Sierra Signals

P.O. Box 6421 Auburn, CA 95604 **October 2013** http://w6ek.org info@w6ek.org

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Misc Radio: Fred, K6DGW
Sunshine: Richard, WA6RWS
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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
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Gary Cunningham, KQ6RT
Norm Medland, W6AFR
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Inside this issue:

- *The Loading Coil*
- *VHF Contest*
- *Upcoming Club Picnic details*
- *VHF/UHF station into a crossband repeater*
- *Miscellaneous Radio – Coding & Ham Radio*
- *Board & General Minutes*

Calendar:

Fri 11 October: Club Meeting

Sat 19 October: Cystic Fibrosis Bike ride in the Newcastle area

Sat 26 October: Club Breakfast & The California Endurance Riders Association (CERA) - El Dorado National Forest

Sat 2 November: Club Picnic

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

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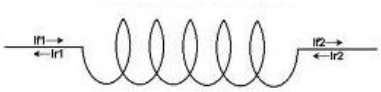
The Loading Coil

By Bob -K6UDA, President



Redundancy 101

One motto in life is the adage "Two is One, One is None." At work and in my personal life, I double most every tool I use. I carry two flashlights. I have more than one bug out bag. I carry two sets of keys to my vehicles…and if you see only one pistol on me…well, you get the point.

I subscribe to the "Two is One, One is None" theory in my ham world as well. I own two identical handheld transceivers, programmed alike. One is safely stored away in an EMP proof bag and one travels with me daily. Why? I stay proficient with the IC-92AD I use every day and if the unthinkable happens (I break it), then I've got its twin to replace it. I encourage redundancy with my friends and family too.

Ladies and gentlemen, we have but one repeater stationed at one site. We live by definition in a severe fire zone. It seems to me, getting a backup repeater operational should be bumped up on the "to do" list. ***Richard WA6RWS*** and ***Dave NO6NO*** have done a fantastic job of securing some of the infrastructure for a second repeater. ***Jim KI6AZH*** has graciously offered his property and towers to accommodate us. I'm sure we'll be needing miscellaneous parts when it's time to put everything in, but what I see as the greatest need will be labor. We'll need folks to help haul, move, and install the hardware, dig trenches, wire stuff up and secure feed-line, and whatever else needs to be done.

I'm not sure what needs to be done, but Richard does. I encourage you to call him, preferably in the middle of the night (Kidding!). On a lighter side, I am considering purchasing a D-star Repeater under Icom's new infrastructure program. I'll be looking into this more in the next month or two. I'm looking into the possibility of picking up the frequency pair left when theW6DHS D-star repeater vacated the area for New Mexico about 6 months ago. I know only a fraction of you have any experience with D-star, but let me tell you it's fun and very useful. You can operate simplex, local repeater, internet connected repeaters, HF and a very robust data side under D-Rats. I'll expand on D-Star in coming editions of the newsletter.

Until recently, D-star in the Sacramento area was flush with repeater choices. K6MDD was the big boy on the block, with KS6HRP serving the Folsom Area and W6DHS located in Volcano, CA. About 6 months ago Larry, WA6USA purchased all the equipment and the call sign W6DHS and moved to New Mexico. Subsequently the area was left with only two active D-star repeaters. With the fire on Mt Diablo (see page 3 for details), we are now down to one. "Two is One, One is None."

BTW, I was just joking about calling Richard in the middle of the night. He prefers calls at 0430 (HA!).

73,
Bob K6UDA

At last month's meeting, I was supposed to do the tech 10 on the wonderful world of D-star. About a week prior to the meeting, a major fire broke out in the Diablo Forest and on Mt. Diablo itself. K6MDD, the major D-star repeater for the east bay and Sacramento Valley, was shut down and inaccessible to the trustee. Not wanting to bore you with a tape recording of a radio transmission inside of a PowerPoint, I elected instead to postpone that tech 10 and "charm" the membership into volunteering for club offices.

