

# SCCARA-GRAM



## Santa Clara County Amateur Radio Association

Volume 48, Number 1

January 2023



## Meetings & Gatherings

Some of you may be “done” with the corona virus by now, but unfortunately it isn’t done with us. Please let’s all be safe and healthy this new year!

Our general meetings have resumed. Board meetings are still being held on our 2 m repeater. We’re scheduled to host the April 8 Electronics Flea Market, location is yet to be determined.

The average number of new covid cases daily in Santa Clara County is now 432 (309 last month). Masks are not required but recommended indoors and around others. **Vaccination with the latest omicron bivalent booster is strongly recommended.** In Santa Clara County only 29.2% have received that booster so far (24.3% last month).



## Club Station

Happy new year! Hope everyone had a good holiday season.

SCCARA’s club station is at the Red Cross, located at the corner of 1<sup>st</sup> Street and Plumeria in San Jose. We are normally there on the last Saturday of the month for general operating. We also come down for contests such as California QSO party and Sweepstakes (both CW and SSB). We can also open it at other times upon request.

We have also operated Field Day as well. We are able to operate two stations at a time on HF and a digital station as well.

The station is also used for emergency communications by the Red Cross groups.

Having our station is a good opportunity for members who don’t have HF capability to get on the air.

We will open up our club station at the Red Cross on Saturday Jan 28th from 10AM to 5PM. This is the same weekend as Winter Field day. So SCCARA will participate in Winter Field Day.



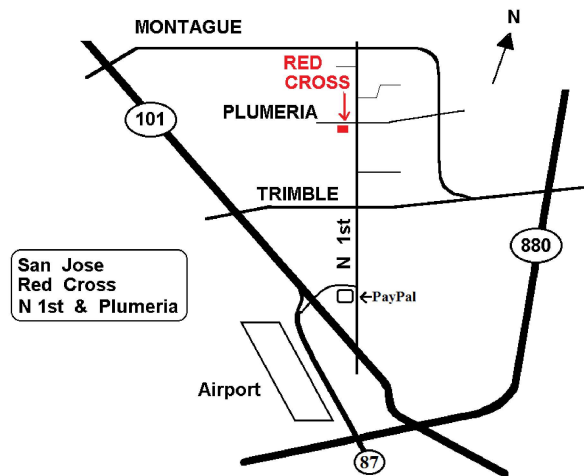
73, Don Village K6PBQ  
Station Trustee

## Calendar

- 1/9 SCCARA General Meeting
- 1/16 SCCARA Board Meeting: On our 2 m repeater after the net at 7:30 PM)

## General Meeting

- Day: Monday, January 9
- Time: 7:30 PM
- Place: San Jose Red Cross, meeting room 3
- Featuring: {to be announced}



## Happy New Year! or will it be?

Remember--all memberships expire January 1<sup>st</sup>. If you haven’t renewed yet (and so far that’s most of you), please do it now while you’re thinking about it. There’s a membership form on the back, on our web site, and we’ll have some at the meetings.

The **SCCARA-GRAM** is published monthly by the **SANTA CLARA COUNTY AMATEUR RADIO ASSOCIATION**, PO Box 106, San Jose CA 95103-0106.

SCCARA was formed in 1921 and became a non-profit corporation in 1947. SCCARA is an affiliate of the American Radio Relay League (ARRL). The club station is W6UW.

Permission to reprint articles is hereby granted, provided the source is properly credited.

The deadline for articles is the **last Monday of the month.**

Web page: [www.qsl.net/sccara](http://www.qsl.net/sccara)

club email: [w6uw@arrl.net](mailto:w6uw@arrl.net) or [w6uw@sbcglobal.net](mailto:w6uw@sbcglobal.net)

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(officers are also directors)

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#### SCCARA REPEATERS

SCCARA owns and operates two repeaters under the call W6UU:

2 meter: 146.985 - PL 114.8

70 cm: 442.425 + PL 107.2

Phone auto-dial and auto-patch is available. The two meter repeater is located at Eagle Rock near Alum Rock Park in the foothills of east San Jose. The 70 cm repeater is located at the Regional Medical Center (formerly Alexian), east of downtown San Jose, north of 280 and 101.

