



P.O. Box 6421 Auburn, CA 95604

January 2014

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

**At The Key of SFARC:**

**PRESIDENT**

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no6no@pacbell.net

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Robert Bell, W6RBL  
Jim Jupin, WA8MPA

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Dave Albright, NO6NO

**REPORTERS**

Satellites: Greg, KO6TH  
History: Gary, KQ6RT  
Misc Radio: Fred, K6DGW  
Sunshine: Richard, WA6RWS  
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  
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anderson51@starstream.net

**WEBMASTER & ARRL PIO:**

Carl A Schultz, WF6J

**Calendar for January**

**Friday 10<sup>th</sup>:  
Club Meeting**

**Saturday 25<sup>th</sup>:  
Club Breakfast**

**Inside this issue:**

- *From the Mic*
- *D. Michael "Puma" Clements, K6BJS SK*
- *Sunshine Report*
- *Miscellaneous Radio – Coding & Ham Radio*
- *Christmas Party Minutes*
- *Tribute to Bob*



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

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## From the Mic

*By Tyghe Richardson – KD6MLH, President*

I would like to thank everyone for electing me to President of the Sierra Foothills Amateur Radio Club; I am honored. As I made clear in my campaign statement I want to see the club grow and retain its current attributes, and I will work hard to accomplish this. I would like to thank all the members that have volunteered to support and promote the club. I would especially like to thank **Bob Brodovsky K6UDA** for doing a wonderful job as President for the past two years. As I replace Bob I can't help but think of how well he performed the role of President. I hope I can follow in his footsteps and help to fulfill the goals set forth by our members.

This hobby is about many things, one of which is volunteering - what better way to enjoy part of ham radio than to volunteer with this wonderful club! We have several people volunteering in multiple capacities in the club, and I would like to ask for more volunteers to step up so that no one gets burned out. I would like all the normal standing committees for 2014 to be formed and a chairperson selected at the January 10<sup>th</sup> club meeting. Vice President **Dave Albright NO6NO** and I would like to add a Vice Chairperson position to most of the 2014 committees. Adding a Vice Chairperson to most of the committees will help spread the work load and give a fall back/second contact person if needed. This is the list of committees we currently have:

### 2014 COMMITTEES AND CHAIRPERSONS

Field Day, **Bob Naylor WE6C**  
 Membership, **Ron Etchells KK6DHJ** (new committee)  
 Raffle and Volunteer Events, **George Simmons KG6LSB**  
 VE Exam, **Dave Albright NO6NO**  
 Refreshments, **Jim Jupin WA8MPA**  
 ARES, **Chuck Minton KG6FFK**  
 Newsletter, Greater Sunshine, Repeater, **Richard Kuepper WA6RWS**  
 Webmaster, **Carl Schultz WF6J**  
 Contest, **Bob Brodovsky K6UDA**  
 Satellite, **Greg Dolkas KO6TH**  
 Picnic \_\_\_\_\_  
 Christmas Party \_\_\_\_\_  
 Nomination/Election \_\_\_\_\_  
 White Elephant \_\_\_\_\_

Please think about volunteering and how you would like to participate!!

If you need any information on the committees, or if you would like to volunteer as a Chairperson or Vice Chairperson, contact me and attend the January club meeting. I encourage all the members to think about volunteering. More help is greatly appreciated! No matter how long you have been a ham you can help the club by joining one of the committees now. It seems that as we get more help from technology the years go faster and faster. January 1<sup>st</sup> is closer to December 31<sup>st</sup> than ever before. It will be elections and the Christmas party before we know it.

And, don't forget to renew your membership - you can renew at the next meeting, by mail, or on the web site.

I am looking forward to a fun year of club events and camaraderie with a great group of people. We should all make the most of each event and meeting, so I hope to see y'all at our events this year!

