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

At The Key of SFARC:

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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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Barbara Anderson, W6EVA
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WEBMASTER:
Carl A Schultz, WF6J

Inside this issue:

Calendar:

Fri 14 December: Club Christmas Party

Sat 29 December: Club Breakfast

Tues 25 December: Christmas

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

President's Christmas Ideas

It's beginning to look a lot like Christmas… Ahh the hectic time of year is upon us. Vacation traveling is pretty much over; our boats, motorcycles, and motorhomes are winterized and the weather is getting (well, cooler) and less fun to be out in. In the spirit of my six year old grandson, "it's all about the toys." I'm not going to attempt something insightful, but have decided instead to play with toys. So here's the plan… You leave this page strategically placed on the kitchen counter where other members of your clan will surely be looking for stocking stuffer ideas. Say goodbye to the ugly tie or xmas sweater… See you at the Christmas Party!

Baofeng UV-5RA Ham Two Way Radio Dual-Band DTMF CTCSS DCS FM UV-5R Transceiver

This little gem has been all the rage here in the Auburn area for the past few months. Priced at just about $50.00 delivered, this is one of those "gotta have" items you'd love to find under the tree. It's a 2/4 watt, dual band, dual VFO radio that can be programmed on either your PC or on the radio. At this price, I know guys who are buying them as emergency radios for each member of the family as incentives to get a tech license.
You'll find then for as little as $42.00, but look for the vendors that offer free shipping.
Go to ebay.com & search: baofeng uv-5r.

Nifty Ham Radio Guides
We all have a radio or two (or six) that has many, many more functions than we know how to use. Yes, you could RTFM, but then after a month, it would become stained with pizza and Pepsi. The Nifty Guide is small, TRI fold size, thick & laminated, and great for throwing it a backpack or field box. The best part is, it gets right to the nitty gritty of the radios programming and functions. You order these for specific radios, and I haven't found a radio I own that they don't make a Nifty Guide for.

Order online from your favorite ham radio retailer like HRO for about $20.00 or go to their website at:
http://www.niftyaccessories.com/

Anderson Power Poles

These things are the greatest things since sliced bread. I've got power poles on virtually all things ham radio. They make perfect electrical connections, are idiot proof once installed, and cheap. I can install any radio I own and apply power in seconds. Swap radios in different vehicles, power supplies in my shack, extension cables, etc… I'm even using them for the electrical system in my race car.

You can get them at a variety of online retailers, but I prefer Powerwerx.com. They have a huge selection of wire, connectors, tools and diagnostic equipment.
http://www.powerwerx.com/

DC Inline Watt Meter and Power Analyzer, Powerpole Ends
Once your all setup with power poles, this slick little watt meter will plug right in and make your power diagnostics as simple as plugging it in. Measuring capacity up to 60 V and 130 A. Bright blue backlit LCD display. Measures 8 electrical parameters: Amps, Volts, Watts, Amp-hours, Watt-hours, Peak Amps, Minimum Volts (Sag), Peak Watts. Auto reset feature. No configuration, works automatically!

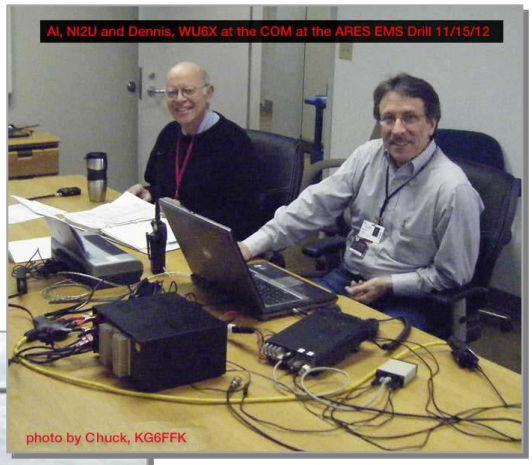
Get this one from Powerwerx.com exclusively for $59.99
http://www.powerwerx.com/

