Sierra Signals

P.O. Box 6421 Auburn, CA 95604 **September 2012** http://w6ek.org info@w6ek.org

At The Key of SFARC:

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Charles Baker, AE6LR
Gary Martinez, N6UWQ
Jim Griffith, KI6AZH

FIELD DAY CHAIRMAN
Al Martin, NI2U

REPORTERS
Satellites: Greg, KO6TH
History: Gary, KQ6RT
Misc Radio: Fred, K6DGW
Sunshine: Richard, WA6RWS
rkuepper@ymail.com

REPEATERS
145.430 (-0.6 MHz/PL 162.2)
440.575 (+5.0 MHz/PL 94.8)
223.860 (-1.6 MHz/PL 100.0)

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

CLUB MEETINGS
Second Friday of the month,
7:30PM at the Library, 350
Nevada St, Auburn CA

CLUB BREAKFAST
Last Sat of the month at Susie's Café
Cirby at Riverside, Roseville – 8:00 AM

NET CONTROL OPS
Dave Jenkins, WB6RBE
Gary Cunningham, KQ6RT
Norm Medland, W6AFR
Casey McPartland, W7IB

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WEBMASTER:
Carl A Schultz, WF6J

Inside this issue:

Happy Labor Day!

Relax and Enjoy

Calendar:

Sat 8 September: Lincoln Swap Meet

Fri 14 September: Regular Meeting

Sat 22 September: El Dorado County ARC Fox Hunt

Sat 29 September: Club Breakfast

12-14 October: ARRL National Convention – Santa Clara, CA

Sat 20 Oct: Cystic Fibrosis bike ride- Newcastle vicinity

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

President's Report

Bob -K6UDA k6uda@arrl.net

Wow. The summer is almost over and soon the holidays will be upon us. I'd like to take a quick look back over our summer before we sprint toward the future. This year we had an excellent Field Day. Lots of people showed up and participated and a great time was had by all. We scored big points and many of us learned a ton about portable radio setups.

This year, we scheduled our club picnic on the hottest day of the year and changed the venue to a backyard. **Al, NI2U** came up with a few fun activities with valuable prizes. With the typical SNAFUs and the 110 degree heat, the majority of the folks either bugged out early or went inside the house to escape the sun after lunch. Prizes will be awarded at the next meeting. Saturday breakfasts continue to be popular with our crowd but those pesky bikers keep the noise level of the room at maximum.

I'd like to take a moment to recognize our new VEC. **Dave, NO6NO** is a natural teacher and has done a great job at the VEC position. Our membership rolls have increased this year by about 20%; that's an incredible increase. So what now? Now that we've met one of the objectives we set out this year, how do we follow up on it? This is where we take the leap into the future. **Carl, WF6J** hits the nail on the head when he says we need to excite the youth about our hobby. I agree. We've made giant progress in getting younger folks interested in ham radio and our club.

We've learned from experience and research that few new hams fall into the old "experimenter" group. It may be that solid state computer control has frightened some of us away. The number of new ham licenses in the U.S. is at an all time high. If not for the pure love of talking on the radio, then what is driving all these new hams to study for a test and get their amateur radio license? This year, we started collecting data. So let's look at some of the data…

Out of 26 test questionnaires so far this year, this is what we've learned:
13 expressed a general interest in tinkering, love of radio, or general curiosity about ham radio.
4 got licenses to help them with emergency preparedness.
5 got their license as either a requirement or to assist in another volunteer activity such as SAR, Red Cross.
2 are using ham radio to help with remote 4X4 activities.
1 is interested in radio controlled models.
1 is using his license to further his hunting activities.
1 was interested in Military Communications

I know there is something we can offer all of these types. Even the "Red Cross, I'm on a mission" folks seem to get their tech tickets and disappear into the woodwork. The others are almost easy; we tap our members "in the know" about such activities and look for ways to market our club to those interests. Now it's time to get the new folks involved & I ask two questions:

Q1: To the long time members, I ask, "What can we as a group offer these new hams? How can we keep the spark alive and nurture it so the young ham wants to learn and to be an active part of our group? **Q2: To the new member or young ham** I ask, "Is there something we, as an organization, can offer that would help excite you about ham radio enough to get more involved in club activities? Would you like to share your new hobby with your other friends in whatever related activity you do?"