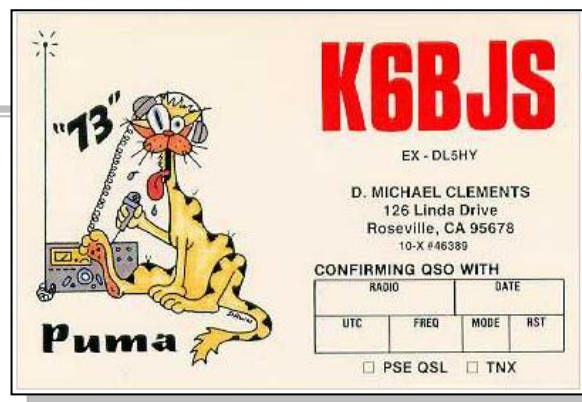
## D. Michael (“Puma”) Clements, K6BJS SK

Puma Clements, K6BJS, passed away in the latter part of December 2013. Those who have been around awhile will know that he goes back a long way with the Sierra Foothills ARC community. I remember talking with him on my commute when the K6ARR repeater was still on 16/76. He lived in Roseville and was active in a number of the public service activities of both the SFARC and the Golden Sierra Amateur Radio Group which worked with the Placer County Search and Rescue for a number of years.

Puma was a very private person, and although I knew him for many years, he never talked with me about his family, or, with the exception of a few conversations, about his military service or other parts of his life. He spent time in Germany and had held DL5HY. He worked at several of the many incarnations of what we all know as the Ground Cow over the years, and he volunteered for the communications crews for the Western States, Tevis, and various charity events in the area. Once, while Andrea and I were on our way down to the Metke garage for the start of the Roseville Christmas Parade, she said to me, “We should stop and get some donuts.” I was talking with Puma on 2m at the time and I asked him if he thought that was a good idea. He replied, “Bob’s a former police officer, I really think there will be donuts” (and there were). Puma was also very generous to new hams, particularly younger ones. As one license class that I was teaching for the SFARC was coming to a close, he showed up with a 2m mobile and two 2m HT’s to give to three of the students.

I had not talked to Puma in a couple of years. While he was private and did not share a lot of personal information and experiences, he was a friend and his passing is sad indeed. Rest in peace, Puma.

Fred K6DGW



## Sunshine Report

Please keep **Chuck Baker AE6LR** in your prayers that his medical treatments will be successful.

Richard  
WA6RWS

*“Any man who thinks he can be happy and prosperous by letting the government take care of him better take a closer look at the American Indian.” ~ Henry Ford*

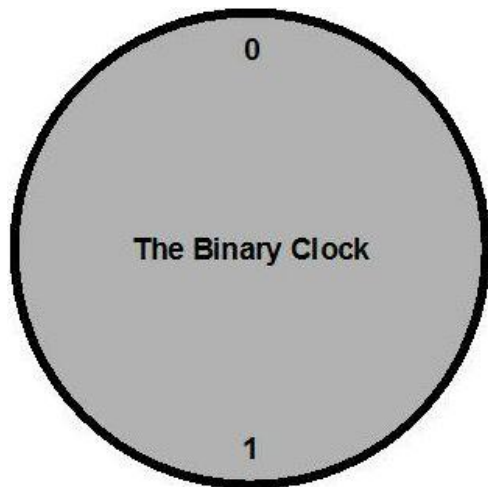
# MISCELLANEOUS RADIO

## Coding and Ham Radio

### Build A (7, 4, 3) Hamming Code Encoder

As mentioned earlier, one way to build an encoder for our code is to just do a table lookup. It has 16 entries for the 16 possible 4-bit data blocks, and each entry contains the 7-bit block to be sent. Memory is dirt cheap these days, but while that works for this simple code, there are much more complex block codes for which it is far from optimum. So, we will resort to a little math to devise a mechanism that can be made to work for all block codes. To do so, we need to take two short digressions into modulo arithmetic, and linear algebra. Not to worry however, while math dudes may view these subjects as more fun than a college kegger party, our use is very simple, and since we're in binary [only 2 digits], the arithmetic becomes absurdly simple.

**Modulo Arithmetic:** It is sometimes called “clock arithmetic,” and that's a really great way to understand it. Imagine a clock face, 12 at the top, 6 at the bottom. Pick a number ... let's pick 5. Now pick another number, let's pick 4. Add the two, and we get 9 which is on the clock. Now, with 9 as our first number, let's pick another, say 7. Add it to 9 and we get 16, which, if you've served in the military or operate a radio, is a perfectly valid time. However, not all of the world has served in the military or operates a radio, and their clocks [and nearly all of ours too] don't have 16 on them.<sup>1</sup> So, if we start at 9 on our 12-hour clock and count out 7 hours clockwise, we end up at 4. In math-dude jargon, “ $9 + 7 \text{ mod } 12 = 4$ .” It's the same as dividing 16 by 12, discarding the quotient, and keeping the remainder, and it works every time, guaranteed. ☺



