes stuff will find this a great opportunity.

Anyone who has similar stuff that your significant other has been suggesting needs to leave is invited to join the tables. If you want a modest sum for anything, tag your item beforehand.

Speaking of Meetings

The next meeting date falls on Governor's Day, and is their custom, KVH will be closed. Therefore the August meeting will be held on Tuesday, August 15th at the usual 19:00 time.

New Technician Class

Bob Beatty, WB4SON, announces that there will be a new Tech class at St. Lucy's Church in Middletown starting at 17:30 October 5th. Each of the six-session classes will run until 20:00. The FCC exam will be given as a seventh class on November 16th. Class fee is $10, exam fee is $15. For more information see the News tab at:

www.w1sye.org

Field Day

Did I Get Two Page Ones?

Seems like a printing error, but no, this is Field Day, the spring event. Even so, there's more than a little déjà vu in this story.

Another Great Operation

Event leader, John King, WA1ABI, led a multi-faceted NCRC and Sakonnet 49'ers team to yet another top o' the heap operating event.

Final words from John, WA1ABI

Safety is a huge part of setting up our antenna farm. As anyone who has seen our Field Day in operation knows, it's big and complicated.

Another tower goes up

The completed antenna array

Although primarily an operating event, NCRC takes advantage of the early summer weather to welcome families to The Glen. Under the leadership of Fay and Ed Gosling, W1NQH, The family picnic is always a grand time with excellent food.

Fay and Ed Gosling, W1NQH

Families under the pavilion

How Did We Do?

Although the final standings have not yet been published, here is are our results as reported to ARRL:

- CW - 2020 points
- SSB - 1360 points
- GOTA - 500 points (524 earned, but capped at 500)
- QSO total - 5,900 points
- 17 bonuses - 2560 points

Final Score = QSO total • 2x power multiplier + bonus points = **14,360 points**

Many thanks to all from John, WA1ABI, for this fine showing!

Island Activators and US Islands

Off to the Elizabeth Islands

Here in southern New England we are fortunate to have many islands close to the mainland. All of the islands from New Jersey to Cape Cod are the result of retreating glacial action and so have gentle shores. The Elizabeth Island chain is actually a terminal moraine —the detritus pushed along at the end of a glacier. Starting with Cuttyhunk, the Elizabeths run northeast to Woods Hole and offer wonderful cruising grounds for anyone with even a modest boat.

Cuttyhunk Pond (Harbor)

The NCRC Island activators are well familiar with the Elizabeths and so it was natural that sooner or later we'd see if there were any yet to be activated. Turned out that except for Cuttyhunk, none had been activated under the US Islands Awards Program. We left Narragansett Bay on a five-day activation voyage in two boats.

Goblin and Barbara E

Penikese—MA060S

Penikese was our first stop. A horseshoe-shaped island, it was formerly a leper colony and now is a wilderness experience for bad boys. The weather was closing in and we were very glad to make more than our minimum required contacts before it broke.

Visibility about thirty yards

Nashawena—MA017S

The weather cleared overnight so we sailed through Canapitsit Channel and around to Quick's Hole on the east side of Nashawena. All was going well until some very big bulls with long gnarly horns appeared on the beach.

What're you looking at?

More trouble was yet to come, but we'll save that tale for the August meeting. Again we were pleased to more than meet our requirement.

Naushon—MA006S

Our last island was the biggest of the Elizabeths, Naushon. Except for Cuttyhunk, the Elizabeths are privately held by the Forbes Family Trust. Naushon is effectively the headquarters of all island operations. The trust welcomes visitors to Tarpaulin Cove near the center of the island and that is where we set up our station.

Hustler 4-BTV at water's edge

Five Days, Three Islands

We were fortunate to have Barbara E as a support vessel. Warm, dry, and cozy, we were not wanting for creature comforts. We had hoped to qualify three islands and we did. But after three days of hamming, it was time to head for home.

