P.O. Box 6421 Auburn, CA 95604 **November 2015** http://w6ek.org info@w6ek.org

At The Key of SFARC:

PRESIDENT
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DIRECTORS
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Robert Bell, W6RBL
Jim Jupin, WA8MPA

FIELD DAY CHAIRMAN
Mark Graybill, W8BIT

REPORTERS
Satellites: Greg, KO6TH
History: Gary, KQ6RT
Misc Radio: Fred, K6DGW
Sunshine: Richard, WA6RWS

WEBMASTER:
Birton Gilbert, N6UG

REPEATERS
145.430 (-0.6 MHz/PL 162.2)
440.575 (+5.0 MHz/PL 162.2)
223.860 (-1.6 MHz/PL 110.9)

CLUB NET
Thursdays, 7:30PM, W6EK/R
145.430

CLUB MEETINGS
Second Friday of the month,
7:30PM at the Auburn City Hall,
1215 Lincoln Way, Auburn CA

CLUB BREAKFAST
Last Sat of the month at Mel's Diner
1730 Grass Valley Hwy, Auburn 7:30AM

NET CONTROL OPS
Dave Jenkins, WB6RBE
Norm Medland, W6AFR
Bob Brodovsky, K6UDA
Al Martin, NI2U

NEWSLETTER EDITOR
Barbara Anderson, W6EVA
anderson51@wavecable.com

ARRL PIO:
Carl A Schultz, WF6J

VOLUNTEER EXAMINER
Al Martin, NI2U

Inside this issue:

Calendar of Events

November 11th: Veterans Day

November 13th: Club Meeting

November 26th: Thanksgiving

November 28th: Club Breakfast

We encourage members to receive Sierra Signals via email to save the Club the cost of reproduction and mailing

From the Mic

By Tyghe Richardson – KD6MLH, President

It's election time

November is the election and time for the new officers and board to be voted on. WU6X is running the show this year, and I know we have an awesome selection of hams running for club leadership. I still encourage anyone to throw their hat into the ring. This time 2 years ago I was in Billings, MT, when K6UDA, the president at that time, called and asked if I would run for office. I was a little hesitant at that time, but I said yes. I have had a lot of fun serving as club president. After 2 years as president I can honestly say every member should at some point be involved in the leadership of this club. So if you were thinking about running for an office please throw your name in the ring. See you at the polls!!

Picnic recalled

If you missed the picnic you missed all the fun! This year the picnic was a little late but the weather was nice and the location was one of the best. Applegate Park had very little traffic and we basically had the place all to ourselves. As you see in the photos, we had a QLF contest and even hams that never tried code before attempted to win the prize. We also had the 20 question quiz with a prize, and yes we almost had a perfect score. If you missed this year I hope to see you next year at the picnic.

SOLD the white elephant sale

Boy we had some fun at the October meeting! As most of you know the October meeting is the White Elephant sale or auction in this case. First, a big thanks to everyone that bought, bid, or donated something for the auction. But wait there's more….. that's right, an even bigger thanks to anyone that kept bidding on some of the UDA package deals that we sold!! **This year we had a lot of help and I think they deserve a special thank you; Bob K6UDA, Bob N6EMS, Jason KK6RXT, Richard WA6RWS, Dennis WU6X, Jim WA8MPA, George KG6LSB.** We had fun and raised over $1000.00 for the club. If you missed this year don't worry because next October is another opportunity to participate in this event. I know I will be there I am still looking for a White Elephant!

See you next year!

<u>Reminder:</u>

The Christmas party is just around the corner. December will be here shortly so we need to know what you are bringing and who will be there. Please sign up at the November meeting or contact Wendy KK6HSK directly. (12-12-15)

Photos from our club picnic on Saturday October 3rd, 2015

Bob-K6UDA, Bruce-K6BAA, Birton-N6UG and I (Dennis-WU6X) attended Pacificon 2015 again this year on Saturday. Since the "swap" is held now on Sunday only, we missed that. But, remembering last year's swap ... we probably didn't miss much. This year's venue had changed to the Marriott in San Ramon. Easier to get to (no Bay Bridge crossing involved) and the restaurant was better, but the break-out rooms were far too small for the attendance and we were sitting on the floor or standing in some sessions.