Sutter Health Emergency Management System Exercise

By Dennis Gregory, WU6X

On November 15, 2012, the helicopter landed on the helipad at Sutter Roseville Medical Center. Al and I transmitted HICS-213 forms between SAFH and SRMC using MT63 digital and voice modes via FLdigi software. Roseville forwarded and received messages from Kaiser Roseville and SHEMS with 100% success. One of the simulations involved notifying Sutter Auburn that the Blackhawk had crashed on a landing attempt at Roseville Med Center, with casualties, and that event had closed the hospital from receiving patients temporarily. Auburn responded with their readiness to accept Roseville's patients.

As always, there are still improvements to be made ... antennas, more radios, portable printers, etc., but all said, I believe we could have handled traffic should it have been a real emergency and we were operational at Auburn within a 1/2 hour of arriving. This will get shorter once the antennas get installed and the rest of the radio gear is available. BTW, for those of you who want to participate next year somehow, the coffee at Sutter Auburn is good ... and only costs 10 cents!



Miscellaneous Radio

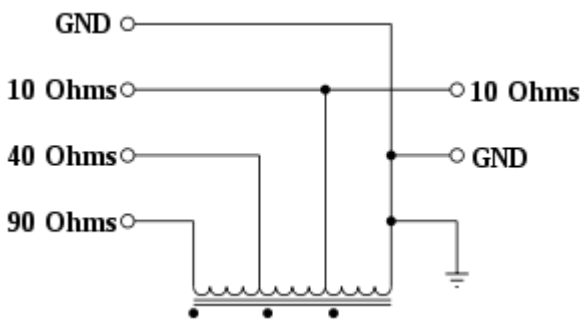
Antenna Tuners

We all have them; we've used them for years, even though our "antenna tuners" have never "tuned" an antenna … not even one. There was a time when we called them "antenna couplers" which is closer but still not technically true. So, if the name "Antenna Tuner" does not describe its function, what does?

Most antennas work best when they are elevated and in the clear. Generally speaking, it is somewhat inconvenient to have your radio elevated and in the clear too, and we solve this with a transmission line from the antenna to the radio more conveniently located. Conceptually, the transmission line is a hose … power in the antenna from the distant station flows down the hose to the receiver and power from the transmitter flows up the hose to the antenna. Coaxial cable even looks like a hose, but that's where the similarity ends.

RF energy is alternating current, so the feed point impedance of an antenna will have both a resistance component and a reactance component which we write as a complex number: $Z = R \pm jX$, where R is the resistance component [ohms], X is the reactive component [ohms, positive is inductive, negative is capacitive], and j is the square root of minus one. If the antenna is resonant, X will be zero – that's the definition of "resonant". If $X = 0$ and R is equal to the characteristic impedance of the transmission line, we say the line is "matched," and the transmitter will see an impedance of R ohms regardless of how long the line is.

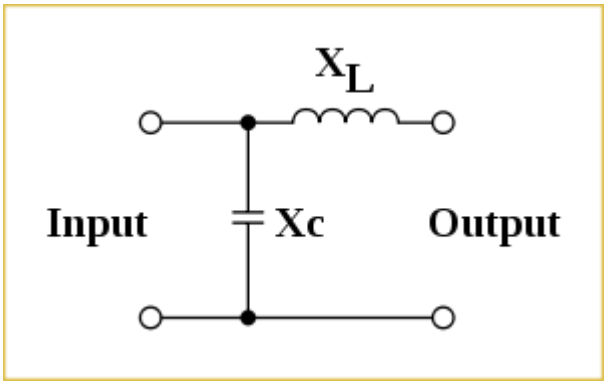
If the antenna is not resonant, or if R is not equal to the line impedance, the impedance seen by the transmitter will be different, will depend on the length of the transmission line,[1] and will be complex … that is, it will have both resistive and reactive components. Our transmitters are designed today to operate into a fixed impedance, most often *50 + j0* ohms. And, that's the real purpose of the "antenna tuner." It is a network that transforms one impedance into another – in our case, it transforms whatever impedance appears at the transmitter end of the transmission line to what the transmitter is designed for and "transmission line coupler" would be a good description, "complex impedance transformer" would be better. What do they look like?