Life aboard Barbara E

East Island

East Island lies at the mouth of Sakonnet River, and is the most easterly island of Narragansett Bay. The water surrounding East Island is special because unlike the other bay entrances, very little bay water mixes with Rhode Island Sound water. Therefore

Island Activators and US Islands

the water is cold, clear, and dark blue. The marine life is different also. Green Turtles, Ocean Sunfish (Mola mola), and Gulf Stream spin-offs are seen occasionally.

We had been planning a qualification of East Island for some time, but had not been able to get shedules and weather to line up until a few weeks after the Elizabeth Islands run. Now we were good to go.

There is no beach on this rocky outcrop, so we approached in Goblin and Turmoil, the rigid inflatibles captained by Pete, W1LAB, and John, K1JSM respectively. Landing equipment required delicate ferrying with a rubber dinghy.

Ferry captains Willy and Marshall

We had our station up and on air in short order and immediately began logging contacts.

Note the rackline under the tents

Biting Flies

We landed on the protected north side, but even there the only reasonably flat area was right at the rackline. Unfortunately, that was also the home to sneaky biting flies. One-handed smacking is hard when the pile-ups are running fast.

Which Call to Use?

NCRC has three calls now, the original W1SYE, W1AAD, and the new NE1RI. THe appeal of the new call is great:

Anyone Rhode Island?

But at this point, our activations have generated a host of regular friends who check in with us as W1SYE. Dave Thorne, VE3LDT/VA3LDT from Ontario was one of our first East Island contacts and has been with us on virtually all of our activations. Close on his call was Jim Elliot, KA3UNQ, another regular friend. We call him *Lighthouse Jim* because working lighthouses is also part of Jim's hamming. Clearly staying with the tried and true W1SYE is best.

Coming Back Around

They say that Amateur Radio is a close-knit group and here is an example of that: Jim, KA3UNQ, was one of the first ops to qualify Narragansett Bay Islands. You'll see his call on the US Islands Rhode Island page. Now Jim is about to become a member of NCRC!

Equipment

We were very pleased with the effectiveness of our Hustler 4-BTV antenna. It's simple, rugged and easy to set up. We've found that we can affect a near perfect ground plane by setting the base near the tideline and running a gound into the water.

Originally we used a section of copper baseboard heater clamped to the ground cable. Although that worked well, the aluminum fins were like little knives when handled. This time we tried four copper plates and that gave us all the contacts that we could handle.

Two years ago, Pete, W1LAB, promulgated *Lawson's 20-Pound Law*—nothing heavier than 20 pounds! Ever since we've used $LiFePO_4$ batteries for power. Energy dense, they are light and small enough to fit into a plastic ammo case. They too have worked flawlessly for our activations.

Pete Lawson, W1LAB

The only glitch was that the club's Kenwood 570D transceiver developed some kind of belly-ache. It may have been due to sea water in the PL259 connector at the antenna, but further testing will be required to confirm that.

Our next adventure will be on a Sunday to allow members who work Saturdays to join us in the radio fun. Come join us.

The Parallel Series—Part 3

Part Three of the on-going series by NCRC President, Paul Fredette, K1YBE.

From Zero Frequency to Infinitely High Frequency

Continuing with the analysis of the output filter of the Pixie radio, we need to move from resistance to impedance. Impedance allows us to look at what happens at different frequencies. As Hams, we often speak of HF, VHF, UHF and SHF, but I want to add two more to the list:

- ZF—Zero Frequency
- IHF—Infinitely High Frequency

ZF is simply direct current and together with IHF, both are very useful circuit analysis tools.

In part 2, we introduced the voltage divider with resistances, but let's see what happens when inductors and capacitors are used.

The voltage divider is a simple circuit with a power source and two components. We'll use the following three figures. Figure 1 could represent any components.

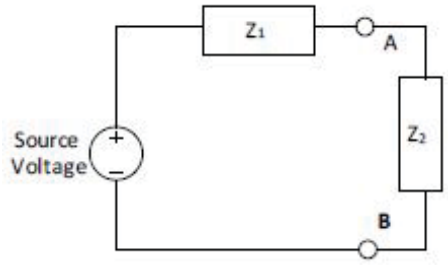

Figure 1

Figures 2 and 3 each have one inductor and one capacitor, but you can see that the two components are in opposite positions.

