



Welcome to SFARC, Auburn, CA

# Sierra Signals



P.O. Box 6421 Auburn, CA 95604

**April 2014**

<http://w6ek.org> [info@w6ek.org](mailto:info@w6ek.org)

## At The Key of SFARC:

### **PRESIDENT**

Tyghe Richardson, KD6MLH  
[tyghe@tjrauctions.com](mailto:tyghe@tjrauctions.com)

### **VICE PRESIDENT**

Dave Albright, NO6NO  
[no6no@pacbell.net](mailto:no6no@pacbell.net)

### **SECRETARY**

Dennis Gregory, WU6X  
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### **TREASURER**

Richard Kuepper, WA6RWS  
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### **DIRECTORS**

Mark Graybill, W8BIT  
Robert Bell, W6RBL  
Jim Jupin, WA8MPA

### **FIELD DAY CHAIRMAN**

Bob Naylor, WE6C

### **REPORTERS**

Satellites: Greg, KO6TH  
History: Gary, KQ6RT  
Misc Radio: Fred, K6DGW  
Sunshine: Richard, WA6RWS  
[rkuepper@surewest.net](mailto:rkuepper@surewest.net)

### **REPEATERS**

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

### **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  
916.624.1343  
[anderson51@wavecable.com](mailto:anderson51@wavecable.com)

### **WEBMASTER & ARRL PIO:**

Carl A Schultz, WF6J

## Calendar of Events

**April 11<sup>th</sup>:**  
**Club Meeting**

**April 26<sup>th</sup>:**  
**Club Breakfast**

**May 3<sup>rd</sup> & 4<sup>th</sup>:**  
**Diabetes Walk & MS Walk**

**June 28<sup>th</sup> & 29<sup>th</sup>:**  
**Field Day &  
WSER**

**August 9<sup>th</sup> & 10<sup>th</sup>:**  
**TEVIS**

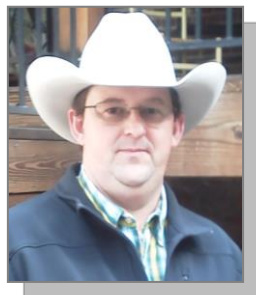
## Inside this issue:

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- *Slow Scan TV*



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## From the Mic

*By Tyghe Richardson – KD6MLH, President*

### Do you have an Elmer?

With the influx of new hams I think it is time we talk about Elmers. An Elmer is a seasoned ham that can provide priceless mentoring to new hams. I have been involved in ham radio since 1992 and have run into some awesome Elmers that have really helped me out. Although much can be gained from books and the internet, having a real live experienced ham to talk radio with is invaluable.

My suggestion to anyone looking for help is this: in selecting an Elmer it is important to find someone you can easily talk to, get along with, and (in most cases) is located somewhat close to you. I have found that some hams are more knowledgeable in urban settings, whereas others excel in rural locations. There are many things that do not change based on location, but it is good to find someone who has the background needed to help with your unique station. Sometimes, seeking the advice of multiple hams can be advantageous.

Whether you are working on a mobile, portable, long wire, or setting up in an apartment, there are plenty of club members who can give you awesome advice. I suggest asking questions of everyone you can. I am sure that most of us have opinions and are happy to share them. I think that with the vastly different aspects of this hobby, having several Elmers can be a good thing.

These are just a few of the reasons that the Elmer Net is so nice. That's right - we currently run an Elmer Net on the repeaters every other Wednesday. This is a good environment to ask questions and get some good advice. The club is also working on starting an Elmer program this year and will soon be able to set you up with an Elmer, if needed.

Start small, expand, think about the long term, and have some fun!

73's for now

### *Melissa Mikel*

*Melissa Mikel wife of Wayne Mikel KJ5UQB (ex KJ6DJE) passed away from a brain tumor. Wayne was president of SFARC in 1999 and 2000. They have been living in Oklahoma for the past 10 years. Along with Wayne, Melissa was very active in the club especially field day. She was a happy mother and for a while studied for her ham license.*

*Their address is: 321 N. Cherry Street Pauls Valley, OK 73075*

## WSER/TEVIS

### Western States Endurance Run and Tevis Cup (Western States Trail Ride)

Both are 100 mile events from Lake Tahoe to Auburn, CA. (Endurance Capital of the World). WSER is also known as "The Other Field Day" since 9 out of 10 years it falls on the same weekend as Field Day. We do have more fun!!!!