#### SCCARA NETS

On our two meter repeater: Mondays at 7:30 PM, (not the second Monday--our meeting night). Coordinator: Don Village, K6PBQ. On ten meters, 28.385 MHz USB, Thursdays at 8:00 PM. Net control: Wally Britten, KA6YMD. Visitors welcome.

#### NØARY PACKET BBS

SCCARA hosts the packet BBS NØARY (connect to n0ary-1). User ports: 145.09 MHz at 1200 baud, 433.37 MHz at 9600 baud, and telnet sun.n0ary.org (login "bbs"). Sysop: Gary Mitchell, WB6YRU For general packet info, see the NCPA web site [ncpa.n0ary.org](http://ncpa.n0ary.org).

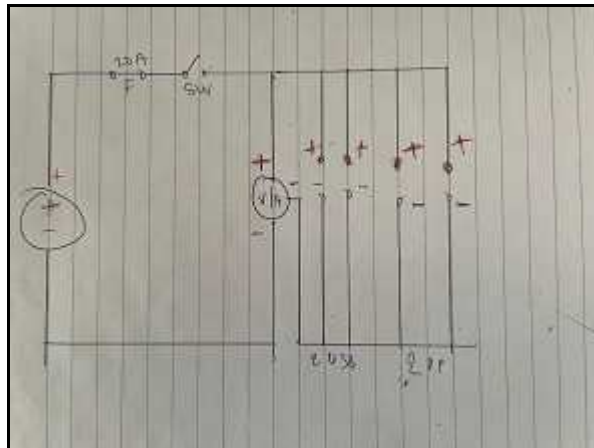
#### AMATEUR LICENSE TESTING

ARRL/VEC Silicon Valley VE group:

Morris Jones, AD6ZH: 408-507-4698

## DIY Battery Box

I like to go camping and operate my QRP radio, so I decided to build a battery box for extra power. The box itself is an ammo box, I bought it in Harbour Freight. I bought a switch, voltmeter, 5V USB DC adapter and panel mount housing for two Anderson poles on line. I opted for Dakota Lithium 12V 23Ah LiFePO4 battery because they have 11 years warranty. Other parts like inline fuse, electric connection bus bar and wire I had in my junk box.



Schematic



Ammo box



Battery connection



Wiring



Completed box

73, Ned AC6YY

## ARRL News

From *The ARRL Letter*, Dec. 08, 2022

### New General Question Pool Released for Ham Radio Licensing Effective July 1, 2023

The National Conference of Volunteer Examiner Coordinators' (NCVEC) Question Pool Committee (QPC) has released the [2023 - 2027 General Class FCC Element 3 Syllabus and Question Pool](#)

to the public. The new General Question Pool is effective July 1, 2023, through June 30, 2027.

<http://www.ncvec.org/>

<http://www.ncvec.org/page.php?id=333>

<http://www.ncvec.org/page.php?id=369>

The new pool incorporates some significant changes compared to the 2019 - 2023 version. Its 432 questions were modified slightly to improve wording and to replace distractors; 51 new questions were generated, and 73 questions were eliminated. This resulted in a reduction of 22 questions, bringing the total number of questions in the pool down from 454. The level of difficulty of questions is more balanced, and the techniques and practices addressed have been updated.

The [pool](#) is available as a Microsoft Word document and PDF. The single graphic required for the new General Question Pool is available within the documents, or separately as PDF and JPG file formats.

“The newly revised pool must be used for General-class license exams starting July 1, 2023,” said ARRL VEC Manager Maria Somma, AB1FM, who is a member of the NCVEC Question Pool Committee. “New test designs will be available to [ARRL Volunteer Examiners](#) on that date. The ARRL VEC will supply its officially appointed, field-stocked VE teams with new General exam booklet designs around mid-June.”

<http://www.arrl.org/volunteer-examiners>

General class examination candidates preparing for their exams using the 9th edition of *The General Class License Manual*, and/or the 6th edition of ARRL's *General Q & A* are encouraged to test by, or before, June 30, 2023. New editions of ARRL licensing publications will be available in May, for exams taken on, or after, July 1, 2023.

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From *The ARRL Letter*, Dec. 22, 2022

### Rep. Lesko Introduces Bill to Replace Symbol Rate Limit with Bandwidth Limit

Congresswoman Debbie Lesko (AZ-08) introduced a bill in the U.S. House of Representatives (H.R. 9664) on December 21, 2022, to require that the Federal Communications Commission (FCC) replace the current HF digital symbol rate limit with a 2.8 kHz bandwidth limit.