This is a homework assignment. Help me brainstorm the next logical progression to our new members. The goal here isn't just to get new members on the books, the goal is to retain members and have them active in the club. Please email me your suggestions and together we keep building this club and learning new ways to enjoy the sport of radio.

P.S. I figured out why the BMW club always seems to have more members at Suzie's than we do. It's much easier to get a motorcycle license than it is to get a ham license.

Photos from the picnic at Bob's house

Saturday August 11, 2012

BOARD OF DIRECTORS MEETING MINUTES

August 10, 2012

The SFARC Board meeting for August commenced at 1800 hours at Elm Avenue Round Table Pizza in Auburn.

Officers present: President Bob Brodovsky-K6UDA; Vice President Al Martin-NI2U; Secretary Dennis Gregory-WU6X and Treasurer Richard Kuepper-WA6RWS, and Director Chuck Baker-AE6LR. Directors Gary Martinez-N6UWQ and Jim Griffith-KI6AZH were absent. VE Examiner Dave-NO6NO dropped-in briefly to present a promotional idea to the Board (see VE's Report).

REPORTS

President's Report: Bob discussed readiness and planning for the upcoming Club Picnic, which led to the VP's report on that subject.

VP's Report: Planned event "ideas" were discussed including a DSTAR contest, QRP CW on 40m and long-distance contact contest, with a 2m halo antenna award for the farthest contact. A test/quiz with questions from the Tech and General License pools plus a "mystery question" is also planned, the prize to be an atomic clock. Al also reviewed the Tech-Ten and presentation subjects planned for the General Meeting.

Secretary's Report: Dennis reported securing an Auburn PO Box for the Club, which has been in Newcastle. The Newcastle address has caused confusion over the years by people searching for our Club in "Auburn", and the Board had been discussing moving it to Auburn for some time. Dennis took the initiative and secured a new box; transition will occur through August, with full use beginning on September 1st. The Club will seek a 3-month refund from Newcastle for the remainder of the contract; new **PO Box** is **6421, Auburn 95604**.

Treasurer's Report: Richard reported a beginning balance as of July 1st was $3,295.54. Expenses in July totaled $88.89. Deposits included membership renewals and donations totaling $43.00. Net cash on hand at end of July is $3,249.65. Richard also reported that Metro Electronics donated a multi-meter for the Picnic.

Repeater Reports: The donated Icom equipment was sold to a local ham for $200 and the Board was in agreement to place the proceeds in the General Fund. The Hallicrafters receiver is not sold.

VE's Report: by Dave - NO6NO. Two candidates both passed the Tech exam. Dave suggested a promotional incentive to offer "free membership" in the Club to new hams (2012) for the rest of the year. The Board was in unanimous agreement and the subject will be brought to the Membership.

Property Officer: no report

Web/PIO Report: Via email, Carl is looking for any input or updates to the Club webpage. He also added a "news" scroll bar to the area just below the navigation buttons.

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DISCUSSIONS

Other Discussions: Other reports included discussion of the upcoming Lincoln swap meet. Richard suggested donating items for the "table" at the swap meet scheduled for September 8th, in lieu of our White Elephant Sale, and will suggest this to the Membership. Richard also reported that we are looking for a new "raffle person" as Gene wants to retire from the position after 6 years of excellent service to the Club; to be announced at the General Meeting. More discussion on the upcoming Picnic logistics followed.

Meeting adjourned at 1840 hours. Submitted by *Dennis Gregory-WU6X, SFARC Club Secretary*

GENERAL MEETING MINUTES
August 10, 2012

The SFARC General meeting for August commenced at 1932 hours at the Placer County Library in Auburn. Present were Officers Bob Brodovsky-K6UDA, President; Al Martin-NI2U, VP; Dennis Gregory-WU6X, Secretary and Richard Kuepper-WA6RWS, Treasurer. Directors Chuck Baker-AE6LR and Gary Martinez-N6UWQ were present, with Jim Griffith-KI6AZH absent.

President Bob-K6UDA led the membership in a Pledge of Allegiance to the flag. Officers and approximately 32 members and guests were introduced.

REPORTS:

Past Minutes – The July General meeting minutes, as published in the Newsletter, were unanimously approved.

VP's Report – Al reported on events planned for the Club Picnic (11:30 to 4pm on Saturday). A DSTAR contest, QRP CW on 40m and long-distance contact contest, with a 2m halo antenna award for the farthest contact. A test/quiz with questions from the Tech and General License pools plus a "mystery question" is also planned, the prize to be an atomic clock.

