

SEPTEMBER 2004

THE MONTHLY NEWSLETTER of the SANTA CRUZ COUNTY AMATEUR RADIO CLUB

SHORT SKIP



Explorations of Vertical Angles

Many of us from time to time, need to determine a radio horizon angle, whether for a satellite orbit that is near the horizon, setting a microwave dish, or looking at HF antenna main lobe launch angles. Steep vertical angles are something we often hope not to see, as they often are indicative of short LOS paths, and at HF, they launch RF at ever higher angles, sapping our DX signal strengths.

Often we look at terrain obstacles along our path, and deem the path hopeless due to the seemingly steep wall we are looking at. There is hope. In open country, even with mountain ranges in the distance, it will be rare for any terrain limited horizon to be greater than 10 degrees, vertical angle.

To determine vertical angle, you need to know the horizontal distance (Run) to the horizon, and the difference in elevation (Rise) to the horizon. An angle's tangent is Rise over Run.

Said another way, the angle tangent times the Run equals the Rise.

Use the internet, a calculator, or a trig table, and look up the tangent of angles from 1 degree to about 10 degrees. (In Google, just type: $\tan 1$)

For our non critical purposes; angles up to 10 degrees, simply memorize tangent for 1 degree: .0175. Multiply .0175 by the number of degrees (for small angles) to find other angle tangents.

Do this and you will find, for a 1 mile Run, a 1 degree angle rises 92ft. (.0175 times 5280) For our purposes, and your situation, just multiply 92 by the distance in miles or by the vertical angle in degrees to get the Rise. An elevation change of 920 ft in a mile, is about a 10 degree slope. (pretty steep for a bicyclist unless you are Lance you know who.) About as steep as Laureles Grade Near Salinas. 1000 ft in 3 miles (15000 ft) is about 4 degrees.



An Interactive Bring-Buy-Show-Tell

We can look forward to an entertaining evening at our next meeting on September 17th if everyone takes part. Bring an item that you would like to sell, come looking for bargains or come with an item you would like to show and tell us what's special about it.

Downtown Santa Cruz to the top of 3500 ft. Mount Toro to the south is less than 2 degrees.

Santa Cruz to 3800 ft Loma Prieta is about 12 miles, about 3.3 degrees.

Carmel Valley road near the Village looking north, most would perceive as a virtual canyon shows only 4 degrees vertical angle from the valley floor to the top of Laureles grade.

(The grade: 1000 ft elevation change over 3 miles $\gg 1000/15,000 = .066 = \tan 4$ degrees.

Point Sur Lighthouse to the wall-like Coastal Mountain Ranges, beginning a mile and a half to the east, is only an up angle of 6 degrees.

So, just figure 90 some feet in a mile being a degree vertical, and estimate accordingly. And go for that DX or Satellite contact..

—73, de Pat, aa6eg@hotmail.com

CLUB POT LUCK

Greetings, your radio club wants you! It's time again for our excellent sometimes annual autumn K6BJ radio club potluck barbecue on Sept.18. It will be at president Vic's house in Soquel (no worries, directions soon available). Vic will supply the ribs and K6BJ will provide the soft drinks and chips. Please bring a cooked dish or salad to complement the above provisions. Please send me a description of the dish you will bring to this event. I (Richard, KG6AXD) will be collecting a list of these dishes to help coordinate the menu. If you need ideas on what to bring, I will be here to help you figure it out.

As part of the proceedings I will sponsor a desert cook-off, the only rule is that it should be homemade.

One prize for the most delicious, another for novelty and one for the youngest competitor.

PS Don't forget to let Richard KG6AXD know what you plan to bring.

ARRL Audio News

ARRL Audio News is now on the airwaves in greater Monterey Bay area!

<http://www.arrl.org/arrlletter/audio/>

It's planned that the weekly ARRL Audio News will be heard over Sean's W6MOW

443.600+ PL 110.9 Fremont Peak repeater linked with Mike's W6WLS 147.180+ PL

94.8 Empire Grade repeater on Sunday evenings at 8 PM.

Give a listen!

Thanks to Sean and Mike for providing this alternative for our benefit.

—73, Cap KE6AFE

CLUB MEETING FRIDAY SEP. 17, 7:30 P.M.



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Free to members.