After being petitioned by ARRL The National Association for Amateur Radio® in 2013 (RM-11708) for the same relief, in 2016 the Commission issued a Notice of Proposed Rulemaking (WT Docket No. 16-239) in which it agreed that the HF symbol rate limit was outmoded, served no purpose, and hampered experimentation. But the Commission questioned whether any bandwidth limit was needed in its place. Most amateurs, including the ARRL, objected to there being no signal bandwidth limit in the crowded HF bands given the possibility that unreasonably wide bandwidth digital protocols could be developed, and since 2016 there has been no further FCC action.

In conjunction with introducing the legislation, Congresswoman Lesko stated that “With advances in our modern technology, increased amounts of data can be put on the spectrum, so there is less of a need for a regulatory limit on symbol rates. I am pleased to introduce this important piece of legislation to update the FCC’s rules to support the critical role amateur radio operators play and better reflect the capabilities of our modern radio technology.”

ARRL President Rick Roderick, K5UR, hailed introduction of the

bill. Roderick stated that “the FCC's delay in removing this outdated restriction has been incomprehensible, given that the biggest effect of the delay is to require totally inefficient spectrum use on the already-crowded amateur HF bands. I hope that the Commission will act to remove this harmful limitation without waiting for the bill to be passed.”

ARRL Legislative Committee Chairman John Robert Stratton, N5AUS, added that “the symbol rate limit hampers experimentation and development of more efficient HF data protocols by U.S. amateurs. For all practical purposes the field has been ceded to amateurs outside the U.S., where there is no comparable limit. Removing the restriction not only will allow U.S. amateurs to use the most efficient data protocol suitable for their purpose, but it also will promote and incentivize U.S. amateurs to experiment with and develop even more efficient protocols.”

## NASA “Decodes” Secret Messages Onboard the Orion Spacecraft

NASA has a long history of hiding secret messages in its spacecraft and that tradition continued with the launch of the Orion crew capsule in November on top of the Artemis I rocket.

Five hidden messages were placed in the Orion capsule ranging from Morse Code to musical notes.

On the right side of the capsule below a window and next to the pilot's seat were the letters “C, B, A, G, F” - five musical notes for the first words in Frank Sinatra's song, “Fly Me to the Moon.”



A Morse code symbol for “Charlie” commemorates the life of former Orion Deputy Program Manager Charlie Lundquist, who died in 2020.

Photo courtesy of NASA.

In the middle of the capsule, above the cockpit control console, was a Morse Code message that spelled out the name “Charlie” in remembrance of former Orion Deputy Program Manager Charlie Lundquist, who died in 2020.

Other messages included a picture image of a cardinal to the right of the pilot seat as a tribute to former Orion Program manager, Johnson Space Center director, and St. Louis Cardinals fan Mark Geyer, who died in 2021.

The other two messages were on top of the pilot's seat including Binary code representing 18. This is in honor of NASA's history of travel to the moon with the Apollo Program and to celebrate a spacecraft's return to the Moon after Apollo 17 for the Artemis Generation. The final message was in front of the pilot's seat, the country codes of each country with the European Space Agency (ESA) that participated in developing and building the spacecraft's European Service Module.

## Marconi Contest

On January 1, 2023, an international year-long amateur radio contest to honor Guglielmo Marconi will begin, and is appropriately titled, “Marconi was here!” The main objective of the contest is to historically commemorate some of the most important and significant Italian cities where Marconi performed scientific experiments. Marconi conducted experiments in radio engineering, long-distance communications, radio direction finding, and many others. Overall, the experiments were crucial to the technical and scientific advancement and progress of wireless communications. Each month is dedicated to a specific Italian city connected to the story of Marconi and is paired to a different special call sign. The “MARCONI WAS HERE!” award is an international amateur radio award organized by [A.R.I. Fidenza Radio Club](http://www.ari.it/) in collaboration with [A.R.I. Associazione Radioamatori Italiani](http://www.ari.it/) and the [Marconi Museum](http://www.ari.it/). Further details about the special call signs, special certificates, and all of the rules are available on the official website [www.arifidenza.it](http://www.ari.it/).