Treasurer's Report – Richard reported a beginning balance as of July 1st was $3,295.54. Expenses in July totaled $88.89. Deposits included membership renewals and donations totaling $43.00. Net cash on hand at end of July is $3,249.65, and the sale of the donated Icom equipment for $200.

Secretary's Report – New members invited to receive a "Welcome" handout during the break with information on the Club.

Repeater Report – Richard reports the repeater has been working fine except for a few days of heat-related sensitivity issues.

VE Report – Dennis reported 2 tests were given, both participants passing Tech exams.

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Satellite Report – Greg-KO6TH talked about the "The Dish" movie which highlighted the earth station used during the Apollo 11 mission … and now also for the Mars Rover landing. Also, a new Russian satellite has been launched, no further information available. A meteor shower is expected this Saturday with propagation on 145.585 packet and 6m at 50.620 FM.

Sunshine Report – Richard-WA6RWS reported that Jim-KI6AZH is on the mend from bypass surgery.

Raffle and Refreshments – Gene-KG6NYH reviewed raffle options. Richard reviewed refreshment options and noted that Gene wishes to retire from raffle chairperson and the Club is looking for a volunteer.

OLD BUSINESS:

Webmaster/PIO Report – Carl is looking for any input or updates to the Club webpage. He also added a "news" scroll bar to the area just below the navigation buttons.

Events – Chuck-KG6FFK reported on the Tevis Cup event. This year there was a 52% drop out rate. Two horses came in with no rider which initiated a search of the trail. Riders were found in about 2 hours without further issue.

T-Shirts – Bob reported the T-shirt order for Field Day unfortunately never materialized.

NEW BUSINESS:

Ham Swap – Richard reported on the upcoming Lincoln Swap meet scheduled for September 8th. The Board suggested that the Club donate items that would normally be used for the White Elephant Sale, to a table we would manage at the swap. The idea being that possibly more money for the Christmas fund can be made by the larger audience at the swap meet. Al-NI2U made a motion to sell at the Lincoln Swap Meet, and then use leftover items to the White Elephant Sale, with proceeds going to the Christmas Fund. 2nd by Donna-W6CQX; discussion followed; the motion passed unanimously.

New PO Box – Dennis reported securing an Auburn PO Box for the Club. The Newcastle address has caused confusion over the years by people searching for a club via Auburn zip code. The transition will occur during August, with full use beginning on September 1st. A 3-month refund for the remainder of the contract will be received; new **PO Box** is **6421, Auburn 95604**.

Free Membership – Bob reported on discussions by the Board for a promotional incentive to offer "free membership" in the Club to new hams (2012) for the rest of the year, similar to a Sacramento Club's offering. Birton –N6UG made a motion to offer free, complimentary membership to new hams for the remainder of the calendar year; 2nd by Al-NI2U; discussion followed; the motion passed unanimously.

Tech-Ten – Bob-WE6C gave an excellent presentation on calculating line loss at various frequencies and feedline types using online tools. Web reference is at http://vk1od.net/calc/tl/tllc.php.

Presentation – Chuck-AE6LR gave a presentation on antenna RF patterns under different and variables/conditions.

General Announcements – Club net on Thursday's at 7:30; Board meeting at 6pm on general meeting nights at Round Table Pizza; the General meeting schedule; Club breakfasts (last Saturday at Susie's Café); the "Prepper Net" every other Wednesday on the 2m repeater at 7:30pm; see the Club website (W6EK.org) for more information or changing dates.

The meeting adjourned at 2114 hours. Submitted by, Dennis – WU6X, Secretary

Coaxial Cable

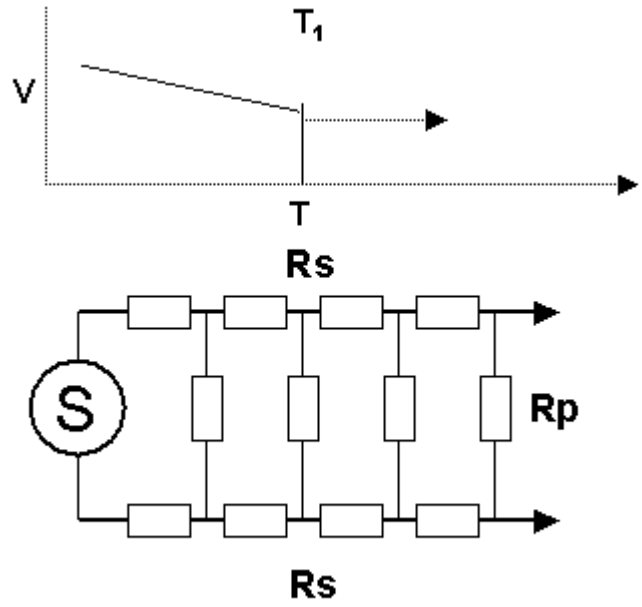
"If Coax Is 50 Ohms, How Does Power Get To My Antenna?"