There were two rooms of vendors ... ham equipment and peripherals in one and vendors selling "other stuff" in the other, like coax, LED bulbs, etc. Yaesu, Elecraft, ICOM and Flex had nice booths with new products to show, but Kenwood was missing again this year. Antenna vendors and other cool stuff were also present, such as Lido mounts, Heil Sound and Bob Heil's competition, Radiosport headsets from Arlan Communications. I believe our little contingent walked away with a couple new Radiosport headsets, in my opinion, nicer than the Heil equivalent.

Lots of folks in the hallways too, setup and pushing products or trying to interest you in participating in something or other. The USS Hornet ham club (the aircraft carrier museum and radio station in Alameda) was there with good information, handouts and offers to come aboard and operate.

K6UDA was the big spender this trip having figured out that all the mods he wanted to do to his K3 would cost him only $400 less than a brand new K3S ... so, he ordered the new one. Anyone looking for a really fine K3 with all the good stuff installed including the general coverage receiver board should contact Bob for a quick sale. By the time the newsletter is published it may already be too late!

I bought a half dozen LEDs for the RV ... always a good price at these shows. I'm swapping the current 1156 bulbs, which draw somewhere north of 1 amp, with new LED bulbs having the same candle power at about 60 ma. 1156's are rated at about 1,200 hours while the LED's are rated at 14,000 hours. Yes, I'll not replace them again in my lifetime.

W1AW/6 was setup outside with (4) transmitters all connected and using the same Hexbeam antenna ... yes, all at the same time with no interference. Of course, I spotted about $5,000 worth of filters and band pass units ... wouldn't it be nice for Field Day operations? Wow! We had out pictures taken in front of the W1AW setup but actually didn't operate this year as we were headed out after a long but very fun day.

So, that's about it from me on Pacificon ... I would recommend you go next year if you haven't been ... You'll meet old friends and make a few new ones. Vendors are friendly ... I talked at length with Eric from Elecraft ... oh wait, maybe he was trying to sell me something? Yeah, I think that was it ... Bob succumbed.

73,
Dennis - WU6X

MISCELLANEOUS RADIO

A Short Digression into Infinities

Miscellaneous Radio has been going on for some time now, partially because I promised that if someone would take over the job of Editor … Thank you Matt and Barbara!! … I'd supply some content ... available content is a huge problem for editors of ham newsletters, "Everyone wants to read it, no one wants to write it."

Over the years, both as author of MR, and several tours as SFARC News and Sierra Signals Editor, I've used the term "countable infinity" as if everyone knew what it meant. It turns out, based on the number of questions I've gotten, it is not as universally understood a term as I had thought, and while it's only peripherally connected to radio, given the number of questions I've received, it probably deserves an explanation before MR fades into history. We'll start with some discussion of infinities, but we'll get back to electronics in the second act.

The idea of "an infinite number of things" is a bit mind boggling so lets take it one step at a time. We'll start with the set of positive integers … 1, 2, 3, – – . The next number in the sequence is formed by adding 1 to the last number in the sequence, and you can obviously do this forever, there's no end to the set. We use the positive integers to count things and they're sometimes referred to as the "counting set." The set is "closed on addition" which just means that if I add any two or more of them, I'll get another positive integer … every time.[1]

The set of positive integers is said to be countably infinite because I can match each one up with the counting set [obviously, they're the same set]. It will take forever, but I know that if I had forever, I could do it. Now, consider the set of positive rational numbers. Its members are all quotients of the positive integers. 2/3 is a rational number, as is 23/29. The positive integers themselves are obviously rational numbers, just express them as the integer divided by 1. Note – they don't have to have exact decimal equivalents, 1/3 is rational but its decimal equivalent goes on forever. The set of rational numbers appears to be much larger than the set of positive integers. After all, for each possible numerator, I have a countable infinity of positive denominators, and there is a countable infinity of numerators for each one of those denominators as I line them up. This is where infinities become non-intuitive.