Yesterday, Tim Barrett, K6BIV wrote a note to the hardcore D-star fans explaining just how severe the damage actually was. Here it is in its entirety:

Hello All,

On Tuesday of last week we got up to the site and saw firsthand the condition of the equipment. It was depressing to say the least. Black soot covered everything and several pieces of equipment were charred; feed lines were burnt and will need to be replaced or fixed. The filters, duplexer, power amp, preamp and Gateway CPU may need to be repaired or replaced. The AC power is off on the top of North Peak and several power poles need to be replaced in order to have the power restored.

I pulled all of the equipment on Tuesday and it looks like the D-Star Controller maybe lost. Icom asked for all of the D-Star equipment to be sent to them, and would advise me on what should be done. I will bring the D-Star equipment to HRO on Monday and they will assist in sending it back. A very big thank you to them for making this offer.

The BUILDING at the Site is in BAD shape and will either need to be replaced or repaired before we can re-install any equipment. The Site Owner wants us back and appreciates the service to the Ham Community that is provided by the K6MDD D-Star System.

Several of you have asked if I would accept donations to assist in getting the K6MDD D-Star System back on the air. I have the insurance claim process started. I'm not sure what will happen with it or how long it will take. So, the bottom line is YES, I will accept donations.

Donations can be made from a link on the K6MDD Web Site at www.k6mdd.org

I will keep you updated on the progress of the rebuilding effort. As we all know, the K6MDD D-Star Repeater is one of the BEST D-Star Systems in the World and it will be AGAIN.

I sincerely want to thank everyone in advance for any contributions made.

Thanks & 73
Tim Barrett, K6BIV

Dave NO6NO, Bob WE6C, and Bob K6UDA working the VHF contest on Sunday September 15, 2013, at the end of Clark Tunnel Road in Penryn.

The Picnic will be at Recreation Park, Picnic # 1, Recreation Drive, off of Racetrack Street, off of Auburn-Folsom Road, across from the Gold Country Fairgrounds. We have the Facility reserved for the entire day from 9:00 AM until 8:00 PM.

The Club will provide Hamburgers, Hot Dogs, some Chicken Breasts, Sodas, Paper Plates, and Plastic Ware. Please plan to bring a salad or desert to pass. Send the name of your dish to Al, NI2U. That way we can keep track of duplicates.

There will be two contests. The Quest Quiz similar to ten Mystery Questions and a QLF contest. Prizes will be awarded, as we did last year, but they are undetermined at this time. Google QLF to find its definition. You will need to add ham radio to get the relevant description.

Send any questions to the Picnic Committee:
Gene KG6NYH, Jim WA8MPA, Richard WA6RWS or Al NI2U

How can I legally make my VHF/UHF station into a crossband repeater?

By Dennis, WU6X

Modern dual-band or tri-band VHF/UHF rigs often have the capability to do crossband linking. When operating in this mode, the users may call them "crossband repeaters." Actually they are often remote bases, such as when they are used to allow an operator with a hand-held radio to access a repeater from a location where he or she would normally not be able to do so. For example, a hiker in a remote location might leave his car where his dual-band mobile rig can access a distant 2-meter repeater. Leaving the mobile rig on, he then takes his UHF hand held with him, and can access the 2-meter repeater via his mobile rig.

A crossband repeater (or "portable remote base") is okay as long as several conditions are met:

1) The user communicates with his crossband rig via the UHF side. Since this serves as his control and voice uplink, it is a form of auxiliary operation and must be conducted above 222.15 MHz. Since the operator is the control operator, that person must actually be able to control the station! That person must be able to turn it off remotely if a problem develops. If the operator can't control it, it's not legal [97.7, 97.201, 97.213].

2) If the control link fails, the remote station must shut down within three minutes which means a 3-minute timer is required [97.213].

3) The unattended station must be identified on all frequencies it transmits on. Since this is a form of remote base, the user's ID over the UHF uplink to the dual-band radio also serves to ID the VHF output of the mobile rig. In the other direction, however, there is no way for the control operator to ID the UHF downlink from the mobile remote base, so some form of automatic ID must be employed [97.119]. Unfortunately, few manufacturers include the capabilities listed above in their rigs. Hence, to be fully legal, some form of add-on controller may be necessary.

Another use for crossband operation is to link together two existing repeaters on different bands. This is usually done on a temporary basis during an emergency, a drill or a special event. Again, the requirements for proper station identification and control on both sides of the dual-band radio's transmissions still apply. If both the VHF and UHF transmitters are not properly identified and controlled, the operation is not legal.