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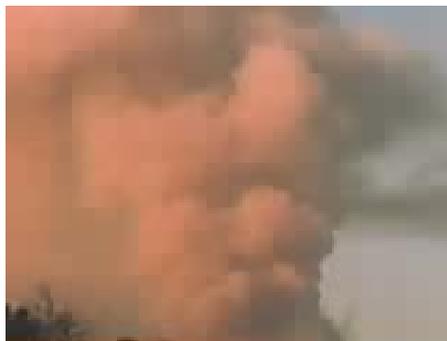
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SACRAMENTO VALLEY ARES UNITS GO ON HIGH ALERT FOR FIRE DUTY

Amateur Radio Emergency Service units in the ARRL Sacramento Valley Section of Northern California went on high alert this past week as firefighters continued efforts to contain and control the French Fire. Located 15 miles northwest of Redding, the French Fire, which broke out August 14, at one point resulted in the evacuation of French Gulch. As of August 20, the fire had destroyed 22 homes, caused a dozen injuries and consumed nearly 13,000 acres of forest lands and vegetation. The California Department of Forestry and Fire Protection (CDF) was estimating that the fire would be 90 percent contained by week's end. Sacramento Valley Section Emergency Coordinator David Thorne, K6SOJ, said he expected ARES to remain active at least through the August 21-22 weekend and possibly into the following week.

Continued page 5

BIG-Time DXers

by AA6ZG, Leon Fletcher

- They operated from 223 countries.
- From each of most of those countries they worked more than 100 other countries.
- They held more than 200 different ham calls.
- Their files contained more than one million QSL cards--the world's largest collection.
- They held more DXCC certificates than any other couple in the world.
- Together they were licensed hams for more than 104 years.
- They traveled the world almost non-stop for nearly three decades--"for but one purpose: to ham," they told me.

They were Lloyd and Iris Colvin--W6KG and W6QL, of Richmond, CA.

Thrills

When operating from Villa Xochtle, Mexicali, they experienced two 6.2 earthquakes. They operated from Nepal with the personal authorization of the Chief Secretary to the Royal Palace; that made them the 3rd and 4th hams to ever be on the air from that very rare DX location. They were on the air from 14 of the 15 republics of the Soviet Union. While putting up an antenna on the roof of a 3-story hotel in Barbados, a section of the roof gave way and Lloyd fell through; he was not injured.

The Colvins traveled with ham gear weighing about 150 pounds. During my visit with them, Lloyd strutted back and forth across their large living room, demonstrating how he walked to make a heavy transmitter look light when he boarded an airplane. Iris displayed the purse that she traveled with; it held--in addition to a woman's usual stuff--a microphone, CW key, logs, connecting cords, and more ham stuff.

As they toured the world, of course many photos were taken of them, yet reportedly in every photo Lloyd "always had on his coat and tie."—even when on a blistering hot South Pacific island.

They avoided hotels, preferring to stay with local hams--whether they'd known them before or not. Lloyd explained to me, "We never squander our money--we use it all for DXing!"

Achievements

In November, 1976, both of them were named to the prestigious CQ DX Hall of Fame.

They were members--honorary, associate, or regular--of more than 100 radio clubs around the world.

Their DXpeditioning started in 1965. It ended in 1993, in Istanbul, Turkey, when Lloyd died of a heart attack and pneumonia at age 78. Iris died four years later, in Richmond, at age 84.

They were instrumental in the formation of the nonprofit organization, YASME--which will be briefed in next month's article



Surf to ARES

We need to know who's still out there with any interest in emergency communications and what's new in our County. We need updated roster information for our communicators. With better, more current information we can be more prepared, and develop better training and plans.

Do we have all your best contact phone numbers, including that new cell phone, pager, or work number? How old is your copy of the ARES roster or "phone tree"? How long has it been since you let your EC know which bands you can use in an emergency? What kind of training have you got or are you interested in?

We'd like EVERYBODY who can do so to PLEASE give us an update using our easy new online ARES Registration Form! Just fill it out and submit it online, over the internet. Even if you're already a 2004 updated member, or even if you don't have any new changes, we'd STILL like to get your information again this way, online.

Thanks! It's easy! Help us out by surfing on over to <http://ares.santa-cruz.ca.us/regform.htm> Or just search for "Santa Cruz County ARES" using Google (or similar search engine) and then review the latest August 24 NEWS item at the top of that ARES webpage for a hyperlink to the Form.

After you fill out the Form and click on the SUBMIT button, you will get another chance to review and approve what you're submitting before it is finally sent.