**WSER: June 28-29, 2014 and TEVIS: August 9-10, 2014**

We're always looking for Radio Op's to help. If interested, please check out our website at: [www.wstrail.org](http://www.wstrail.org), then click on the COMM Tab. If you're still interested, please fill out the Volunteer Signup Form and submit it. Any website issues please call, email, or use the radio freq. below.

Ralph Lucas, W6RWL  
P.O. Box 1083 Foresthill, CA 95631-1083  
408-640-0963 cell; 530-367-3026 home  
[w6rwl@arrl.net](mailto:w6rwl@arrl.net), 146.625, -, pl 151.4

### Info from S.W.O.T.

As I mentioned, I had to go out of the country during my Spring Break. I went to Panama (HP) for 4 days (really 2 minus the travel). I saw one Ham antenna while I was there, and it was for HF.

I continue to see posts of 144 MHz TEP between Puerto Rico and South America. If I had some equipment, I think it would have been possible from my locale. There are a few mountains and a slew of 70+ story high skyscrapers and high rises to mount antennas on. The capital is very impressive. I noticed that KG7HF will be QRV 6, 2 and .70 Meters from Panama in July. Sure would be nice to work him on Es, but I think he will focus on EME.

I did see a number of horizontal Halos mounted on high rises and homes in Panama. I guess they are for analog TV in the country. They are almost perfect duplicates for those used for 2-Meters. Anyone who knows their real use let me know.

Anyhow, I will do my best to get something out. Retirement is now 12 weeks away and a move down to south Texas is very possible. I hope to make it to Austin for Central States.

Have fun out there.  
73, Art Jackson KA5DWI

SWOT Homepage:  
<http://www.swotrc.net/TheSWOTRCHP.aspx>

# MISCELLANEOUS RADIO

## Coding and Ham Radio

### Other Uses for Coding in Ham Radio

Last month, we completed the plan for a (7,4,3) Hamming Forward Error Correction code. But error detection/correction is by no means the only reason for encoding digital data. We'll take a look at a few other reasons, but first, an answer to an emailed question:

*"This whole series has focused on 'binary codes.' Are there error correcting codes that are not binary?"*

You likely won't be surprised that the answer is "Yes, and way more than you want to know about." ☺ The reason that binary codes occupy such a large slice of Information Theory is because of their simplicity. In particular, you only have to know which bit got taken out by a noise pulse. Knowing that, you just invert that bit to correct it. For non-binary codes, you need to know which symbol is in error, and what its value should have been. Binary codes are also much more simple to implement in either hardware or software. The "arithmetic" for all of this is rooted in the theory of Finite Fields in mathematics, which gets fairly involved after the first chapter. For binary codes, it reduces to AND and XOR. It is seriously more complex for non-binary codes, and not something that could have been implemented until sort-of recently.

A good example of non-binary codes are a class called Reed-Solomon Codes, named after their inventors [or "discoverer's" I guess, the math behind them was always there]. Practically, they generally use 8-bit "symbols", although there is nothing magic about that except that numbers not divisible by 8 are really annoying to programmers and engineers in today's world.<sup>1</sup> The math to generate and decode non-binary codes, and hence the hardware and/or software, is orders of magnitude more complex than what we have been doing for the last 9 months, and it's only been with the advent of microprocessors and microelectronics that they have been feasible.

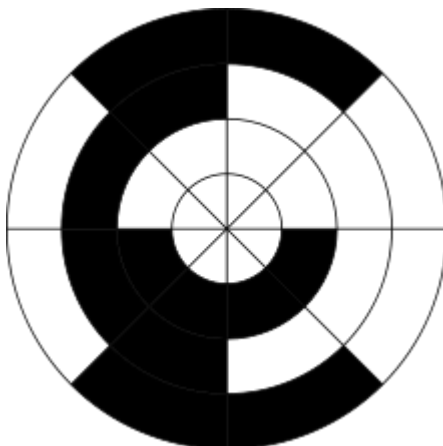
The JT-65HF weak signal digital mode that is growing in popularity uses a powerful Reed-Solomon code to decode signals with negative signal-to-noise ratios, and it does it with a lot of mathematics buried in a lot of software running on microprocessors clocked at over a GHz.