<http://www.ari.it/>

<https://www.museomarconi.it/welcome/>

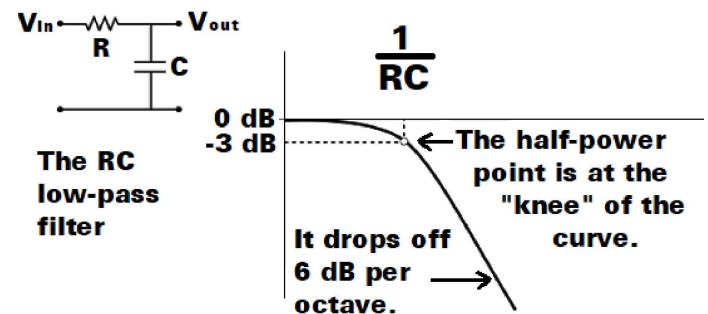
## Analog to Digital and Software Radios, pt 3

First we considered how an analog-to-digital converter (ADC) turns a RF signal into a string of numbers. Each number is like the reading of a volt meter, and it's done many times per second (the sample rate).

And last time we looked at an example of how a RC filter circuit can be simulated, how it acts like the real thing on a digitized signal (that string of numbers). A radio removes everything above and below the frequency we want to receive, so there's a lot of filtering going on in there. Most of them are better than the RC filter, but it's a good simple example.

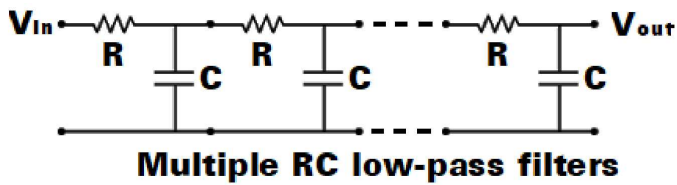
Software and analog radios perform the same function. But unlike an analog radio, software radios only manipulate data. We'll get a little more into that, but first let's consider that RC filter again.

As you probably know, a basic RC filter has a gradual cut-off. We usually want filters that have a sharper cut-off.



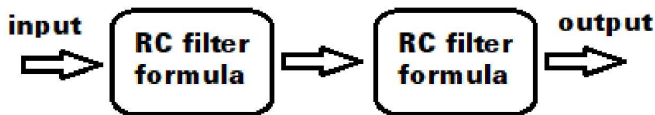
This is a log plot showing the amplitude in decibels vs frequency. At the frequency equal to  $1/RC$ , the output is -3 dB down or about half. That's what we consider to be the cut-off frequency.

Now, if you want a sharper cut-off, and we usual do, our first impulse might be to make another identical RC filter and just feed the output of the first into the second. But it's not that simple, there are losses, stray capacitances and inductances, impedance matching to consider, etc. And we could do better if we use an inductor instead of a resistor... in the real world.



But in a software radio, there's only the code. It can be anything we want--and nothing we don't want. It takes a lot of work to write a proper circuit simulator, one that accurately duplicates real circuits. But we don't care about that, we only want a good radio. We'd like all circuits to be as close to ideal as possible. Fortunately, an ideal circuit is the simplest to simulate. Remember, the goal is to simulate the radio's function, not to accurately simulate all its real-world components and circuitry.

So, let's take advantage of that. Go ahead and stick on a second RC filter. In software, that's a cinch! In fact, let's make it 10 RC filters... or 100. The only limitation is the speed of the computer. Instead of the above circuit, we've got this:



**Multiple RC low-pass filters,  
software version**

The output (answer) of one formula is the input to the next. And we can make that chain however long we like to get the performance we want.

See that 6 dB roll-off in the graph? With two filters it'll be twice as good. And with 100 of them... well, suddenly that's an amazingly good low-pass filter! You might have heard the term "brick wall." A brick-wall filter passes signals perfectly until you reach the cut-off frequency then the response drops like a rock, the plot looks like a brick wall. Well, in software, you've got it! Really! There are no losses, no interference, no impedance to worry about. Those things just aren't there... unless they're included in the software, and they won't be.

Now, suppose we do all that again, except make it a high-pass RC filter. It's the same circuit just with the capacitor and resistor swapped places, and it's a similar formula. That will be pretty much all we need to isolate our frequency of interest.

If we're clever, the formulas for that string of RC filters could be combined and simplified. That takes care of any possible computing issue with simulating all those filters. All we need is to mathematically do what those filters do. If the math can be simplified, so much the better.