In the examples cited above, the control requirement can be satisfied by having a control operator at the station, thus making it a locally controlled station. Although this may not always be convenient, it is a way to satisfy all of the station control required.

MISCELLANEOUS RADIO

Coding and Ham Radio

AMTOR - A Forward Error Correction Example

AMTOR is the amateur radio name for SITOR [Simplex Telex Over Radio][1], and was very popular in the 80's. It has been pretty much replaced by newer digital modes such as PSK31. However, it's a great example of how one can construct codes that will detect errors and correct them, so we'll take a look at it.

To begin with, it is a lot like RTTY in that it uses FSK modulation with the MARK and SPACE frequencies separated by 170Hz. Whereas RTTY uses the 5-bit ITA-2 [Baudot] character code, AMTOR uses the 7-bit CCIR 476 code. And, like SITOR, AMTOR has two modes, often labeled A and B although AMTOR-A is sometimes called AMTOR-ARQ, and AMTOR-B is termed AMTOR-FEC.

CCIR 476 Character Set: Unlike Baudot [and ASCII] where the binary codes are assigned sequentially to characters and all of them are used, CCIR 476 is a "4 of 7" code. In 7-bit ASCII, all 128 combinations of 7 bits are assigned to characters … some of them printing characters like the letters of the alphabet, and some of them control characters. In such a code, a one bit error will transform the sent character into another character and the transformation is invisible to the receiver. In CCIR 476, every character, printing or control, will contain exactly 4 "one" bits [the MARK frequency] and 3 "zero" bits [the SPACE frequency].

#	BIN	C
0	000	--
1	001	--
2	010	--
3	011	A
4	100	--
5	101	B
6	110	C
7	111	--

Obviously, there are gaps in the CCIR 476 character assignments, that is, some combinations do not correspond to any character at all and there are fewer characters. This is a bedrock, fundamental characteristic of error detecting and correcting codes. Consider the example at the left. This code is a made-up "2 of 3 code," every valid code will have two 1-bits. I've got 8 possible combinations of 3 bits, but only 3 of them are valid codes that I can assign to a character … the three with exactly two 1-bits.

The advantage to this character code is that if the receiver decodes one of those invalid characters [i.e. a code that does not have exactly two 1-bits], it knows that an error has occurred. If you check it, all 1-bit errors of one of the three valid characters will create an invalid character. So, using this character code, the receiver can detect that one bit is in error in all cases. Some 2 and 3-bit errors will be detected but not all possible ones. If an "A" [011] gets corrupted to 000, it will be detected because 000 is invalid. However if "A" gets corrupted to 101, it is valid [B], and won't be detected. If all 3 bits of "C" are inverted, it's invalid [110-->001].

AMTOR-A: AMTOR-A transmits a message in 3-character groups using the CCIR 476 character encoding. That means the transmitter sends 21 bits. It then goes to receive. The receiver counts the number of 1-bits in each of the three characters and if all three have exactly four 1-bits, it sends an ACK character [one of the CCIR 476 control characters]. The transmitter then sends three more characters and the process repeats. If the receiver detects an error, it sends a NAK character and the transmitter repeats the three characters. On the air, this sounds like "chirp1, chirp2, chirp1, chirp2 ..." where chirp1 is the message transmitter and chirp2 is the message receiver. The chirp1's are 3 characters long, the chirp2's are 1 character long.

Because AMTOR is an HF mode, and HF channels tend to be "bursty, and he's only sending 21 bits at a time, a lot of the chirp1's will sneak between noise bursts. Not foolproof of course, but if the message is plain text, decoding errors can probably be human-corrected on the "I know that "6345 PAIN ST" is probably "6345 MAIN ST" principle. You'll have to poke around on the Internet to find some audio clips of what AMTOR-A sounded like, I haven't heard it in a number of years on the HF bands.