### Convolutional Codes:

The previous issues of Miscellaneous Radio have focused on block codes ... codes where we divide the incoming stream into fixed length blocks of bits, encode them, transmit the [larger] block, and then decode the larger blocks back into the data blocks. Each block is independent of the surrounding blocks. There is another really different, somewhat more mathematical form of coding called convolutional codes. They are very common, often paired with simple block codes when talking to spacecraft fairly far away [like Jupiter or Saturn]. This however is a Radio Club not a Math Club, and were going to leave convolutional codes there.

### Gray Codes:

Gray codes arose in the late 40's at ... where else? ... Bell Labs. The "problem" was mechanical encoders. They act like multiple switches, brushes on segmented plates not unlike the distributor on a mechanical teletype machine.



As you turn the shaft, you want the output to count either up or down [depending on rotation direction] in binary. 0=00, 1=01, 2=10, 3=11. Seems pretty easy, except note what happens as you turn the shaft from "1" to "2". The encoder output needs to go from "01" to "10". Two bits change. What if, because of mechanical tolerances, the sequence actually is, "01", "11" [briefly], then settling on "10"? You didn't turn the shaft somehow from "1" directly to "3" and then quickly back to "2," but that's what the encoder reports.

Frank Gray came up with the "Reflected Binary Code," a code for which the difference between one value and the next [or previous] is exactly one bit. The ambiguous "[briefly]" above can't occur. And Bell Labs patented it ... I hope you're not surprised. ☺ The patent has long since expired [and actually involved some slightly different ideas], and Gray codes are ubiquitous in digital communications today.

<sup>1</sup> While digital communication is ultimately always binary at the lowest level, these codes correct multi-bit "characters." A Reed-Solomon code that will correct one 8-bit character in a block is equivalent to a binary code that will correct 8 bits in a block.

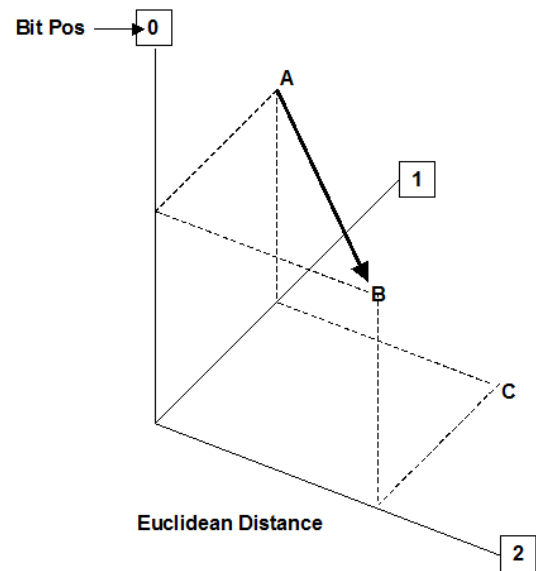
The diagram above is a shaft encoder plate that delivers a 3-bit Gray code. Three bushes in a line would press down on the plate, etched so the black segments were conductive and the white ones weren't. As you turn the shaft, there are never any segment boundaries that change more than one bit at a time. Our shaft-encoders today tend to be optical, but are still constrained by mechanical tolerances and still commonly use Gray codes.

It is more common than you might think that early inventions/discoveries find their way back into current technology. The “crystal detector” was replaced by vacuum tubes for a number of decades only to be replaced by solid state electronics, based again on the crystal detector. Remember the morph of early spark transmitters into megawatt LORAN C transmitters? The Gray code of the 40's now returns to our increasingly digital world. In fact, the various WSJT weak signal digital modes encode the data into Gray code before adding error correction.