So, set the RC values of the low-pass filter to the frequency you want to receive, plus a little to allow for the desired bandwidth. And likewise set the RC values of the high-pass filter to the receive frequency, minus a little for the bandwidth. And there you have it, a very good receiver!

You may be thinking: "Wait a minute, that sharp cut-off filtering is all well and good, but the signal will be very weak." Well, don't forget, it's all just numbers. Want more gain? Fine, somewhere along the way just put in a single multiplication. How much gain do you want? Ten times? A thousand times? More? You've got it. In an analog radio you'll need amplifiers, but in software it's just one multiplication by a number, that's all.

Then of course there's the detection stage. But that's also easy to do in software. After that it's just audio, and our computers have been able to handle audio for many years.

And any mode can be simulated. You can easily have a software radio with every modulation mode there is. Imagine that!

And since it's done in software, there are none of the limits we encounter with hardware circuits. The only limitations are the speed of the computer and the sophistication of the software, and that's getting better all the time.

Now, please keep in mind, the RC filter we've been considering is just an example. The function of any circuit can be simulated, and any radio design. It can be the good ole super heterodyne design, or the regenerative design, or any other. You could even have a radio design that would be difficult or impossible to build in hardware. Whatever you can think of is possible--the only requirements are that it can be described mathematically (that is, in software) and the computer has to be able to do the calculations fast enough. That's it!

We've already seen a taste of this digital future, the so-called "waterfall" or spectrum displays on some modern radios are done mathematically with a built-in processor. Those may not be software radios, but it's a start.

The best part is that the software radio has perfect "components" and ideal "circuits." Actually, it's not *completely* perfect, there are resolution limits. However even that can be expanded if necessary. Perhaps we should call it "perfect enough."

Unfortunately, it's not all peaches and cream. There will always be some noise and interference. We can't eliminate that, but with a little programming cleverness, it can be dealt with easier than with hardware circuits.

So, what's all this digitization and computerization going to do to amateur radio? Well, my crystal ball isn't any better than anyone else's. But I'll give it a try... next time.

I invite you all to do the same. Send in your ideas on what the future may hold. And don't worry about being wrong, as Yogi Berra said: "*Predicting the future is hard because it hasn't happened yet.*" But it can be fun to speculate!



73, Gary WB6YRU

## Meeting Minutes

### General Meeting, Dec. 12, 2022



Held at Denny's, 333 S. Abbott Street, Milpitas  
Meeting called to order by President Gregg Lane KF6FNA at 7 PM.

Customary self introductions.

Announcements

President Gregg KF6FNA:

Welcome to the first dinner meeting in a couple of years due to the pandemic. We expect the next year to be mostly back to normal.

Various misc. discussions, including how members are doing.  
And we had a nice dinner.

Gary Mitchell WB6YRU, recording for the Secretary

### Board Meeting, Dec. 19, 2022



*{this meeting was cancelled}*

# Packet Pieces

## Downloaded from the BBS packet network:

=====  
Date: 12 Mar 2020 01:04  
Message #: 83163  
To: HUMOUR@WW  
Subject: jokes 12/3  
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From Great Britain

-----  
Dear Son,

Just a few lines to let you know I'm still alive.

I'm writing this letter slowly because I know you can't read fast.

We are all doing very well.

You won't recognize the house when you get home - because we have moved. Your dad read in the newspaper that most accidents happen within 20 miles from your home, so we moved 25 miles to Wexford.

I won't be able to send you the address because the last family that lived here took the house numbers when they moved so that they wouldn't have to change their address.

This place is really nice. It even has a washing machine. I'm not sure it works so well though, last week I put a load in and pulled the chain and haven't seen them since.

Your father's got a really good job now. He's got 500 men under him. He's cutting the grass at the cemetery.

Your sister Mary had a baby this morning but I haven't found out if it's a boy or a girl, so I don't know whether you are an auntie or an uncle.

Your brother Tom is still in the army. He's only been there a short while and they've already made him a court martial!

Your Uncle Patrick drowned last week in a vat of whisky in the Dublin Distillery. Some of his workmates tried to save him but he fought them off bravely. They cremated him and it took three days to put out the fire.

I'm sorry to say that your idiot cousin Seamus was arrested while riding his bicycle last week. They are charging him with dope peddling.