AMTOR-B: Mode B is a forward error correction mode and the transmitter just sends its message all the way through, again using the CCIR 476 character set. In the mode B case however, it repeats every character it sends, five character times later. So, if my message was "ATTACK AT DAWN", my transmitter would send:

"ATTA[A]CK<sp>A[T]<sp>DAW[T]N<i><i><i><i><i>[A]<i><i><i><i><i>[C]<i><i><i><i><i>[K]<sp><i><i><i><i>[A]

<i><i><i><i><i>[T]<i><i><i><i><i>[D]<i><i><i><i><i>[A]<i><i><i><i><i>[W]<i><i><i><i><i>[N]"

The<sp> are spaces, the <i> is the idle character, and I've set off the repeated characters between the brackets to make them more visible. The message is padded out with the idle character to provide space for the character repetitions left over at the end. If after replacing any erroneous character with its repetition, any of the characters are invalid in the CCIR 476 set, the receiver can send a NAK character and the transmitter can then resend the message, however a major usage of SITOR-B is for

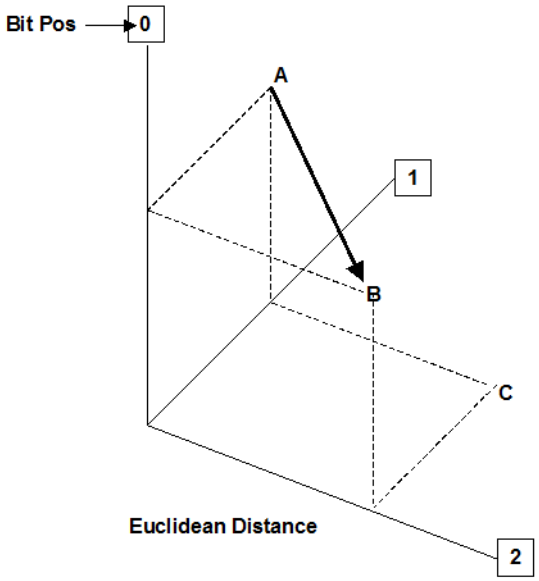
1 SITOR is very much alive in the maritime world, a large use is for distribution of weather forecasts

broadcast messages to multiple receivers and this generally isn't done.

This is a neat combination of error detection and forward error correction by repetition without experiencing the penalty of reducing your net throughput to 1/3 as would have been the case if I'd just sent the message three times and voted. The throughput rate is ½ of the channel rate because I do end up sending each character twice.[2]

Minimum Euclidean Distance: A mouthful that has a fairly easy explanation. My made-up 2 of 3 code above allows detection of one bit errors in each of the 3 assigned characters since each differs from the others by two bits. If ERRV has a single 1-bit, it will convert the character to a non-assigned combination alerting me that an error occurred. We say that my made up code has a minimum euclidean distance[3] of 2.

The term Euclidean Distance comes from geometry. The diagram at the right is my feeble attempt to illustrate this. In this case, my made up code has three bits which is usually denoted by *n*. I chose three because we're going to visualize the code in *n*-space, and, while the mathematics doesn't really care if *n* > 3, it's a little hard to draw the diagrams for that. ☺



We'll number the bit positions from the right starting at 0. Now, the code for "A" is "011" so I go up the "zero" axis 1 unit, and then out, parallel to the "one" axis 1 unit and that point represents "A". Similarly, the code for "B" is "101", so I go up the "one" axis 1 unit and out the "two" axis 1 unit, and that point represents "B". Describing the point for "C" is left as an exercise for the reader.[4]

All the invalid, unassigned code words can be plotted as well … "000" is at the origin, "001" is on the "zero" axis at the junction of the two dashed lines, and "111" hangs in space a little bit northeast of the "one" axis label in the square.

The Greek mathematician Pythagoras taught us all how to calculate the length of that heavy arrow between "A" and "B", it forms the hypotenuse of the triangle with the dashed lines as its other two sides. His rule is to square the lengths of those dashed lines, add them up and take the square root. The dashed lines are each one unit long, one squared is 1, and adding them we get 2. Thus the length of the arrow is the square root of 2 or about 1.414 units. We can skip the square root step because we're not interested in the physical distance, the two sides of the triangle are enough, and we would say the minimum euclidean distance between each pair of the three characters is 2. It is usually denoted by *d*.