Since EVERYBODY was first asked to please fill out and submit the Form during Tuesday's county-wide ARES net, the following ARES members have already accomplished the assignment: KE6AFE, K6BDK, N6FW, KF6GPE, W6IBN, AE6ID, KE6KAN, AE6KE, KG6MBA, AE6RF, N6RXX, N6TGM, KE6UWH, AB6VU, W6WLS, KF6YCB, KQ6YV If you have any questions about filling out the Form, any of these folks can help you.



By Art Lee WF6P

CHATTER

Yesterday I received a nice land line from Cap, KE6AFE, bringing me up-to-date on the progress of the ARES van. The team is installing a bank of storage batteries in preparation for hooking up wiring bundles being routed behind the soon-to-be-installed operating benches and wall paneling. Although I haven't yet seen the new van, it is a bigger and much improved version over the old one. I recall all the work that went into the former van, and one harrowing tale by Rich Hanset, KI6EH. Rich described driving it to Monterey. "It was all over the road" said Rich, "and it was a real wrestling match as it had no power steering." When the old van was new, several of us ARES members took it around to a few grade schools, providing on-the-air experience for the young students. There was room for only one operator and the student inside the van. In the classroom, we used a handheld. It was quite a hit for the kids. Now, I guess they all have cell phones in their backpacks so the "mystery" of wireless communications is no longer as challenging.

I just fired my "All About Hidden Antennas" article off to Monitoring Times.

Join them! Check it out! And help pass the word that we need ALL county amateurs with ANY interest in emergency communications to signup for ARES this way. If you know someone who doesn't have internet access at home, let them know they can fill out the Form on a computer at the local public library or at a friend's house.

Thanks for your interest in assisting emergency communications. And thanks for your help updating your ARES information to improve emergency communications.

—73, Cap KE6AFE

Santa Cruz County ARES DEC

Hopefully it will appear in the April or May issue. It seems that in today's world of CCs&Rs, an antenna nobody sees is the best one. At the last CAKE meeting I was surprised to learn that Wayne Green's 73 Magazine is defunct. Leon Fletcher, AA6ZG, used to pass his complimentary copies on to me. Wayne's editorials took up quite a few pages and he had some mighty interesting and far out topics to discuss. He was always admonishing us hams to stop smoking, eating fatty foods, drinking alcoholic beverages, coffee, and such. I never smoked, so I skipped over those paragraphs. Hi! Hi!

Speaking of innovative antennas, Jeff, AE6KS, is developing one that fits that category. Using an inflatable flexible tubing section as a portable mast with the vertical antenna wire either inside or outside, sounds quite workable. He would use an air pump to inflate the flex tubing. Hey, maybe he'll make a demo model for next field day? A different approach might utilize three such tubing sections in tripod fashion. Good thinking, Jeff.

I dug around in a drawer and discovered a bunch of old, unanswered QSL cards. I made up a new card and sent a batch of them out. I'll bet those operators receiving cards from 1981 QSOs were surprised. Can I blame the mail for being slow? I still owe Steve Smardan, N6TGM, a card but I've misplaced his. When I locate it I'll get mine off to you, Steve. I received a bunch of cards recently from QRP operators. One Op lives in Kent, WA. I asked him if he worked for Boeing. "Heck no!" he pounded out, "I'm only 15!" He had a nice fist and very easy to copy. I told him to add 60 years to his age and that would be mine. Early in our QSO I told him I was a new ham of only 25 years. I guess age is a relative thing.

The monthly CAKE meetings are interesting and fun. Thanks to Ron, W6WO, for getting this going. There is always an interesting discussion or two going on with appropriate show-and-tell objects to wonder over. I have one of my own in mind, a simple but effective device. What is it? I'll have to build it first to see if it works. Who wants to be embarrassed with something that doesn't perform as advertised?

Almost Free dBs Anyone ?

By Ron, W6W0

Part 1

This is part 1 of a 2-part story about gaining communications capabilities at low cost.

Imagine you have a dipole, one way to increase gain by 10 dB would be to replace it with a 4-element beam or wire array of some kind. For a 100 Watt radio, to gain 10 dB you would need a 1 KW amplifier. Your receiver with a 10 dB noise figure will require a low noise preamp with a NF better than 1dB. It doesn't take long in our hobby to appreciate that dBs can be expensive and sometimes hard to come by.

What if I said you can have 10 dB free, would you be interested? What about 20 dB at no cost, would that grab your attention? If I offered to turn your 1watt QRP rig into a KW would you believe me? Would I lie to you? Read on and find out.

Of course any dB gain has value only if it will increase the desired signal to noise and interference ratio (SNR). You are no better off if you increase signal and noise or interference by the same amount. Here are some ideas for making real improvements in communications effectiveness.