I went to the doctor on Thursday and your father went with me. The doctor put a small tube in my mouth and told me not to talk for ten minutes. Your father offered to buy it from him.

The weather isn't bad here. It only rained twice this week, first for three days and then for four days. Monday was so windy one of the chickens laid the same egg four times.

We had a letter from the undertaker. He said if the last payment on your grandmother's plot wasn't paid in seven days, up she comes.

About that coat you wanted me to send you, your Uncle Stanley said it would be too heavy to send in the mail with the buttons on, so we cut them off and put them in the pockets.

John locked his keys in the car yesterday. We were really worried because it took him two hours to get me and your father out.

Three of your friends went off a bridge in a pick-up truck. Ralph was driving. He wound down the window and swam to safety. Your other two friends were in the flatbed at the back. They drowned because they couldn't get the tailgate down.

There isn't much more news at this time. Nothing much has happened.

Your loving Mum.

-----  
A guy walks into a bar with an octopus. He sits the octopus down on a stool and tells everyone in the bar that this is a very talented octopus. "He can play any musical instrument in the world."

Everyone in the bar laughs at the man calling him an idiot. So he says "I'll wager \$50 to anyone who has an instrument that the octopus can't play."

A customer walks up with a guitar and sets it beside the octopus. Immediately the octopus picks up the guitar and starts playing better than Jimi Hendrix. The guitar owner pays up the \$50.

Another customer walks up with a trumpet. This time the octopus plays the trumpet better than Miles Davis. The trumpet-owner coughs up the \$50.

Then Jim a Scotsman plonks some bagpipes on the table. The octopus fumbles with the bagpipes for a minute and then backs off with a confused look.

Ha!" the Scot says. "Can ye nae plae it?"

The octopus looks up at him and says "Play it? I'm going to make love to her as soon as I figure out how to get her pyjamas off."

-----  
Two Irish hunters got a pilot to fly them to Canada to hunt moose. They bagged six. As they started loading the plane for the return trip the pilot said the plane could only take four moose.

The two lads objected strongly. Last year we shot six and the pilot let us put them all on board and he had the same plane as yours."

Reluctantly the pilot gave in and all six were loaded. Even with full power the little plane couldn't handle the load and went down a few moments after take-off.

Climbing out of the wreckage Paddy asked Seamus "Any idea where we are?"

"Bejasus I tink we're pretty close to where we crashed last year."

-----

We are in DEEP trouble...

The population of this country is approximately 60 million.

32 million are retired.

That leaves 28 million to do the work.

There are 17 million in school or at Universities.

Which leaves 11 million to do the work.

Of this there are 8 million employed by the UK government.  
Leaving 3 million to do the work.

1.2 million are in the armed forces.

Which leaves 1.8 million to do the work.

Take from that total the 0.8 million people who work for  
Local County Councils.

That leaves 1 million to do the work.

At any given time there are 488000 people in hospitals or  
claiming Invalidity Benefit.

Leaving 512000 to do the work.

Now there are 511998 people in prisons.

That leaves just two people to do the work.

You and me.

And there you are sitting on your arse at your computer  
reading jokes. Is it any wonder that we are in such a mess  
and that I am stressed out through trying to cope on my  
own?

-----  
A blonde lady gets a job as a physical education teacher of  
16 year olds. She notices a boy at the end of the field  
standing alone, watching all the other kids running around  
having fun, kicking a ball. She takes pity on him and  
decides to speak to him.

'You ok?' she asks.

'Yes,' he replies.

'You can go and play with the other kids, you know,' she  
says.

'It's best I stay here,' he says.

'Why's that, sweetie?' asks the blonde.

The boy looks at her incredulously and says: "Because I'm  
the \*\*\*\*\* goal keeper!"

-----  
There's a movie entitled, "How to Irritate People." It is  
obviously the employee training film at some companies.

-----  
Who is your *real* best friend? Just try this experiment:

Put your dog and your spouse in the trunk of the car for an  
hour. When you open the trunk, who is really happy to see  
you?

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## Need Help?

Amateurs have a long history of helping each other. An  
experienced amateur who helps another is traditionally called an  
"Elmer." If you have a question or problem, you are encouraged  
to ask one of SCCARA's Elmers. Below is a list of topics and who  
to contact for each. If your topic isn't listed, ask one of the Elmers

under the topic that comes closest and we'll ask around.