**Orthogonal Codes:** Remember the diagram on the right? I used it to illustrate the concept of “distance” between two binary vectors. An alternative visualization is that it creates a “vector space” of  $8 [2^3]$  different vectors, represented by 8 points arranged at the corners of a cube. Each of the three bits represents a distance, either 0 or 1 unit, along the three mutually perpendicular [i.e. orthogonal] axes.<sup>2</sup>

Now, there is nothing special about each axis having only two possible values [0 and 1], I can just as well assign 4 possible values, 0, 1, 2, and 3 to each of the three axes. In binary, those points would be at 00, 01, 10, and 11. This would give me a vector space with  $4^3$  or 64 distinct points. Note that whatever happens along one axis has no effect on what is happening on the other two because the three axes are mutually perpendicular.

And, as you're no doubt beginning to surmise if you've been paying attention to earlier parts of this drivel, we can have any number of mutually perpendicular axes ... we just can't draw a diagram and none of us knows what it would “look” like. The mathematics does

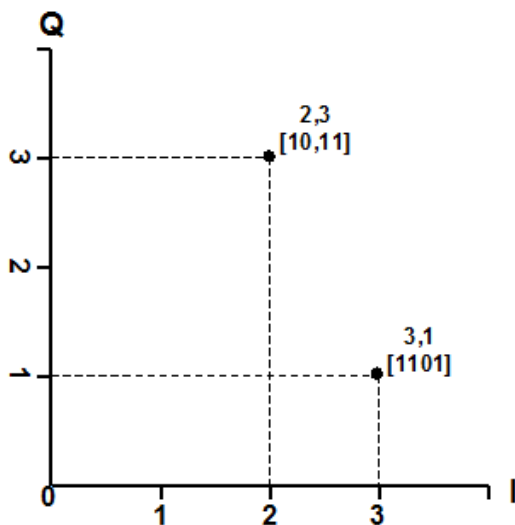


not care however.

Instead of adding axes, I'm going to remove one in the diagram at the left. I have two orthogonal axes, each with four possible coordinate values. This defines a 2-dimensional code space with  $4^2 [16]$  possible vectors. I've marked two of them with decimal coordinates and binary coordinates underneath. Note that I don't really need the comma between them, each point is simply defined by a four bit vector.

I labeled the axes “I” and “Q” which normally stands for “in-phase” and “quadrature” ... “at right angle to ...” And finally, we're going to get to radio.

I generate a sine wave at some audio frequency [I], and from it I generate the same wave but  $90^\circ$  out of phase [a cosine wave] which I and everyone else in the world that knows will call Q. I'll set the amplitude of the I-signal to 3 and the amplitude of the Q-signal to 1 and add them together. I feed it to my USB transmitter and send it to you. You decode it as the vector 1101. This is called one “symbol,” and the array of 16 points in the code space



is called the “signal constellation” ... sort of like stars arranged in the sky I guess. When the next 4-bit symbol comes along, I do the same thing.

This is called 16-Quadrature Amplitude Modulation or 16-QAM, and  $m$ -QAM dominates the high data rate digital channels such as digital TV, satellite and fiber optic circuits, and ... some amateur transceivers. The Elecraft K3 generates its signals in QAM in the digital DSP, and recovers the I and Q values in the DSP on receive. The newer Elecraft KX3 does the same thing, only it sends the I and Q channels out through connectors and you can use them in a variety of ways.

<sup>2</sup> “Vector space” is the generic math term. In the digital coding world, it is often termed “code space” because the permissible code combinations exist in that space.

There's nothing magic about 4 possible values on I and Q axes, a much more common implementation allows 8 values<sup>3</sup> on each axis which yields a constellation of 256 possible points or 256-QAM. Note carefully: in 256-QAM, two 8-bit vectors combine to send one of 256 possible symbols [i.e. constellation points] ... in one symbol period.

**Short Digression:** Currently, Part 97 imposes a limit of 300 symbols/sec we can transmit as hams. This harks back to the early 80's when everything was FSK, symbol rate and bit rate were identical, and 300 bits per second equated to a bandwidth of approximately 3 KHz. We're now 30+ years later, *m*-QAM and others have been invented, and I can send 16 bits in one symbol period using 256-QAM, which, at 300 symbols/sec is 4,800 bits per second. Bandwidth and bit rate are directly linked by fundamental physics so a 4,800 bit/sec 256-QAM signal will occupy about 20 KHz of spectrum. Nor am I constrained to just one modulated carrier, I can do the same thing with another 4,800 bps, 20 KHz up in frequency.<sup>4</sup>