Essentially every transmitter on the current market [and for many years] has a "50 ohm" output, which matches a variety of commercially available coaxial cables. How convenient! It hasn't always been this way. Up until late 50's, it was common to feed antennas with open wire line which connected to a small "link coil" that could be moved into and out of the PA output inductor. On AM, you'd commonly hear, "Rig is a pair of 250TH's link coupled to an Extended Double Zepp," or some other antenna. It didn't really matter what the impedance of the line was, no one used SWR bridges to tune antennas, and in fact, no one even talked about SWR.

In the late 50's, the PI-Network replaced the parallel tuned circuit in the output of ham transmitters. The Pi-net connected directly to the plate circuit of the PA through a blocking capacitor [to keep the HV plate voltage off the antenna], a variable capacitor to ground, a series [usually] variable inductor, and another variable capacitor to ground. It served two purposes: First, it was a low-pass filter to help remove harmonics from the signal. Secondly, it served to match the very high output impedance of the vacuum tube PA [several thousand ohms] to what had become the ubiquitous transmission line … 50 ohm coaxial cable.

What does "50 ohm coax" really mean? If it's 50 ohms, like the resistor in a dummy load, why doesn't it consume all my power on the way to the antenna?

An answer to the second question is that it could! While at Keesler AFB for 3 months, I was active in the radio club [K5TYP]. We had one triband antenna that never worked. It measured 50 ohms on 20, 15, and 10, but it received poorly and transmitted even worse. Accidentally, we finally discovered that it was 50 ohms everywhere, frequency didn't matter, and we concluded we had the longest dummy load in Harrison County MS. It had been out in the weather with open ends for a couple of years, and was full of water. The real answers to both questions involve some electrical theory so, as usual we'll creep up on the subject slowly.



First off, "What does the 50 ohms mean?" It is true that a real transmission line is, in one way or another, made of wire [usually copper] and will exhibit resistance. For this discussion, we'll use a model at the left, a DC model of a parallel wire transmission line. Coax is a center conductor surrounded by an outer cylinder, but at DC, it's just a two-wire line, and has resistance, distributed along the length of the conductors.

Conjuring up a mathematical model of a continuous resistance becomes fairly complex, so engineers typically do it in tiny little increments. The little rectangles labeled Rs represent the series resistance of a tiny little section of the line, and the Rp right after each pair represents the parallel resistance of the dielectric between the conductors. You can make the increments as small as you like.[1] In any practical line, the DC resistance of the dielectric is huge [dielectrics are DC insulators], and Rp is often ignored. For this model, the two wires extend to the right forever.

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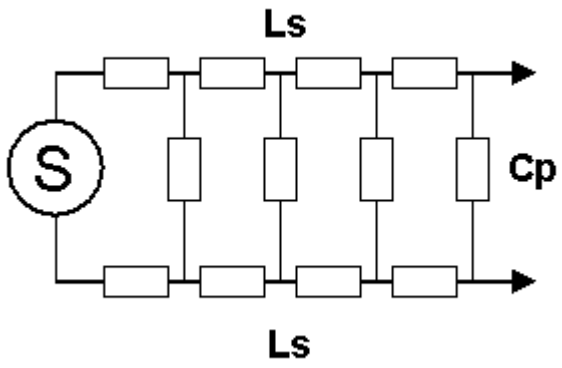
1 Those with a background in calculus will recognize the Central Limit Theorem behind this approach.

Now, assume that **S** is a source … for DC it can be a battery with a switch. With the switch open, the voltage on the line is zero. At time $\mathbf{T_0}$, we close the switch. The voltage at the left end of the first model increment immediately goes to the battery voltage. This starts a current flowing [Ohm's Law] and the power it represents [Ohms Law again] begins to propagate down the line. After passing through the first model increment, the resistors have dissipated a tiny fraction of that power in heat which is lost from the system. The next model increment sees a slightly lowered voltage [and current] since **P=IE**, where I is the new current and E is the new voltage.