Well, one possibility would be a transformer since we know that the impedance in the secondary is a function of the impedance connected to the primary and the turns radio between the two windings. The example at the left is exactly that, as an autotransformer, with the two windings combined. If the impedance at the end of the transmission line is *10 + j0* ohms, and we connect it to the 10 ohm terminal and GND on the right and the transmitter to the 40 ohm terminal and GND on the left, the transmitter will believe that it is sending power into a 40 ohm transmission line.

Frequency won't matter, but note … the transmission line must have zero reactance. All real RF loads have non-zero reactance unless they are resonant, and that occurs only at one frequency. So, a simple transformer won't take care of everything.

Here's a network that <u>will</u> take care of "everything." It's called an "L-Network" because, if you turn it counter-clockwise 90 degrees, the inductor and capacitor are arranged in the shape of the letter "L". It really comes in 4 flavors: as shown; with the X_C on the output terminals; and two versions with X_L and X_C *swapped*.



Theoretically, at least one of the four flavors will transform ***any*** input impedance to ***any*** output impedance. Some impedance transformation combinations will result in some pretty wild component values that might not be physically realizable[2] but theoretically, it is universal device.

Note that the values for the inductor and capacitor depend on both the impedance transformation desired, <u>and</u> the frequency.

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1 If the line is a multiple of a half-wave long, the transmitter will see the feedpoint impedance of the antenna.

2 For example, inevitable circuit stray capacitance might be larger than the required value of X_C

Thus these components must be adjustable if it is to work over a band of frequencies.

Computing the required values of *XL* and *XC* is fairly straightforward if you know how to do arithmetic with complex numbers.

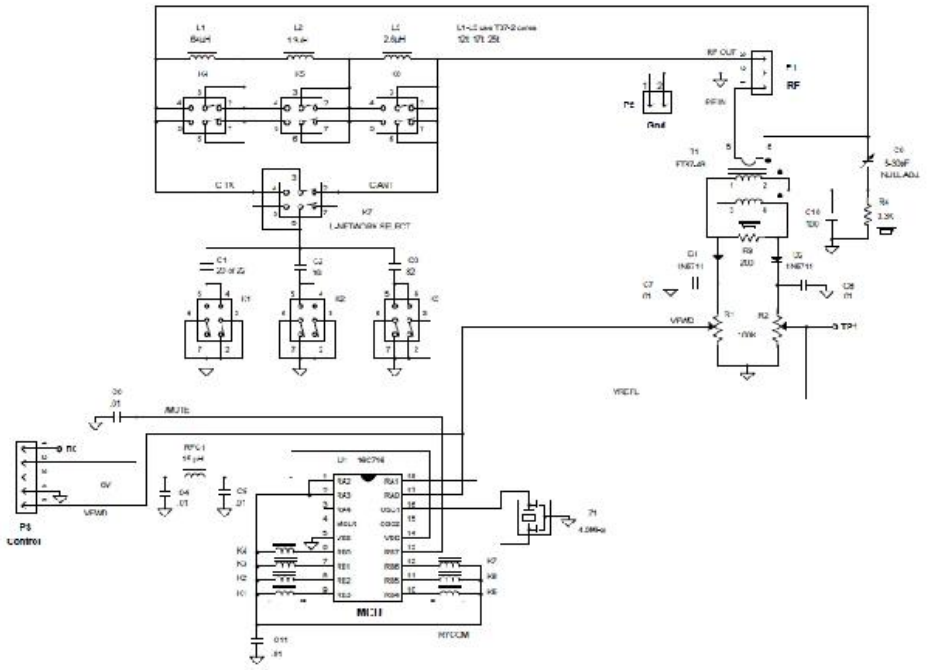
$$X_L = \sqrt{\left(R_{source} + jX_{source}\right)\left((R_{source} + jX_{source}) - (R_{load} + jX_{load})\right)}$$

$$X_C = (R_{load} + jX_{load})\sqrt{\frac{(R_{source} + jX_{source})}{(R_{load} + jX_{load}) - (R_{source} + jX_{source})}}$$