OK ... here we have a binary clock. It has one of the digits in our system [0] at the top and the other [1] at the bottom, there are after all only two digits in a binary system. And, as I said, the “clock arithmetic in binary” is absurdly simple:

$0 + 0 \text{ mod } 2 = 0$  ... nothing changed

$0 + 1 \text{ mod } 2 = 1$  ... we moved half way around

$1 + 0 \text{ mod } 2 = 1$  ... we did the same thing

$1 + 1 \text{ mod } 2 = 0$  ... we're back at the top

Not exactly rocket science, right?. And, if you check those 4 lines above, you'll realize they define the Boolean Exclusive-OR function [XOR] which we already saw earlier in this drive.

Now, make no mistake, modulo arithmetic, when applied to number systems more complex than binary can lead to some hugely interesting things,<sup>2</sup> but our binary number system has exactly 2 digits and the above is pretty much all there is. Sorry about that. ☺

**Linear Algebra:** Please don't quit reading, this is as simple as clock arithmetic if you're doing it in the binary number system. There are two things we need from it. Linear algebra defines a “vector of order  $n$ ” to be an ordered set of  $n$  numbers. In binary, the numbers are either 1 or 0.

**[1 0 1]**

This is an example of a binary vector of order 3. The order of the numbers does matter, [1 0 0] is a different vector from [0 0 1]. For our purposes, we can consider this vector to be 3 bits out of a stream of bits and would form a data block for a block code that will encode 3 bits into a codeword with a larger number of bits.

**$\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix}$**

Linear algebra also defines an entity called a matrix. The one at the left is a 2x3 binary matrix and is made up of three order-2 vectors [the rows]. Now there are all sorts of things we can do with vectors and matrices, and math dudes love them, but there's only one thing we want to do with them, and that is multiply a binary matrix by a binary vector. Doing this involves multiplying 1's and 0's [rather simple] and then adding the 1's and zeroes together [also very simple].

The only wrinkle is that when we add them together, we use our binary clock arithmetic above [adding modulo 2], so the answer will always be a 1 or a 0. Add the 1's and zeroes up, divide by 2, throw the quotient away, and

<sup>1</sup> The USAF issued us wrist watches that had 24 hours on the face and the hour hand went around once in 24 hours. Took some getting used to.

<sup>2</sup> If you're a Math Dude

keep the remainder. Also very simple.

So how do I multiply a binary matrix and a binary vector and what does the answer look like? Well the matrix must have as many columns as the order of the vector, which in the example is 2. The answer will be another vector whose order is the number of rows in the matrix – 3 in the example. The example below shows how to do it. For this example, I arbitrarily chose an order-2 vector and a 2x3 matrix just to keep things simple. The three rows in the matrix are labeled “a”, “b”, and “c”, and the columns are labeled “1” and “2”. The two vector elements are labeled “v<sub>1</sub>” and “v<sub>2</sub>”

$$\begin{bmatrix} a_1 & a_2 \\ b_1 & b_2 \\ c_1 & c_2 \end{bmatrix} \times [v_1 \ v_2] = [(a_1v_1+a_2v_2) \ (b_1v_1+b_2v_2) \ (c_1v_1+c_2v_2)]$$

I start with the “a” row of the matrix and multiply a<sub>1</sub> by v<sub>1</sub> and a<sub>2</sub> by v<sub>2</sub> and then add them together modulo 2. The answer is either 0 or 1 and that becomes the first element of the result vector. I then move to the “b” row and do

exactly the same thing which gives me the second element of the result vector, and likewise for the “c” row. The answer is an order-3 binary vector.

$$\begin{bmatrix} 1 & 0 \\ 0 & 1 \\ 1 & 1 \end{bmatrix} \times [1 \ 1] = [1 \ 1 \ 0]$$

Here's an example with numbers. It's an order-2 vector and the matrix has 2 columns. It has 3 rows so the result is an order-3 vector. Starting with the top row, 1 x 1 = 1 and 0 x 1 = 0 and adding them modulo 2, I get 1 for the first vector element. Using the middle row, 0 x 1 = 0 and 1 x 1 = 1, and adding, I get 1 for the second vector element. Using the bottom matrix row, 1 x 1 = 1 twice, adding I get 2, and when I divide by 2, the

remainder is 0 which becomes the third vector element. As I said, this is really simple, you can do it on the fingers of one hand even if you're missing a couple of fingers, and it takes way longer to explain it than to do it.