The set of rational numbers is countably infinite because I can match up each numerator with the counting set and I can match up each denominator the same way. As usual with infinite sets, it will take me forever to do this, but when forever is over, I will have counted every rational number. "But, you'll use up all the numbers in the counting set just to count the numerators," I hear from the back of the room. As I said, this is where infinities become non-intuitive. There are as many members of the counting set as I need. It never ends. So long as I can line up each member of a set with the members of the counting set, and in this case, it is obvious I could, given forever, it is a countably infinite set. Recall the Hamming Codes from the Misc Radio Coding series.[2] Each code is identified by (*n, k, 3*) where *n*, and *k* are positive integers. I can line up every possible *n* and *k* with the counting set. Thus, the set of (*n*, *k, 3*) Hamming codes is countably infinite.[3]

That's what "countably infinite" means. If that's all you cared about, you can quit now, but there's more.

Georg Ferdinand Ludwig Philipp Cantor, a currently dead mathematician from the later 19th century, delved into infinities and established the branch of mathematics called "set theory.". He was able to prove that a countably infinite set is the "smallest" of all infinite sets, and he gave it a symbol, $\aleph_0$ which is aleph, the first letter of the Hebrew alphabet, with a subscript of zero. I'd have put the subscript after the $\aleph$ except that I can't … Hebrew is a right-to-left language and when I try, Open Office [and Word] puts it "before". All countably infinite sets are of that "size," including the set of rational numbers.

So let's ask the question, "Are there any numbers that are not in the set of rational numbers. In other words, do numbers exist that cannot be expressed as the quotient of two positive integers? To answer it, it will help if we think of the positive rational numbers as points on a line that extends to infinity. Zero is at the left end, right in front of us, and the positive rational numbers extend to the right … forever. While that set is closed on addition, subtraction poses a problem. 4-3=1, so far so good, but 3-4=?, a number that is not in our set of positive integers. To handle it, we will invent the negative integers which extend from zero to the left on our line. And of course, we have negative rational numbers too in between the negative integers.

Now, and this takes a little thinking, we can create positive and negative rational numbers as close as we want to each other, right?. Consider zero … "What is the first rational number right next to zero?" That is, what is the first rational

1 It is also closed on multiplication since multiplying two numbers is just repeated addition

2 That many readers probably thought would never end ☺

3 While the Hamming codes form a countably infinite set, those with $n > 32$ or so have long blocks, the codes will only correct one error in each block, and are thus not terribly useful. They do exist, however.

number when we move off zero? ½ is half way between zero and one, but ¼ is closer to zero, and 1/8 is even closer. Just make the denominator larger and larger and we can get a rational number as close to zero as we want. So suppose that we mark our line with every rational number … there are a countably infinite number of them, it will take forever, but when forever is over, we'll have them all marked. Georg then asked the $64K question – "Are there any numbers in between all those countably infinite rational numbers?"

As you might suspect, the answer is "Yes." They're called the irrational numbers [not real creative naming here ☺] and he discovered that their number was larger than $\aleph_0$ sub zero. He gave the set of irrational numbers a cardinality of $\aleph_1$ sub one, a "bigger" infinity if you will. While that doesn't really make sense, you can think that if you counted them forever, you still wouldn't have counted all of them. OK, that doesn't make sense either, but it's true.