And of course, knowing the required reactances, we can compute the capacitance required in farads and the inductance in henries. In manual antenna tuners, the capacitor is variable and the inductor is usually a roller inductor. Years ago, automated tuners were sometimes built using motors on the capacitor and inductor controlled from a directional coupler that measured the phase difference between the current and voltage and ran the motors to drive it to zero.

Today, with the ubiquitous microprocessor, automated tuners are very common. They use relays driven by a programmable microcontroller to switch capacitors and inductors into/out of the circuit. The controller receives SWR and impedance data from a directional coupler, and the controller program creates combinations trying to minimize the SWR seen by the transmitter. While there are elements of trial and error in the algorithm, there are some mathematical techniques that help it converge on the right combinations of L and C.

KXAT1 Schematic



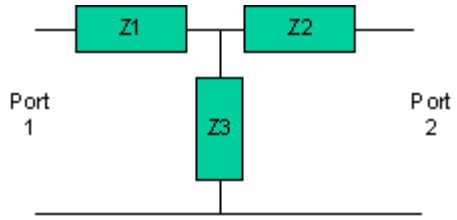
The above diagram [which isn't too clear, I'm sorry] is the KXAT1 autotuner in my Elecraft KX1 trail radio. The stuff at the bottom is the microcontroller, and the 7 relay coils it drives. It receives data from the directional coupler on the right, and we're going to ignore that part. What we care about here are the 7 relays, 3 inductors, and 3 capacitors in the upper left. They're labeled K1-K7, C1-C3 [20pf, 39pf, and 82pf] and L1-L3 [0.64µh, 1.3µ, and 2.6µh].

Now, capacitors in <u>parallel</u> with each other simply add values. Likewise, inductors in <u>series</u> add. The 6 relays switch the 3 inductors into/out of a series connection, and the capacitors into/out of a parallel connection. If we label the inductors A, B, and C, this gives us 8 different inductance values: A; B; C; A+B; A+C; B+C; and A+B+C. "That's only 7," I hear you say. The 8th one is actually none … that is a short across all of them leaving just the inductance of the wire. Likewise, the

capacitors combine in parallel, and we get 8 more values. Together, that makes 8^2 or 64 different L-C combinations. In addition, K7 switches the capacitor to either the input or output side of the network yielding 128 possible value/configuration combinations.

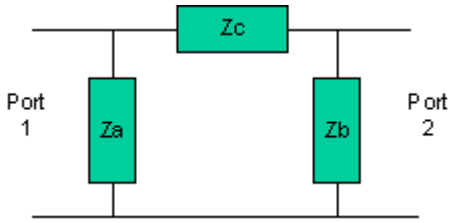
Now, the KX1 is a trail radio, 3" x 5" x 1", space is at a premium, and 3 toroids, 3 capacitors, and 7 miniature relays is what will fit. For the record, my KXAT1 has never failed to get an acceptable match on whatever I've connected to it.

Autotuners that are not constrained by size like the KX1 can have more inductors, capacitors, and relays, and the number of combinations – and thus the range of SWRs and the accuracy of the match – get large very fast. For example using 4 inductors we get: none; A; B; C; D; A+B; A+C; A+D; A+B+C; A+B+D; A+C+D; B+C; B+D; B+C+D; C+D; and A+B+C+D for a total of 16 combinations. Likewise with 4 capacitors, and the total number of combinations is 16^2 or 256. We have two ways to configure those combinations [capacitance on input or output] for a total of 512 possible combinations. 5 inductors and capacitors would give us 32^2 combinations times the two configurations for 2,048 possible combinations.