ARRL realized that using OFDM, one could generate one signal that would occupy the entire CW/RTTY/Data sub-band and would remain within the 300 symbol/sec limit and thus be legal. They petitioned the FCC to remove the symbol rate limit and impose a 2.8 KHz hard limit on the occupied bandwidth of any amateur data signal. This has to be the absolute, most misunderstood petition ever submitted. It generated well over 800 comments from hams, many of which opposed the change as "too wide a limit." Let us hope the FCC sees through the arguments and grants the petition before someone fires up OFDM on the bottom 150 KHz of 40 meters.

**CDMA:** Finally, let's return to orthogonal codes and cell phones. The cell phone concept requires that multiple users be able to access a given fixed station simultaneously. There are different ways of doing this and a common one is Code Division Multiple Access or CDMA. My Sprint phone is a CDMA device. Without belaboring the math, CDMA digitizes my voice signal using sampling. When I want to make a call, the strongest site assigns a long, what appears to be a random, code [sequence of 1's and 0's] to my phone. The phone generates that code at a much higher rate than the digital voice signal, mixes the two, and transmits it. The effect on the air is that my voice signal is split into little blocks in time ["chips"] and the blocks are scattered all over the spectrum. The site remixes the received broadband signal with the code synchronized with the one in my phone, and magically gets my voice signal back. It's a form of spread spectrum.

The key is the "spreading code." Each user gets one assigned and the critical condition is that all the codes must be mutually orthogonal ... again we'll ignore the fact that we can't visualize the code space created by more than three orthogonal axes. If all the codes are orthogonal and are all synchronized by the cell site, then when my "chip" is on one frequency, everyone else's' chips are on other frequencies. My next chip may fall on the frequency where your last chip was, but you've also moved on and that frequency is mine for the duration of the chip. Since everyone is generating chips of equal length and in synchrony, we never interfere with each other.

The fact that everyone's spreading code is orthogonal to all the rest is what accomplishes this, and it's not too hard to see why even if we can't visualize *n*-space for  $n > 3$  – each code sequence corresponds to an axis that is perpendicular to all the rest. What happens on one axis can't affect what happens on any other axis. Since everyone is hopping around, an interfering narrow-band signal [or noise pulse] on one frequency will affect a user only for the duration of a single chip which is very very short – one of the sources of the bathroom noises you sometimes hear on your CDMA phone.

GPS does the same thing. The spreading code we all use is fixed and repeats every 100 ms. The precision code is much longer and repeats every 7 days. Matching up the much longer code equates to much more precision in measuring the time delays, and thus much less uncertainty in distance.

Thus endeth the Miscellaneous Radio saga Coding and Ham Radio. I hope you have been taking notes, pop quiz to follow.

Fred, K6DGW

<sup>3</sup> 8 is a very computer-friendly number.

<sup>4</sup> This is called Orthogonal Frequency Division Multiplexing [OFDM] and is the basis for Broadband over Power Line [BPL]





## BOARD OF DIRECTORS MEETING MINUTES

March 14, 2014

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

**Roll Call:** All officers and Directors were present except for Robert-W6RBL. Carl-WF6J, PIO and guests Toni-KK6JPJ, Al-NI2U and Bob-K6UDA were also present.

### REPORTS and DISCUSSIONS

**President's Report:** No report

**VP/VE Report:** Dave-NO6NO, VE reported that (10) candidates took (30) exams with (10) Techs, (4) Generals and (4) Extras passing.

**Secretary's Report:** Dennis-WU6X reported he confirmed our request to use the Nyack site this year for Field Day with the owner, Grant Wells, and then followed up with a written request and insurance certification requirements. He also reported that George-KG6LSB has responsibility for ordering the portable toilet.

**Treasurer's Report:** Richard-WA6RWS reported net cash on hand at beginning of February of \$6,452.04; expenses of \$530.61; income of \$721.30 and balance of \$6,642.73.

**Repeater:** Richard – WA6RWS reported the replacement of the PL deck on the 2m repeater in an effort to fix an interference problem. Motion by Mark-W8BIT, and 2<sup>nd</sup> to spend up to \$200 to purchase a new PL deck for a shelf spare; passed unanimously.