But, “What good is all of this?” I hear you ask. Well, lets pretend that we've received a string of bits [maybe from a keyboard] using some sort of character encoding, let's say plain 8-bit ASCII characters but it doesn't really matter, which I want to encode into a (3, 2, 1) block code. The order-2 vector [a block] is simply 2 bits out of the stream. The matrix is called the “generator matrix,” usually denoted by **G**. I multiply **G** by my 2-bit vector and get an order-3 vector. Those 3 bits are what I transmit for each block of 2-bits in the bit stream, and that's my (3, 2, 1) FEC block encoder. Every binary block code that exists, and the number is countably infinite, has a unique **G** matrix that will encode it.

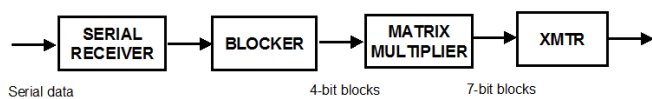
Now, I just made up that **G** and the 2-bit data block, and there actually is no useful (3, 2, 1) block code. But, what about our now-familiar (7, 4, 3) Hamming code? Its generator matrix is:

$$\begin{bmatrix} 1 & 1 & 0 & 1 \\ 1 & 0 & 1 & 1 \\ 1 & 0 & 0 & 0 \\ 0 & 1 & 1 & 1 \\ 0 & 1 & 0 & 0 \\ 0 & 0 & 1 & 0 \\ 0 & 0 & 0 & 1 \end{bmatrix} \times [0 \ 1 \ 0 \ 1] = [0 \ 1 \ 0 \ 0 \ 1 \ 0 \ 0]$$

Just trust me for this month, that 4x7 matrix really is the generator for our code, we'll get back to “How do I know that” next month. I arbitrarily picked a 4-bit vector [0 1 0 1] which happens to be “F” in the table of valid (7, 4, 3) code words. When I multiply **G** and the 4-bit vector, I get a 7-bit vector which is the code word I will transmit, which does correspond to the 7-bit code for “F”. Feel free to check my work, you now know how. ☺

So my (7, 4, 3) encoder looks something like the

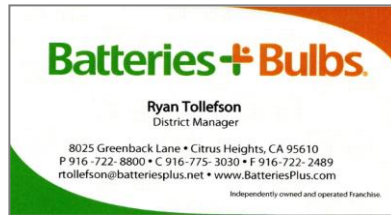
following block diagram:



The incoming data bits form a serial stream in a SERIAL RECEIVER [like a UART], and go through a BLOCKER which divides the stream into 4-bit blocks. Those blocks are multiplied by the generator matrix forming 7-bit blocks which are transmitted. It does this over and over until

there are no more incoming bits. Although mentioned earlier, it bears repeating that, since the encoder transmits 7 bits for every block of 4 received, either the transmitter has to have a faster bit rate than the incoming stream, or we need some memory to buffer the blocks until they can all be sent.

With short blocks like 7 bits, the likelihood that blocks can slip between the error bits caused by noise is fairly high in moderately quiet channels. The likelihood that, if an error occurs in such a channel, it will be a single bit error is very high, and our (7, 4, 3) Hamming code can exhibit very good FEC power under such circumstances.



## CHRISTMAS PARTY MINUTES

### December 14, 2013



The SFARC General meeting for December was cancelled in lieu of the Christmas Party held on Saturday the 14<sup>th</sup>, commencing at 1830 hours at the Veterans' Memorial Hall in Auburn. President Bob-K6UDA greeted approximately 68 members and family in attendance.

#### **Secretary's Report of the event follows:**

A wonderful meal was served accented by turkey and ham furnished by the Club, with members bringing more side dishes than everyone could eat. It was a fantastic feast and I believe no one went away hungry, especially after the deserts were laid out.

Out-going President Bob Brodovsky-K6UDA had his name added to the distinguished list of "past Club Presidents" and was given a round of applause for his faithful service during the last two terms.