First decide where your interests lie on the globe and at what times of day, then select the bands and position your antenna(s) for maximum effectiveness. Take an interest in the various ways our signals can travel from A-B. As a general rule the maximum useable frequency will be preferred because of the lower levels of propagated noise that apply. If you orient a dipole correctly and at the right height you can easily achieve 10 dB better performance than a poorly positioned beam. If you want regional HF contacts you need antennas with lobes at high angles. If you must excel at long haul DX, choose low angles of radiation and preferably a QTH at an elevation of 1000 ft overlooking the ocean in all directions. In the event these options are available do not despair.

Let's recall two critical points

1. The power of common forms of noise is proportional to the bandwidth that it is confined to. Not to get too technical, The wider the window the more the dirt flies in!

2. The required bandwidth of a signal is determined by the rate of information transfer and the type of modulation. Compare a SSB signal requiring 2,500 Hz of bandwidth with a CW signal requiring 250 Hz. Note

the ratio of these bandwidths gives CW a 10 *log10=10 dB SNR advantage. In passing we might note that an acute human ear/brain might also act as a 25 Hz filter of a steady tone and provide a possible additional gain of 10 dB.

The efficiency of digital modes can be improved much further than conventional CW and to see how, we must answer the question of just how much bandwidth is required. As humans we often think of transmission rates in terms of words per minute and the word PARIS is used as the "standard word". If you count the number of dots, dashes, inter letter spaces and an inter word space you will find the word PARIS has the equivalent of 50 dot lengths which is also 25 dot-space cycles. By arithmetic note that 12 words/minute = 5 dot-space cycles/second or 5Hz.

On an Oscilloscope a 12 WPM CW signal will vary with time, very much like a square wave at a repetition rate of 5 Hz superimposed on whatever RF carrier frequency is in use. On a spectrum analyzer you will see a component at the carrier frequency and components called upper and lower sidebands at multiples of 5Hz from the carrier. As a minimum the nearest of these frequency components need to be transmitted along with the carrier and this requires a bandwidth of at least +/- 5 Hz ie. 10 Hz.

In general the minimum bandwidth of similar signals in Hz=1/dot length in seconds. We may decide for various reasons to exceed the minimum bandwidth but normally digital pulses are shaped to confine sideband energy to a few 10s of Hz away from the carrier.

Here's a challenge: Verify from the above information that CW dot length in seconds = 1.2/WPM and the minimum bandwidth B=WPM*0.833Hz. Then check out this table.

CW Speed WPM /MPW	Dot length Secs /msecs	Minimum bandwidth Hz	SNR Advantage dB
20 words/minute (WPM)	60 milliseconds	16.67	Reference
12 WPM	110 msecs	10	2
8 WPM	150 msecs	6.67	4
4 WPM	300 msecs	3.33	7
2 WPM	600 msecs	1	10
1 WPM	1.2 seconds	0.83	13
0.83 minutes/word	1 second	1.0	12
2.5 minutes/word	3 seconds	0.33	17
8.3 minutes/word	10 seconds	0.1	22

Events

September 5

Livermore Amateur Radio/Electronics/Computer Swap Meet
<http://www.livermoreark.org/swap/swap.html>

First Sunday of each month, year round.
 Located in Livermore near I-580 at Airway Blvd. Las Positas College, 3033 Collier Canyon Road.

September 11

Electronics Flea Market
<http://www.asvaro.org/>
 Second Saturday of each month, March through October.

Located in north Sunnyvale near Moffett Field. Corner of C Street and 11th Avenue.

October 2-3

California QSO Party,

You can see that just by constraining the bandwidth we gain considerable advantage in SNR, for example relative to 20 WPM we gain 10 dB by lowering our sending rate to 2 WPM— which incidentally is about my typing speed !!!

Our SNR measure is a ratio of signal energy to noise energy and because energy is the product of power and time we can increase dot energy by either using a power amplifier or increasing dot duration. This means that we can gain signal strength and at the same time reduce noise by using slow speeds and narrow bandwidths. We might well accept 2 WPM when the SNR advantage will make the difference between being able to communicate or not. LF propagation, extreme QRP and essential communications are examples.

All the above is somewhat theoretical and in part 2 of this article we will note actual results obtained with either very small power levels or over extremely challenging propagation paths and then describe the PC based software involved. I hope that you will stay with it and perhaps then feel inclined to put QRP slow speed CW to the test. You don't even need to learn Morse code.