The L-network is not the only network that will transform complex impedances. At left is a T-network, and many manual tuners are of this design. The "Z's" are reactances [either capacitor or inductor], but usually, two of them are variable capacitors and one is a roller or tapped inductor. T-networks have a broader range of impedance transformation with normal-sized components, but they are more complex to tune and exhibit "false matches" where the SWR is at a minimum but it's not the lowest possible minimum.

Another possibility is the Pi-network, so called because it looks like the Greek letter π. In fact, every possible T-network has an equivalent Pi-network, and, as you might suspect, the Pi will also exhibit false matches.



Terms, meaningful or not, tend to become ingrained in our jargon, just as calling a contact a "QSO" is technically incorrect. QSO XXXX? means, "Can you make contact with XXXX?", and QSO YYYY means "I can make contact with YYYY." We just turned it into a noun. So we'll continue to call them "antenna tuners" of course, or if you're old, "antenna couplers" … but we all know what is really happening. My thanks to Elecraft and Eric, WA6HHQ, for permission to use the KXAT1 schematic.

73, and Happy Holidays to all

Fred K6DGW

Sunshine Report

Jim Griffith, KI6ATH, recently had to go back in for additional surgery to remove wires holding his ribcage together.

Bill Mahl, W6WEM, fell and broke his leg and ended up having his hip replaced.

Jim and Bill, get well and hope you can make it to the Christmas Party!!!

Richard WA6RWS

BOARD OF DIRECTORS MEETING MINUTES
November 9, 2012

The SFARC November Board meeting commenced at 1743 hours at 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. Directors present were Chuck Baker-AE6LR, Jim Griffith-KI6AZH and Gary Martinez-N6UWQ. Also present were VE Examiner Dave-NO6NO. PIO Carl-WF6J was absent. Guests present were Bob-WB6VYH, Amaryllis-KJ6TFT and Caroline, Mark-W8BIT and Toni, and Larry-KJ6WOL.

REPORTS and DISCUSSIONS

President's Report: No report.

VP's Report: Ballots ready for voting on new Officers and Directors for 2013.

Secretary's Report: No report.

Treasurer's Report: Richard reported a beginning balance as of October 1st of $3,413.84. Expenses in October totaled $427.96. Deposits included proceeds from the White Elephant Auction of $600, donations and memberships to total $699.00. Net cash on hand at end of October is $3,684.88.

Repeater Reports: No report.

VE Report: Dave reported (7) candidates for exams, all passing; (5) new Techs and (2) Extra class.

Property Officer: No report.

Web/PIO Report: No report

Other Reports: Richard reported no progress on looking into the possibility of a large room at Auburn Faith Hospital that may work as a larger venue for General meetings.

Discussions: The Board discussed possible other activities (XMTR hunt, antenna build session, operating digital modes, etc.); other short discussions included awards/nominations for the Christmas Party and proposed term extensions for Officers from 2 years to 4 years.

Jim-KI6AZH moved, 2nd by Al-NI2U, approved unanimously by the Board, to bring the proposal for term extensions (and resulting By-Laws changes) to the Membership for consideration during November/December, for potential vote in January.

Other Motions: Al-NI2U, 2nd by Gary-N6UWQ, to pay rent to the Newcastle Church for the room to hold our Christmas Party. The Board passed the motion unanimously.

Meeting adjourned at 1817 hours. Submitted by *Dennis Gregory-WU6X, SFARC Club Secretary*

GENERAL MEETING MINUTES
November 9, 2012

The SFARC General meeting for November commenced at 1930 hours at the Placer County Library in Auburn. Officers present were President Bob Brodovsky-K6UDA; Vice President Al Martin-NI2U; Secretary Dennis Gregory-WU6X and Treasurer Richard Kuepper-WA6RWS. Directors present were Chuck Baker-AE6LR, Jim Griffith-KI6AZH and Gary Martinez-N6UWQ. Also present were VE Examiner Dave-NO6NO and Webmaster/PIO Carl Schultz-WF6J.