If you consider yourself to be reasonably competent in at  
least one area of amateur radio and would be willing help others,  
please fill out an Elmer form (available from the club secretary or  
on our web site).

### Topics:

Antennas, feed-lines, tuners: **NV6W, W6JPP, K6PBQ**

CW (Morse code): **NV6W, K6PBQ**

DX (long distance, propagation): **NV6W**

EchoLink: **K6GKB**

Emergency operating, preparedness: **WA6QYS**

HF operating techniques: **NV6W, K6PBQ**

Homebrew projects, construction: **WB6YRU**

Legal, FCC rules: **WB6YRU**

License testing, new amateurs: **W6JPP**

Lightning protection, grounding: **WB6YRU**

Packet Network (BBS, forwarding): **WB6YRU**

SCCARA (club inner workings): **K6PBQ, WB6YRU, WA6QYS**

Station set-up, equipment: **K6PBQ, W6JPP**

TVI, RFI: **WB6YRU**

### Contacts:

K6GKB, Goetz Brandt, 408-259-7287

e-mail: [goetz@ix.netcom.com](mailto:goetz@ix.netcom.com)

NV6W, James D. Armstrong, Jr.,

evening & msg: 408-670-1680

W6JPP, John Parks

e-mail: [w6jpp@arrl.net](mailto:w6jpp@arrl.net)

K6PBQ, Don Village, 408-263-2789

e-mail: [donvillage7@yahoo.com](mailto:donvillage7@yahoo.com)

WA6QYS, Lou Steirer, 408-241-7999

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## Newsletter Notes

Of particular interest, in my opinion, is the Dec. 22 *ARRL Letter* article (above) about *finally* something happening with the long running "bandwidth vs symbol rate" issue.

For those who don't know... In some bands digital communications are limited by symbol rate, regardless of the bandwidth used. For example: Even if you could figure out a way to send, say, 50000 characters per second in the band width of a CW signal, that's too bad, you may NOT do it.

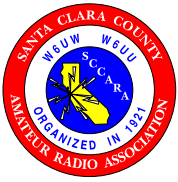
Part of the purpose of amateur radio is experimentation, to "further the art of radio communications." The symbol rate limitation is antithetical to that lofty goal. The FCC agrees, and they admit that restriction serves no purpose. They've been petitioned to change that restriction in Part 97. But oddly enough they've done an impressive amount of foot-dragging.

Thanks to Rep. Debbie Lesko of AZ, there's a chance Congress may build a fire under the FCC's seat. It's about time.

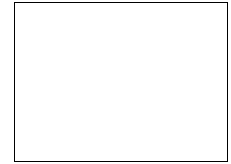


73, Gary WB6YRU, editor

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 Santa Clara County Amateur Radio Association  
 PO Box 106  
 SAN JOSE CA 95103-0106



**FIRST CLASS**

ADDRESS SERVICE REQUESTED

**SCCARA Membership Form for 2023**

If renewing and none of your info has changed, we only need your name and call

Name: \_\_\_\_\_ Call: \_\_\_\_\_ Class: \_\_\_\_\_

Address: \_\_\_\_\_ Licensed since (year): \_\_\_\_\_

City: \_\_\_\_\_ State: \_\_\_\_\_ Zip+4: \_\_\_\_\_

Telephone: \_\_\_\_\_ New Member      Renewal      I'm also an ARRL member

E-mail: \_\_\_\_\_

only for club communications and the SCCARA-GRAM newsletter (pdf)

**Membership type and dues:**      **Individual, \$20**      **Family, \$25**      **Student, \$10 (under 18)**

Memberships start January 1 and expire December 31.

Family memberships (more than one member per household): please include the above info for each member, use separate forms.

**New members:**

Dues are prorated: dues x (11 - month) x 10% For example: July would be \$20 x (11-7) x 0.1 = \$8)

If joining in November or December: normal dues for next year, the rest of this year is included free.

**I want the paper newsletter delivered by U.S. Mail for an additional \$15 per year**

(Prorated, \$1.25 per month. That's \$13.75 if starting in February, \$12.50 if starting in March, etc.)

\$ \_\_\_\_\_ **Total** enclosed

Give this completed form and payment to the Secretary or Treasurer at any meeting or mail to the club address.