The distance BC is also about 1.414 as is the distance AC [I know it doesn't look like it on the diagram but it would if I were a better draftsman]. "Why isn't it called 'Minimum Pythagorean Distance?" I hear you ask [pretend you did if you didn't ask]. Well, Euclid came after Pythagoras and did a lot more so he gets immortalized. Besides, Euclid is shorter and easier to spell than the other guy.

We can do this for any character code with any number of bits just as easy [unless you insist on a diagram], and the more bits we employ in our code and leave unassigned to characters, the larger the minimum euclidean distance will be between those combinations that are assigned. So long as the number of error bits is less than *d*, we can detect all possible errors. Saying it with algebra, these character codes will detect up to *d*-1 errors. *d* error bits will transform one valid character into another, anything less will transform the character into an invalid combination, signaling an error.

We're in the edge of "real forward error correction," the stuff that makes communications with a spaceship at Neptune possible. We'll start that next month.

73,

Fred K6DGW

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2 Well, it's a tiny bit less than ½ the channel rate because I have to add all the idle characters at the end.

3 Sometimes called "Hamming Distance" for Richard Hamming an early researcher in information theory.

4 A phrase commonly found in math texts. Another is, "...and it directly follows..." It's up to the poor student to discover that it does indeed follow but it is nowhere near "directly."

BOARD OF DIRECTORS MEETING MINUTES
September 13, 2013

The SFARC Board meeting for September commenced at 1801 hours at Round Table Pizza in Elm Avenue shopping center in Auburn.

Roll Call: President Bob Brodovsky-K6UDA and all officers and Directors were present with exception of Secretary, Dennis-WU6X and Board Member, Chuck-AE6LR. Also in attendance were refreshments Chair Jim-WA8NPA and Robert-W6RBL.

REPORTS and DISCUSSIONS

President's Report: Bob-K6UDA briefly discussed Mark-W8BIT will be taking the "hold-over" Director position for 2014.

VP/VE Report: Dave-NO6NO requested approval or consent to assemble a backup repeater. The Board directed Dave to assemble a 2nd repeater using existing components, to provide a backup system should the primary box go down.

Secretary's Report: via email; Dennis reported writing a "thank you" letter to the Auburn City Council for their generous donation of radio equipment to SFARC.

Treasurer's Report: Richard-WA6RWS reported net cash on hand at beginning of August as $6,106.11; expenses of $214.16; income of $69.00 and balance of $5,960.95. Richard requested approval of $43 gas expense to attend the NARCC meeting, and $60 for the PO Box; payment approval was moved, seconded and approved by Officers and Board.

Repeater Report: Richard-WA6RWS reported that the 2m repeater is still acting up with hotter temperatures. Also, the Livermore repeater seems to be getting into our system more than ever before. K6UDA reported he had made a contact with a ham in Livermore via the Livermore repeater … without changing PL's.

Web/PIO Report: no report.

OTHER DISCUSSIONS:

Elections Committee: Officers and Board discussed how to encourage the Membership to volunteer, and possibly get people thinking about nominations. Al-NI2U reported on volunteers thus far and the polling of present Officers and Board. Discussion was held on how to keep the momentum moving forward with new ideas; new people serving in Officer/Board positions was agreed to be a great way to do this.

Club Picnic: the Club picnic menu was discussed and hamburgers and hot dogs are planned. Also, there was agreement that Auburn Recreational Park would work the best. Cost is $80 for half day (9a to 2p) or $105 for a full day. A Saturday in October will be suggested to the Membership.

Christmas Party: A venue for the party was discussed as there is concern that we have out-grown the Newcastle church. Several possible places were discussed. Dennis reported via email that the Bell Road Baptist Church is not available. No decision.

Presentations: The presentation for the General Meeting was reviewed.

Meeting adjourned at 1833 hours. Submitted by *Richard-WA6RWS for Dennis Gregory-WU6X, SFARC Secretary*

GENERAL MEETING MINUTES
September 13, 2013

The SFARC General meeting for September commenced at 1930 hours at the Auburn City Hall Rose Room, President Bob Brodovsky-K6UDA presiding. All Officers and Directors were present except for the Secretary, Dennis-WU6X and Director Chuck, AE6LR. Bob led approximately 50 attendees in a Pledge of Allegiance to the flag followed by an introduction of Officers, members and guests.