### OTHER DISCUSSIONS

Mark-W8BIT reported the Field Day Committee's recommendation to the Board to purchase a "triplexers" and filters for Field Day, estimated at \$650. Mark made a motion to bring this request to the General Membership at tonight's meeting; 2<sup>nd</sup> by Dave-NO6NO; passed unanimously.

Mark reminded the Board of the upcoming "preparedness event" at the LDS church on April 12 between Noon and 5pm; and, an emergency preparedness day planned in Colfax, date TBD.

Jim-WA8NPA reported on an 80<sup>th</sup> birthday cake planned for tonight's meeting, so less other refreshments will be needed for the meeting.

Bob-K6UDA (GOTA Captain) reviewed Field Day signs and banner options, estimated at a cost of \$9/sq. ft. with the Board, along with plans for GOTA, VHF/UHF and satellite "tents" to be placed across the front of the property facing the public areas, estimated at up to \$450. Mark-W8BIT moved to bring the purchase of signs and banners to the General Membership at tonight's meeting; 2<sup>nd</sup> by Dave-NO6NO; passed unanimously.

Other discussion held on having "ambassadors" at the Field Day event to greet visitors and conduct tours.

Meeting adjourned at 1850. Submitted by *Dennis Gregory-WU6X, SFARC Secretary*

## GENERAL MEETING MINUTES

### March 14, 2014



The SFARC General meeting for March commenced at 1930 hours at the Auburn City Hall Rose Room, President Tyghe-KD6MLH presiding. All Officers and Directors were present except for Robert-W6RBL. Tyghe led approximately 55 members and guests in a Pledge of Allegiance to the flag followed by an introduction of Officers, members and guests.

#### **REPORTS:**

**Past minutes:** It was noted that Jim's call (WA8MPA) was mis-stated in the minutes as "WA8NPA". Minutes were approved as posted in the Newsletter on motion by Dick-WB6EDR, 2<sup>nd</sup> by Bob-K6UDA with correction of Jim's call as noted; passed.

**President's Report:** Tyghe reminded the 2014 Membership of dues being pass due and requested delinquent members to remit as soon as possible to sustain budget requirements.

**VP's Report:** No report

**VE's Report:** Dave-NO6NO, VE reported that (10) candidates took (19) exams with (7) Techs, (1) Generals and (2) Extras passing.

**Secretary's Report:** Dennis-WU6X requested input for the Yahoo! Groups calendar, and information for new members and guests, and reminded the membership to sign the attendance sheet.

**Treasurer's Report:** Richard-WA6RWS reported net cash on hand at beginning of February of \$6,452.04; expenses of \$530.61; income of \$721.30 and balance of \$6,642.73.

**Repeater:** Richard-WA6RWS reported on the replacement of the PL deck on the 2m repeater in an effort to fix the interference problem.

**Satellite Report:** Greg-KO6TH reported Lithuanian satellites now up but with some issues, and destined to be a VHF/UHF repeater. During Thursday night's net Greg reported that in 100 days in orbit, Oscar-73 has handled 1Gb of data, and that Oscar-2 has been in space for more than 30 years now.

**Sunshine Report:** Richard-WA6RWS reported on losing 5 relatives, and that Robert-W6RBL's father is not doing well.

**Refreshments/Drawing:** George-KG6LSB reviewed items for the drawing including a digital clock and other fine items, while Jim-WA8MPA reported on Joe Ramirez-KN6FH's 80<sup>th</sup> cake and other refreshments planned for the break.

#### **OLD BUSINESS:**

**Committees Reports:** Field Day-2014: Bob-WE6C reported on Field Day Committee discussions and agreements. The FD Committee has come to an agreement to keep the dinner on Saturday night. Bob-K6UDA (GOTA Chair) reported on plans for the GOTA, VHF/UHF and satellite communications "tents" planned, and "ambassadors" to greet and tour visitors.

**Repeater Linking:** Tyghe-KD6MLH revisited last month's discussion on linking the 220 repeater with the 2m repeater full time. After a short discussion, Jim-N6MED moved to do so, 2<sup>nd</sup> by Carl-WF6J; passed.