Fire continued

"If it runs into next week, I may be requesting assistance from the Northern Nevada District, Nevada Section," Thorne said August 20. The San Francisco Section--Humboldt County--already was scheduled to send ARES resources for the August 21-22 weekend.

Mutual assistance was in effect during the week to relieve exhausted operators, with ARES teams from Butte, Siskiyou, Placer and Nevada counties deployed to assist Shasta County ARES. District Emergency Coordinator Richard Cloyd, WO6P is the ARES incident coordinator.

Some 300 area residents evacuated because of the French Fire were allowed to return August 17. Amateur Radio provided necessary communication at the shelter for CDF and American Red Cross as well as for local authorities. At one point, a packet system was set up between French Gulch and the shelter, located at Shasta College, to provide for more secure communications.

One ARES member noted that CDF "was really relying on Amateur Radio" because the agency's own repeaters couldn't reach the fire zone.

The French Fire was one of three that ARES teams in Northern California have had to confront this month. The Bear Fire, which burned over some 10,500 acres, now is considered fully contained and controlled. It destroyed 80 homes and 30 other structures in Jones Valley. ARES supported Red Cross Disaster Services with damage assessment and health-and-welfare support in that incident. Earlier in the month, ARES units assisted in the now-contained Oregon Fire in Butte County.

The French Fire has led authorities to close Highway 299 between Redding and Weaverville from time to time. When it's open, a pilot car is leading traffic through the area.

The ARES response in Northern California drew words of praise from former Sacramento Section Manager and Section Emergency Coordinator Jerry Boyd, KW7J (ex-K6BZ). "I continue to be impressed with how smoothly this whole complex operation is going," he told Thorne in an e-mail. "Please convey to all the admiration of the former SEC and SM." Boyd now directs the Baker County 911 Dispatch Center in Oregon.



August 14

Greetings one and all. Today we had a most stimulating session and were pleased to have Chris KG6DOZ and Richard KG6AXD join the usual crowd.

The 10 page special, antenna issue of Short Skip involved lighter paper to stay within the weight limit and was much appreciated. Thanks Ron K6EXT (what we would do without him doesn't bear thinking about)

First off we saw a demo of a sound card program which eliminates the usual TNC required for packet and APRS applications. Plugged into a HT we observed Cap's APRS node as he approached. This cool software is free, just go to Google and type AGWPE.

Tom WB9VXY and Bob K6XX had an intense discussion about using a programmable logic controller to provide matrix switching of Bob's antennas

Dave W8FLL showed a picture of his ground radial system employing runs of aluminium foil about a foot wide.

K6XX brought along a flea market purchase of a motorized coax switch and we discussed ways to tighten the cluster of N connectors and the relative merits of no-ox and silicon grease.

The loss in coax connectors was discussed, with general agreement is that it should be negligible at HF providing corrosion doesn't set in.

A lot of interest was generated by a cell phone that has web and email access. It had a remarkably bright display and we downloaded an image of Bruce's AC6DN's mobile antenna farm.

The issues and opportunity for co-location with a cell site at N6IJ were discussed.

Ron W6WO showed the Mini Paddle that was a gift from OE3ZK and discussed a graph depicting the focusing gain possible via HF chordal hop propagation.

Art WF6P brought along a copy of 73 Magazine vintage 1992 and the quality and variety of its contents was very evident.

In answer to a question on how best to affix a CW paddle to a desktop. W8FLL discussed the adhesive superiority of Coca Cola vs Pepsi.

August 28:

A small but spirited group gave up a rare sunny morning to take part in our CAKE session and

as usual a lot of topics were covered.

Bob K6XX brought a catalog of industrial control products that he is investigating to tame his antenna farm. He has by far the most ambitious scheme that I have ever seen, it literally involves a combinational explosion of connectivity between multiple antennas and radios. The catalog incidentally has an amazing holographic front cover.

We discussed the unfortunate case of a PC trace acting as a fuse which then required some delicate surgery.

Even an apparently simple mag-mount antenna holds some surprises and can exhibit some interesting behavior. Have you ever used an Ohmmeter to figure out their internal connections? Jef AE6KS was a mine of information as always. Jeff proudly displayed his cellphone purchased for \$35 on eBay.

We discussed the topic of separated power and ground connections where both analog and digital components share the same board. A word of caution was expressed not to rely too heavily on manufacturers application notes.

As you all know there is a log periodic and a disc-cone antenna at N6IJ. I had always thought these were simply for multi-band convenience however a new theory surfaced. It seems that at some point in the past these could have been required to support spread spectrum communications over HF. Any corroboration would be appreciated.