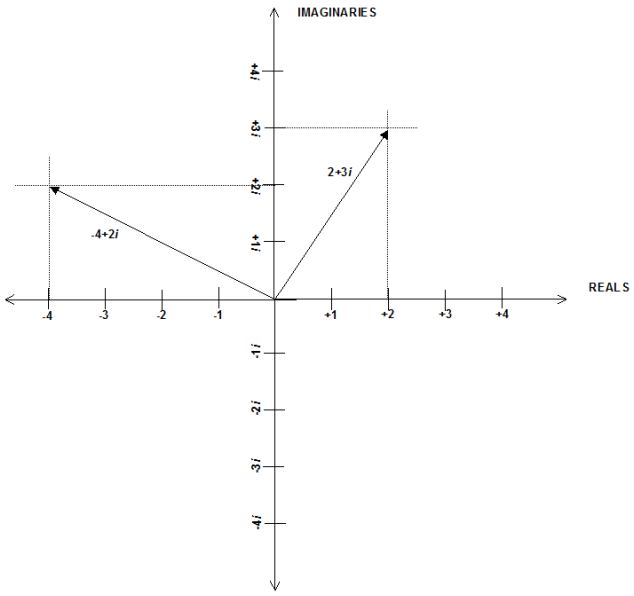
If you take all the positive and negative rational and irrational numbers together as a set, you have what we call "real numbers," and while infinity is infinity, the set of real numbers is a "larger infinity" than the set of positive and negative rational numbers.

The square root of 2 [1.414...] is an example of an irrational, it can't be represented as the quotient of two integers. Π [3.14159...] is another, as is **e**, the base of natural logarithms, roughly 2.718.... In fact, if you pick any two real numbers on our line, there are $\aleph_1$ sub 1 numbers in between them. It doesn't matter how close the numbers you pick are, there is still an uncountable infinity of numbers in between them, numbers that cannot be represented as the quotient of two integers and you cannot match them up to the counting set.

So does our real number line represent <u>all</u> the possible numbers? Well, consider the question, "What real number, when multiplied by itself, equals a negative number?" Alas, the answer is, "None of them." The question is equivalent to the question, "What is the square root of a negative real number." If we try and compute the square root of -1 [or any negative real number], we find that we have no numbers on our number line to represent it, even though there are an uncountable infinity of real numbers on that line. Enter a new line... and electronics.

If I place a DC voltage of **E** volts [a real number] across a resistor of **R** ohms [also a real number], a current of **I** amperes [yet another real number] will flow, according to Ohms Law – **I = E/R**. **E, R,** and **I** are all numbers on our real number line. This is also true for AC -- <u>for a resistor</u>.

Now, a characteristic of perfect inductors and capacitors is that if you place an AC voltage across them, the current through them will be 90 degrees out of phase with the applied voltage.[4] Perfect capacitors and inductors have no DC resistance or losses so **R** = 0, **E/R** is undefined, and we can't compute the current using real numbers. There is current flowing, but the number that represents the magnitude of that current isn't on our real number line.



Let's add a vertical number line that extends forever up and down and crosses our real number line at zero. It has the same $\aleph_1$ sub one [i.e. uncountable infinity] of numbers on it. Recall from all that coding drivel that if we have two orthogonal axes, moving around on one of them has no effect on the other. We named the horizontal number axis the "real" axis, the vertical axis is named the "imaginary" axis. The name choice is really unfortunate because, believe me, there is nothing imaginary about the AC current flowing through the inductor or capacitor, it's just 90º out of phase with the voltage but we're stuck with the name. The square root of -1 is on the imaginary axis, as is the square root of minus anything.

Now, real inductors have resistance and real capacitors have losses, both of which are resistances, so an AC voltage across either of them will cause a current whose value is partly on the real axis and partly on the unfortunately named imaginary axis. That is, there will be two components, and we denote the that current using the notation **A+B*i*** or **A-B*i*** … plus if the voltage is leading the current in phase [inductive], minus if it is trailing the current [capacitive]. The ***i*** simply alerts us that **B** is a number measured along the unfortunately named imaginary axis.

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4 The mnemonic is "ELI the ICE man." E leads I in L [inductance], I leads E in C [capacitance].