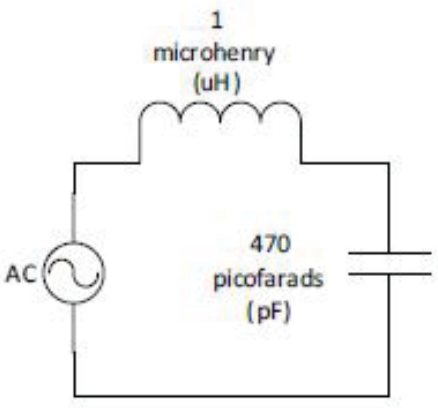

Figure 2, Inductor on top

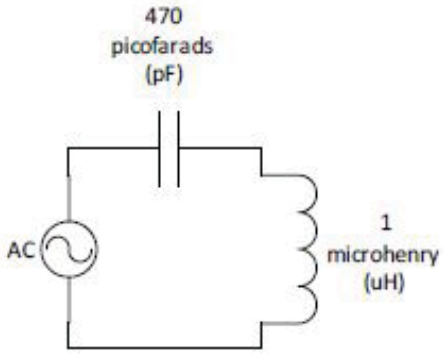

Figure 3, Capacitor on top

We see that the capacitor and inductor are in series in both Figures 2 an 3. Using our knowledge of series and parallel circuits from Part 1, we know that we can find the combined impedance of both components by simply adding their individual impedances. This will allow us to compute the current in the circuit using Ohm's law:

$$E = IR$$

Using impedance, becomes

$$E = IZ \quad \text{-or-} \quad I = E/Z$$

However, with Impedances, this has to be done with vectors.

Vectors are just numbers with length and direction and we can illustrate them as shown in Figure 4.

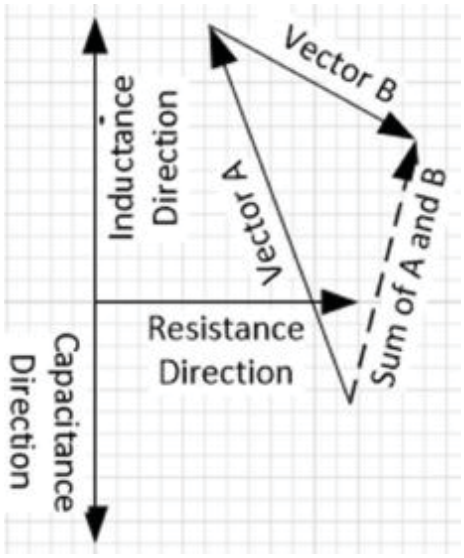

Figure 4

If you make a path from one vector to another, this is vector addition. Figure 4 shows the sum of Vector A added to Vector B with a dashed line.

In figure 4, you can see that inductance points up, capacitance points down, and resistance points at right angles to both. We use simple numbers for values, but remember that they represent impedances.

Because the impedance of inductors and capacitors point in opposite directions, summing them requires that you simply subtract their lengths.

Before you get too comfortable, there is another thing though; component impedance is dependent on frequency—impedance changes with frequency and so therefore does the length of the vector. We need to include frequency in our analysis. Fortunately this is straight-forward.

The Parallel Series—Part 3

Here is the correction that brings frequency into our calculation:

(component value) • 62832 • *f*

Component value is just what is says, the value printed on the device. Note that for capacitors and inductors, you must convert that value to Farads and Henrys respectively, and that usually results in a number preceded by a bunch of zeros. The symbol *f* is the frequency, *in kilohertz,* at which we are interested. The result will be in Ohms for inductors and in Siemens for capacitors.

Siemens is the reciprocal of Ohms, so to find the impedance of a capacitor in Ohms, we can use this version of the above calculation:

$$\frac{1}{(\text{component value}) \cdot 62832 \cdot f}$$

Here is Figure 5, the Super Pixie output filter:

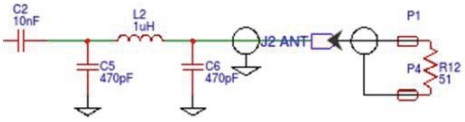

Figure 5

Here are the relevant values:

- C2 is 10 nanofarads or 0.00000001 Farads
- L2 is 1 microhenry or 0.000000000001 Henrys
- C5 and C6 are 470 picofarads or 0.00000000047 Farads.