We briefly talked about amateur experiments at a frequency of 137 kHz with slow CW and sub Hz bandwidths.

It seems to me the Ham community can be divided into those who do well at flea markets and those who do not. I belong to the latter group but was urged to try the new location at Lockheed on the 2nd Saturday of each month.

I neglected to mention an antenna described by Jeff AE6KS which would use inflatable masts. Most of us made comments about hot air and such but didn't take him seriously--we should know better. Jeff has subsequently come forward with the following note .

For those that have heard me ranting about inflatable antennas and towers, and questioned my sanity, be advised that it has already been done by Bosch Aerospace. See: <http://www.boschaero.com/index2.htm>

There's a video of a 60ft tower being raised at: <http://www.boschaero.com/movies/raft1sm.mpg> (5.5Mbytes)

It will be used in Iraq for who knows what purpose. Their design is also somewhat stronger and wider than I anticipate building. I'll post photos of the launch when I get it built. I do not have a date for our next session because of house guests during September but please watch for further information.

—73, Ron W6WO

SCCARC Board - 2004

President	Vic Linderholm	AE6ID	476-5567
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	David Shoaf	KG6IRW	462-4605
	Rich Wadsworth	KF6QKI	722-7005
K6BJ Trustee	Royce Krilanovich	AC6Z	475-4798

MONTEREY BAY ACTIVITY

SCCARC Repeaters: K6BJ 146.790- PL 94.8 Santa Cruz (linked w/Watsonville full time)
K16EH 147.945- PL 94.8 Watsonville (linked w/Santa Cruz full time)
K6BJ 440.925+ PL 123.0 Santa Cruz
• SCCARC Net Monday 7:30 PM 146.79- /147.945- /440.925+ linked
• SCCARC 10 Meter Net 28.308 MHz USB Monday 7:00 PM

SLVARC Repeater WR6AOK 147.120+ PL 94.8 Ben Lomond
• SLVARC Net Thursday 7:30 PM

LPRC Repeater WR6ABD 146.640-(PL 162.2)
• LPRC Net Tuesday 8:00 PM

NPSARC Repeater K6LY 146.97- PL 94.8 Naval Post Graduate School, Monterey
• NPSARC Net Wednesday at 8 PM on K6LY/R

6 Meter Local Net 52.8 MHz (PL-114.8) Sunday 8:00 PM
ARES Nets • SC ARES Tuesday 7:15 PM K6BJ 146.790-(PL 94.8)
• SLV ARES Tuesday 7:00 PM W6JWS 146.745-(PL 94.8) & WR6AOK 147.120+(PL 94.8) on alternate Tuesdays
• South County ARES Tuesday 7:15 PM K6RMW 147.00+ (PL 94.8)
• LP ARES Tuesday 7:15 PM AE6KE 146.385- (PL 98.4) & AB6VS 440550+ (PL 94.8) linked
• SC County ARES Tuesday 7:30 PM 146.79-/ 147.945-/ 440.925+/
147.180+ (all PL 94.8) (linked)
• Monterey ARES Net Wednesday 7:30 PM K6LY 146.970- (PL 94.9)

FOR MORE INFO SEE: <http://www.k6bj.org/freq.html>

SCCARC Calendar of Events

SCCARC Board Meeting 6:30	Friday	Sep 17
SCCARC Meeting	Friday	Sep 17
Club BBQ	Saturday	Sep 18
Short Skip Deadline	Monday	Oct 4
SCCARC Meeting	Friday	Oct 15

MONTHLY MEETINGS.

The SCCARC Meets at 7:30 PM, on the **THIRD FRIDAY** of the each month (except December). Meetings are at Dominican Hospital, 1555 Soquel Drive, Santa Cruz.

SCCARC Website at - www.k6bj.org

CLUB E-MAIL: yourcall@k6bj.org

NET CONTROL SCHEDULE (Subject to Change)

9/13 Phil KE6UWH
9/20 Tom K6TG
9/27 Allen WB6RWU
10/4 Joseph KG6NRI
10/11 Ron W6WO

THE MONTHLY NEWSLETTER of the SANTA CRUZ COUNTY AMATEUR RADIO CLUB

SHORT SKIP

SANTA CRUZ COUNTY AMATEUR RADIO CLUB
P.O. BOX 238
SANTA CRUZ, CA 95061-0238

SCCARC Meeting: Sep. 17, 7:30PM

First Class