This is how mathematicians would write it and mathematics has been around a lot longer than knowledge of electricity, but it poses a problem for electrical engineers … they already used **I** and ***i*** as the symbols for current. Being a creative lot, they decided to use ***j*** to denote a value along the imaginary axis, and just for grins, decided to put it in front of **B** instead of behind. Consequently, they will write the value as **A ± *j*B.**

Mathematicians call this a complex number [as do electrical engineers, thankfully], and the diagram above is called the complex plane. They have worked out a complete algebra for them. You can add, subtract, multiply, divide, raise to a power, extract roots … anything you can do with real numbers you can do with complex numbers. This is really good for the electrical engineers because it lets them extend Ohms Law [among other things] to AC with capacitors and inductors in the circuit. They left **R** for DC resistance and coined a new term, "impedance" for AC resistance and gave it the symbol **Z,** remember **I** has already been used. **Z** is a complex number of course, and we write **Z** = **R ± *j*X** to denote that an impedance is made up of a resistance component **R** along the horizontal axis and a "reactance" component **X** along the vertical axis. $\mathbf{X_L}$ sometimes denotes an inductive reactance, $\mathbf{X_C}$ a capacitive reactance, although the sign also tells you which – plus is inductive, minus is capacitive.

I plotted two complex impedances in the diagram above. They look like vectors [they have a magnitude or length and a direction] and indeed, the algebra of complex numbers and vectors is essentially the same. The length of the **Z** vector [magnitude] is the familiar square root of ($\mathbf{R^2}$ + $\mathbf{X^2}$) and is just a real number, in ohms. If the imaginary part of the impedance [the ***j*X** or reactance part] is zero and you happen to be talking about antennas, it means that the antenna is resonant at your operating frequency. The **R** part is called the "radiation resistance" because it looks just like a resistor that dissipates your power, but if it's an antenna and not a dummy load, the power is radiated rather than converted into heat. If **R** happens to be the same as the characteristic impedance of your coax, the SWR on it is 1.0:1 and you are a happy ham.

Andrea and I both have Nevada drivers' licenses, we have Nevada tags on our two vehicles, we have registered to vote, and our old "farm" in Auburn has new owners [daughter and son-in-law]. We've decided this means we are now citizens of the Silver State and I'll close out Miscellaneous Radio next month.

73,

Fred K6DGW

Holly Dolkas, KE6ETT SK

Our dear Holly passed away recently, after a long fight with cancer. Her desire was for a small service, which we have honored, but we also want to give the many whom she touched, and who touched her life, an opportunity to celebrate her time on Earth.

We have set (*weather permitting*) Saturday, November 14th, 2015, as the date for a potluck get-together for Holly.

11:00 am - 2:00 pm at the Regional Park picnic area (corner of Dry Creek and Richardson Dr. near our house)

Please reply if you're able to come, and let us know what you might be bringing so we can help coordinate. Also, please spread the word to others who knew Holly; we can't possibly reach everyone directly.

Keep your fingers crossed for dry weather. If it's raining, we'll either relocate or reschedule.

Hope to see you all there,

Greg Doklas, KO6TH

BOARD OF DIRECTORS MEETING MINUTES
October 9, 2015

The SFARC Board meeting for October commenced at 1800 hours at the Sizzler restaurant in Auburn.

Roll Call: All officers and Directors were present with the exception of Director Robert-W6RBL. Also present were guests Al-NI2U, Andrew-N6REW, Earl-K6GPB, Jef-N5JEF, Jim-N6MED, Mark-W8BIT and Orion-AI6JB.

REPORTS and DISCUSSIONS

President's Report: Tyghe-KD6MLH had no points for discussion.

Vice President's Report: Bob-K6UDA began the discussion on club membership engagement activities and wanted to give the new incoming board members ideas to implement. Bob felt there was less member participation this last year and wanted ideas to gain more membership involvement to include new and older members. Bob suggested getting club meeting agenda-discussions and Tech-Ten presentations published before the meetings to attract interest. Burton-N6UG agreed that getting information on the meeting's activities could increase participation. He suggested more hands on activities such as demonstrating test and amateur radio equipment or introducing new hams to setting up their first station. Jim-N6MED suggested having off site activities such as field trips to tour facilities of interest. Tyghe suggested shorter business discussions at the beginning of the meetings so the Tech-Ten and presentations start earlier. Jef-N5JEF commented that Nevada Counties ham club starts with presentations and concludes with club business. He also suggested having General test preparation activities for members wanting to upgrade. Earl-K6GPB suggested shorter breaks. Bruce-K6BAA recommended getting a list of members willing to give presentations at club meetings and have a list of topics. Tyghe concluded the discussion, stating we need to market our club meetings.