Bob thanked all those who made this year's Christmas Party a success including the cooks, decorating committee, clean-up committee and Dave-NO6NO and Al-NI2U for their hard work in finding a venue.

He then thanked out-going Directors Chuck-AE6LR and Donna-W6CQX for their commitment and service to the Club. Then, introduced new officers, President for 2014, Tyghe Richardson – KD6MLH, and new Directors Robert Bell-W6RBL and Jim Jupin-WA8NPA before passing the gavel to Tyghe.

Dennis-WU6X read a poem (see elsewhere in this Newsletter) he had prepared for Bob as a tribute to his service to the Club and to the personal friendship developed over the last 2 years.

Donna-W6CQX ran a special "*ladies drawing*" planned for the evening giving away many really nice prizes with the grand award being the annual hand-made quilt.

Al-NI2U announced Bob-WE6C as the winner of the QLF contest held at the Club Picnic.

George-KG6LSB ran the usual drawing for a pile of nice prizes in addition to three special prize drawings of \$100 bills with Tyghe drawing the numbers.

Well, that was about it for this year and I know I've forgotten a lot of things, but hey, it was my night off, so going strictly from memory here. ☺ My heart-felt thanks to anyone I missed in this short summary. Without your support the event would not have been as successful as it was. THANK YOU!

The party adjourned at approximately 2030 and the clean-up crew put the Hall back in order with help from volunteers.

Submitted by Dennis – WU6X, Club Secretary

## THE UDA CHRISTMAS

'Twas the night before Christmas, when all through his Shack  
 Not a thing was stirring, not even his Mac;  
 His earphones were hung by the radio with care,  
 In hopes rare DX soon would be there;  
 Yes, Bob was nestled all snug in his bed,  
 While visions of towers and beams danced in his head;  
 Wife Karen in jammies, and Bob in his cap,  
 Had just settled down for a nice winter's nap;

When out in the yard he thought ... a loud voice?  
 He sprang from his bed grabbing weapons of choice;  
 Away to the ham shack, he made a mad dash  
 Dancing wildly around, Myla's latest toy stash;  
 He threw open the blinds, poised ready act,  
 While the moon in the trees cast strange shadows, in fact;

When, what to his wide-open eyes did he note,  
 But a miniature Jeep, pulled by eight tiny goat;  
 With a little old driver, calling CQ CQ,  
 He knew in a moment what he had to do;  
 Faster than ever, he brought radios to life,  
 As he whistled, and shouted, calling Karen his wife;  
 "Look Honey! I knew it, our house has been blessed!  
 "The rarest of all DX has arrived at our nest!"

To the top of the band, all knobs cranked to the right,  
 He tried desperately to find a clear frequency that night;  
 Static noise crashed louder, than ever before,  
 As he pressed the mic button ... and fell flat on the floor;  
 Yes, the excitement had wrapped cords from knee to toe,  
 But wait ... Bob wasn't just any old Joe;  
 He sprang back to his feet and peered towards the south,  
 Calling ... "I hear you, I hear you", mic pressed to his mouth.

The little man turned ear, towards the noise from the dash,  
 And said, "QSL Bob, QSL ... you are 59 with hash;  
 He was chubby and plump, a right jolly old elf,  
 And Bob chuckled when he saw him, in spite of himself;  
 Then, with mic in one hand and the other on wheel,  
 He down-shifted and turned like a dancer on heel;  
 And Bob heard him exclaim, as he drove out of sight,  
 QSL via the buro OM, and Merry Christmas tonight;

'Twas about then, that wife Karen arrived in the shack,  
 As Bob wildly explained while logging contact on Mac;  
 Karen smiled as always, head cocked to the right,  
 Then walked away mumbling ... as always ...  
 "Yeah right!"

By D. Gregory - WU6X

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

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**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
<b>TOTAL:</b>		<b>\$ _____</b>	<b>Please add \$1 if paying via PayPal</b>	

\*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

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Date: \_\_\_\_\_ Treasurer: \_\_\_\_\_ Secretary: \_\_\_\_\_ Roster: \_\_\_\_\_  
Payment: \_\_\_\_\_ Check Number: \_\_\_\_\_ Cash: \_\_\_\_\_ PayPal: \_\_\_\_\_