## **NEW BUSINESS:**

**Hats and Patches:** Dave-NO6NO reported on his research into the purchase of hats and Club patches. After short discussion, Dave moved to spend up to \$275 for purchase, 2<sup>nd</sup> by Richard-WA6RWS; passed unanimous.

**Sign and Banners:** Bob-K6UDA presented designs and suggestions for new FD banners and signs that can be used at other events, reviewed by the Board. Gene-KG6NYH moved to spend up the \$450 to purchase, 2<sup>nd</sup> by Al-NI2U; passed.

**Tri-plexers:** Bob-WE6C discussed tri-plexers that could be purchased for FD-2014 that would allow multiple stations to operate on a single antenna, for example, a tri-band yagi. The cost would be approximately \$700 for the unit to included band-pass filters. Bob-K6UDA moved to spend up to \$700 for the tri-plexers, 2<sup>nd</sup> by Dick-WB6EDR. After much discussion, Tyghe suggested we table the motion until next month's meeting.

**Repeater Repairs:** Richard-WA6RWS reported the need for repairs and updates to the 2m repeater. Jeremiah-W6DLO moved to spend up to \$200 to make repairs, 2<sup>nd</sup> by Jim-KD4BKZ; passed

**Event Opportunities:** George-KG6LSB reported on events planned for 2014, the Diabetes Walk and MS Walk scheduled for May 3<sup>rd</sup> and 4<sup>th</sup>, respectively, plus the annual Enduro. Please contact KG6LSB if you are interested in participating in these great events. Mark-W8BIT reported on a planned "Preparedness Day" event at the LDS church at 287 Poetsmith Drive planned for April 12, Noon to 5pm. Contact Mark for more information.

**General Announcements:** The Club Net meets every Thursday's at 7:30; Board and General meetings occur on the 2nd Friday; Board is held at Round Table Pizza at 6pm, and General meetings at 7:30. Club breakfast (last Saturday), the Elmer Net is held every other Wednesday night at 7:30pm. See W6EK.org for more information or date changes.

**Presentation & Tech-10:** Al-NI2U presented a Tech-10 on Field Day goals this year. Distinguished guest, Ron Murdock (W6KJ) ARRL Section Manager gave an excellent presentation on the history of amateur radio via a new documentary movie marking the 100<sup>th</sup> anniversary of the ARRL.

The meeting adjourned at 2120. Submitted by Dennis-WU6X, Club Secretary

## **May 9th presenter of a program on Slow Scan TV**

Randy Hall, K7AGE, has held an Amateur Radio license for over 45 years. Randy is widely known for his YouTube ham radio videos. Some of his most popular videos show how to operate PSK-31, satellites, and building antennas. Randy has produced a series of videos introducing the newly licensed ham to 2 meter FM highlighting repeaters, radio programming and operating. Randy has also presented to local ham clubs in the Sacramento area and at PACIFICON, SEA-PAC and SWHAMCON hamfests. The easiest way to find Randy's videos is just google K7AGE. Randy has an Extra class license and regularly posts ham radio content to Twitter and Google+.

Fun with Slow Scan Television, SSTV. SSTV was first used by amateur radio operators back in the late 50s. In the early years, the hams had to build their SSTV equipment, which required up to 13 vacuum tubes. Over the years SSTV evolved from home built to commercial hardware to using a computer operating with free SSTV software and a radio. Randy covers the history, early days, commercial, and computer SSTV operation. Randy will also demonstrate using a smartphone and a 2 meter HT to send and receive SSTV during the presentation.

Carl, WF6J

[wf6j@sbglobal.net](mailto:wf6j@sbglobal.net)

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

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

**2014 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*	\$ 22.00	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
August	\$ 18/5	November	\$ 12/2+ following year
September	\$ 16/4	December	\$ 10/1 + following year

OFFICE USE ONLY:

DO NOT WRITE BELOW THIS LINE

Date: \_\_\_\_\_ Treasurer: \_\_\_\_\_ Secretary: \_\_\_\_\_ Roster: \_\_\_\_\_

Payment: \_\_\_\_\_ Check Number: \_\_\_\_\_ Cash: \_\_\_\_\_ PayPal: \_\_\_\_\_