Secretary's Report: Bruce-K6BAA had no points for discussion.

Treasurer's Report: Richard-WA6RWS reported net cash on hand at the beginning of September of $8534.52; deposits of $118.00, expenditures of $163.15 with an ending balance of $8489.37.

Mark-W8BIT advised the board he was unable to handle the Field Day Chairmanship and a replacement would be needed. Tyghe advised he would coordinate with Mark on his replacement.

Meeting adjourned at 1830. Submitted by Bruce-K6BAA, Club Secretary

GENERAL MEETING MINUTES

October 9, 2015

The SFARC General meeting for October commenced at 1930 hours at the Auburn City Hall Rose Room, President Tyghe-KD6MLH presiding. All Officers and Directors were present with the exception of Director Robert-W6RBL. Tyghe led approximately 45 members and guests in a Pledge of Allegiance to the flag. An introduction of Officers, members and guests followed.

The club meeting was then dedicated to the annual White Elephant sale.

We raised a total of $1,173,00!

Turkey Oreo Treat Recipe

Ingredients:

48 Oreo cookies (you'll need two 15-oz. packages)

24 Reese's Mini Peanut Butter Cups, refrigerated

24 Hershey's Whopper malted milk balls

120 pieces of candy corn

White frosting

Chocolate frosting

Black icing tube

Yellow icing tube

Red icing tube

Instructions:

Carefully pull apart the two halves of one Oreo and gently press 5 candy corn into the stuffing with the wider ends of the candy corn sticking out over the cookie. Spread some frosting onto the Oreo half and press the two halves together. Refrigerate to set.

Cut off a small rounded edge of a peanut butter cup (you want to do this so the flat edge can stand on top of the Oreo base). Use chocolate frosting to attach the flat bottom of the Reese's to the Oreo base and the Oreo with the candy corn to the Reese's.

Use a small amount of chocolate frosting to attach the Whopper to the Oreo with the candy corn.

Pipe small spheres of yellow icing onto the Whopper for eyes, and two small feet onto the Oreo base.

Pipe two dots of black icing onto the yellow eyes.

Finish with white frosting piped on the Whopper for a beak and red icing for the wattle.

SIERRA FOOTHILLS AMATEUR RADIO CLUB
P.O. Box 6421, Auburn, CA 95604

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2015 MEMBERSHIP APPLICATION

Name: _____ Call: _____ Class: ___ e-mail: _____

Address: _____ City: _____ State: _____ Zip: _____

Associate Name: _____ Call: _____ Class: ____ email: _____

Phone: _____ Cellphone: _____ Application is: (Circle) New Renewal

Dues / Donations:

Membership: yearly*	$22.00or 20x__	Name Badge:	$ 7.00	Yes	(special name)_____
Associate: yearly*	$ 7.00	Repeater Donation:	$_____		
Auto Patch Donation:	$_____	Newsletter Booster:	$_____		
Misc. Donation:	$_____	Christmas Donation:	$_____	ARRL member? (circle)	Yes No
		TOTAL:	**$**_____	**Please add $1 if paying via PayPal**	

*Prorated dues for NEW Members/Associates Only

July	$ 20 /6	October	$ 14/3 + following year	**New---New---New---**
August	$ 18/5	November	$ 12/2+ following year	**Multi-year DISCOUNT Membership**
September	$ 16/4	December	$ 10/1 + following year	****$20 per year for 2 or more years (new or renewal)**

OFFICE USE ONLY: DO NOT WRITE BELOW THIS LINE

Date: _____ Treasurer: _____ Secretary: _____ Roster: _____

Payment: _____ Check Number: _____ Cash: _____ PayPal:_____

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