REPORTS:

Past minutes: The minutes of the past General Meeting as posted in the Newsletter were approved as submitted on motion by Mark-WA8MPA, 2nd by Birton-N6UG.

President's Report: nothing to report.

VP's Report: nothing to report.

Treasurer's Report: Richard-WA6RWS reported net cash on hand at beginning of August as $6,106.11; expenses of $214.16; income of $69.00 and balance of $5,960.95.

Secretary's Report: no report due to absence.

VE's Report: Dave-NO6NO reported (9) candidates taking exams with (4) new Tech, (2) General and (3) Extra Class passing.

Repeater Report: Richard-WA6RWS reported that the 2m repeater is still acting up with hotter temperatures, and the Livermore repeater getting into our system more than ever. Richard suggested using the 220 machine when the 2m box has a problem until it can be resolved. Also discussed was the ability to run an audio "self-test" through the repeater; use published access codes. A short report was given about plans to construct a 2m backup repeater and the 440 repeater tie-in plans. Jim-KI6AZH's QTH is planned for the backup site. Richard reported his attendance of the NARCC meeting.

Satellite Report: Greg-KO6TH gave an update on the fast-scan amateur TV project planned from the International Space Station (ISS). More information can be found at: http://www.kayser.it/index.php/exploration-2/ham-tv. Greg also discussed satellite communications protocol, delays, and other interesting facts about communications into space. 146.430 simplex and 147.570 simplex (alternate) were the two frequencies allocated.

Sunshine Report: Nothing to report.

Refreshments and Drawing: George-KG6LSB reported items available for the drawing; Refreshments Chair, Jim-WA8NPA reviewed the "eats and drinks".

OLD BUSINESS:

Elections Committee: Al-NI2U reported on the *Elections Committee* desire to have several candidates this year for the various offices. Al talked about what it takes to be an Officer or Board member, and the minimal effort required, and encouraged members not to be afraid to run for an office.

Club Picnic: Al-NI2U reported on the Boards suggestion to have the picnic in October rather than July. Al is checking on available dates at Auburn Recreation Park. It's convenient, good shade, parking, playground for kids, and centrally located. Hamburgers and hot dogs are planned, with possible other meats; a sign-up sheet will be circulated soon. Carl suggested going to W6EK web and viewing pictures from past years picnic at the Park.

NEW BUSINESS:

"Pre-Election" Nomination: Bob called for people who might be interested in running for an office to stand and be recognized and be thinking seriously about volunteering. Several nominations were voiced and will be contacted by the Elections Committee as to what position they might be interested in.

(Continued on page 10)

White Elephant Sale: The up-coming White Elephant sale/auction planned for the October meeting was discussed and members are encouraged to bring whatever they can to donate to the Club.

Pacificon 2013: October 11th to 13th was discussed. Admission for all three days is $23 until September 30th, then $28 at the door. Saturday night banquet is extra ($47).

General Announcements: The Club Net meets every Thursday's at 7:30 on W6EK repeater; Board and General meetings occur on the 2nd Friday; Board is typically held at Elm Avenue Round Table Pizza in Auburn at 6pm (venue subject to change at the discretion of the Board), and General meetings at 7:30pm at Auburn City Hall. Club breakfasts are held on the last Saturday of every month at Mel's Diner in Auburn at 7:30am; the "Prepper Net" and the Elmer Net are held on opposite Wednesday nights at 7:30pm on W6EK repeater. See website (www.W6EK.org) for more information date or venue changes.

Tech-Ten: A planned D-Star presentation was postponed due to the D-Star repeater being destroyed by fire.

Presentation: A very informative presentation on "bug-out gear" and emergency preparedness in this area was given by Kim Scheidel KE6RKX.

The meeting adjourned at 2125 – Submitted by Richard-WA6RWS for Dennis–WU6X, Club Secretary

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

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SIERRA FOOTHILLS AMATEUR RADIO CLUB **2013 MEMBERSHIP APPLICATION**
P.O. Box 6421, Auburn, CA 95604

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:_____

Rev. Nov 2012