President Bob-K6UDA led approximately 36 members and 11 guests in a Pledge of Allegiance to the flag, followed by an introduction of Officers, members and guests.

REPORTS:

Past minutes: The October General meeting minutes, as published in the Newsletter, were unanimously approved.

President's Report: See Proposed By-Laws Change under new business.

VP's Report: Election of officers ballots are ready.

Treasurer's Report: Richard reported a beginning balance as of October 1st of $3,413.84. Expenses in October totaled $427.96. Deposits included proceeds from the White Elephant Auction of $600, donations and memberships to total $699.00. Net cash on hand at end of October is $3,684.88.

Secretary's Report: Dennis-WU6X reminded guests and new members to stop by and pick up a "Welcome Letter" containing useful information on the Club during the break.

VE's Report: Dave-NO6NO reported (7) candidates for exams, all passing; (5) new Techs and (2) Extra class.

Repeater Report: None; **Satellite Report** – None; **Web/PIO Report** – None; **ARES** – None

Sunshine Report: Richard-WA6RWS reported that both Bob-WE6C and Donna-W6CQX were down with the flu.

OLD BUSINESS:

Elections Committee: The Committee presented candidates for Club offices as follows: President, Bob Brodovsky-K6UDA; Vice President, Dave Albright-NO6NO; Secretary, Dennis Gregory-WU6X; Treasurer, Richard Kuepper-WA6RWS; Director, Donna Naylor-W6CQX; Chuck Baker-AE6LR and Mark Graybill-W8BIT. There were no other nominations from the floor. Jettie Hill-W6RFF moved, 2nd by Mike-N6BRP, to accept the Committee's proposed candidates as read from the ballot. The motion passed unanimously.

NEW BUSINESS:

ARRL Report: Ron Murdock-W6KJ, Sacramento Valley ARRL Section Manager recapped an FCC Notice of Proposed Rule Making (NPRM) to modify the Amateur Radio Service rules to grant examination credit for expired and beyond-the-grace-period-for-renewal Amateur Radio operator licenses; to shorten the grace period during which an expired amateur license may be renewed; to revise the time a call sign is not available to the vanity call sign system, and to reduce the number of volunteer examiners needed to administer an amateur license examination from 3 to 2. The NPRM also asks for comment on amending the rules to permit remote test administration, and proposes to amend the Amateur Radio Service rules to allow amateur stations to transmit certain additional emission types. Comments must be filed on or before December 24, 2012. The NPRM can be found on the web in PDF format at:

http://transition.fcc.gov/Daily_Releases/Daily_Business/2012/db1002/FCC-12-121A1.pdf

(Continued on page 9)

Christmas Party Prizes: Motion by Dave-NO6NO, 2nd by Paul-KB6NYB, to create a Christmas Party prize again this year in the amount of $150. The motion passed unanimously.

Christmas Party Rental: Bob-K6UDA reported on the Board's decision to again reserve the Church in Newcastle for this year's Christmas Party venue, and to pay a fee of $200 for the rental.

Proposed By-Laws Change: Bob presented the Board's recommendations to extend term limits for Club Officers from 2 years to 4 years. Bob explained that the term would remain a year-to-year service and still be voluntary. The rationale is that some positions (e.g. Treasurer) take considerable time to master, and the person must leave office about the time he/she begins to be comfortable with the responsibilities. With longer possible terms, a serving Officer can legally remain in office beyond the present 2-year term if re-elected by the Membership. The Membership was asked to consider the proposed changes pending a vote in January.

General Announcements: The Club net is 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 Membership was also reminded of the Veteran's Day weekend parade in Auburn, starting at 10:50am at the Chamber.

Tech-Ten: Dave-NO6NO presented the steps and form example of how to apply for and get an amateur radio license plate. Cost is a one-time fee of $21.

Presentation: Dennis-WU6X presented a video tour of ARRL radio station W1AW recorded in February of this year.

The meeting adjourned at 2057 – Submitted by, Dennis – WU6X, 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