This continues down the line, forever. I put a small graph of the voltage vs time [which is the same as distance down the line] at the top, and at time $\mathbf{T_1}$, the current pulse has reached several model increments down the line and the voltage [and current, and thus power] has declined. The power becomes smaller and smaller as time goes on, and when forever is over, it is zero and all the power left the system as heat.

So the answer to the second question, at DC, is "Yes, eventually all of your power will be lost as heat [I^2R loss], but the line will be very very long before this becomes a factor, and it has nothing to do with "50 ohms." To get to that, we need a new model and a new source, namely AC, and in our case, radio frequency alternating current.

As we've seen, for all practical purposes, using realistic length transmission lines, we can ignore the DC losses. The AC [i.e. RF] model is at the right. It looks just like the DC model, and the explanation about breaking the line into arbitrarily small increments using real components still applies. In this case, however, the series resistors are replaced with very small inductors, the parallel resistors are replaced by very small capacitors, and the source becomes your transmitter.



Here's what happens: The two wires [or inner conductor and shield of coax] form a capacitor between them, that's what a capacitor is … two conductors separated by a dielectric. We think of an inductor as a wire wound into a coil ... the more turns, the more inductance ... but a straight wire has inductance too. Unwinding the coil until it is straight reduces the inductance , but it doesn't go to zero. Cutting the wire in half makes the inductance smaller still. But, unless the length of the wire is zero, it <u>always</u> has some inductance.

The two inductors and capacitor form a network that exhibits an impedance to the AC current. We ignored the tiny resistors, so there are no losses, and all the impedance does is determine … through Ohms Law … how much AC current will flow for a given voltage at **S**. In a lossless line, Power Out = Power In, you call 3D2C with 100W, 100W goes into your antenna, Maxwell assures us it radiates, and you're in the log. It's the magic of radio. ☺ That lossless impedance, for RG-8, is ~50 Ω. RG-9 is a little larger physically, and is ~75Ω.

The size of the conductors and their spacing define the size of the little model increment inductors and capacitors and thus the impedance. 3 1⁄8" hard-line has an outer solid copper conductor that has an inside-diameter of 3 1⁄8" [you're surprised?], and a center conductor about 1 1⁄2" in diameter [it's a hollow copper tube]. This line doesn't bend, but it is still 50Ω and will handle upwards of 10KW depending on frequency.

If you want something much over 100Ω or so in something flexible at our power levels, coax becomes unwieldy since the model increment capacitors have to be very small and that means large separations. This is why you don't find high-impedance coax, and since coax is ubiquitous for hams, "all" transmitters want to see 50Ω. Higher impedances use open-wire two-conductor lines with various dielectrics ranging from air to various plastics, the wider the spacing, the higher the impedance. The principles are identical, however.

Since inductive reactance and capacitive reactance are frequency-sensitive, you may wonder why RG-8 is 50Ω all over the ham bands. The reason is that the impedance of those little model increments depends on the ratios of

the components, not their absolute values. As the frequency increases, the inductive reactance of each little increment increases, however the capacitive reactance of that section decreases by exactly enough to keep the impedance constant.

And, one small correction to a liberty I took at the start of this … RG-8 and all coax is really a 3-conductor line for RF, because AC [and especially RF] is confined to the surface of conductors … the so-called "skin effect." As a result, your coax has an inner conductor, and the inside surface of the shield. The currents are equal and opposite in these and they cancel all radiation. The outside surface of the shield is a 3rd conductor, and currents flowing on it do radiate [and receive]. The currents are induced by imbalances in the antenna and by the fact that the line is in the antenna near field, and they will interfere with your desired radiation pattern to some degree. Two bigger effects are they conduct RF back into your shack and interfere with all sorts of digital and analog electronics we all can't seem to live without [RF Feedback].

And, the outside of the shield is its own receiving antenna. Unfortunately most of what it "receives" is noise generated mainly by your, your neighbors', and PG&E's noise makers. One way to stop all this is to wind your coax through a fairly large [~2-3"] ferrite toroids right where it enters your shack. This will choke off those common mode currents before they get inside and cause headaches.

73,

Fred K6DGW