To the right is a table that shows the vector lengths or reactance of these components at different frequencies for the Super Pixie filter. The impedance is indicated by 2 numbers in brackets: Z=[length,direction].

Voltages

Voltage sources are vectors too. So if the voltage vector length (called peak or magnitude) of the source is [10V, 0] with 0 meaning in the resistance direction, and the frequency is 7 Mhz, the current (I) in Figures 2 and 3 (see page 4) would be:

$$I = \frac{E}{Z} = \frac{(10v,0)}{(48.4\Omega,-90) + (44\Omega,+90} = \frac{(10v,0)}{4.4v,-90)} = 2.28 \text{ Amperes, } +90$$

Note that the current is pointing up and is the same for Figures 2 and 3, but the voltage between A and B will be different. When dividing vectors, the angle from the top and bottom are subtracted , (0- (-90) = +90) and the top length is divided by the bottom length.

If you're familiar with the term phase in AC circuits, this means that the current is leading the voltage by 90 degrees. More on that topic later as it's not essential at this point.

If you were wondering what happens with resistors, Figure 6 illustrates an inductor in series with a resistor. As you have seen, impedances in series add, and the vector sum is shown.

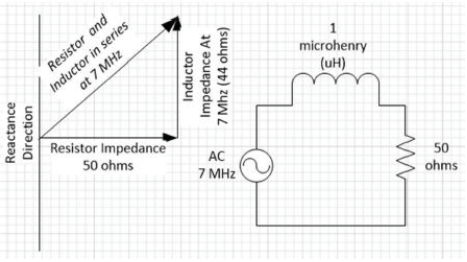

Figure 6

Now for the easy part – Let's see what happens at ZF and IHF. At ZF, or direct current, capacitors act as open circuits and inductors act as short circuits. Can you figure the current in Figures 2 and 3 for a DC source?

Well, it's zero because at least one of the components in series (the capacitor) is an open circuit.

Now try IHF with inductors as open circuits and capacitors as short circuits. If you get zero current you're getting good at calculating nothingness.

Try this with the Pixie output filter above. How much ZF and IHF current flows from the output amplifier driving C2 to the antenna?

If you replace C2 with a wire,

			C5&C6	L2	C2
	2000pi =	6283.18	470 pf	1 uH	10000 pf
Band	Frequency in KHz	6283xFrequency in KHz	Impedance = [Reactance,-90°]	Impedance = [Reactance, +90°]	Impedance = [Reactance,-90°]
ZF	0	0	Open Circuit	Short Circuit	Open Cicuit
HF	700	4,398,230	483.8 ohms	4 ohms	22.7 ohms
HF	**7,000**	43,982,297	**48.4 ohms**	**44 ohms**	2.3 ohms
HF	14,000	87,964,594	24.2 ohms	88 ohms	1.1 ohms
HF	21,000	131,946,891	16.1 ohms	132 ohms	0.8 ohms
VHF	70,000	439,822,972	4.8 ohms	440 ohms	0.2 ohms
UHF	700,000	4,398,229,715	0.5 ohms	4,398 ohms	0.0 ohms
IHF	Infinity	Infinity	Short Circuit	Open Circuit	Short Circuit

The Parallel Series—Part 3

does ZF current make it to the antenna? How about IHF? The answer for ZF and IHF are different.

So let's summarize

If we have inductors and capacitors in a circuit and we have AC signals that alternate at some single frequency, we can compute an impedance vector for all the components in the circuit. Then we can use our analysis rules to get answers.

We have to be careful to add things using vectors and I hope to show you some simple to use programs for the harder problems in later episodes.

If there are multiple frequencies coming from a source, you need to do the analysis for each one and combine the results. This is where computers come in really handy.