

JANUARY 2002

THE MONTHLY NEWSLETTER of the SANTA CRUZ COUNTY AMATEUR RADIO CLUB

SHORT SKIP



CAKE Report #2

Today we convened our second Coffee Assisted Knowledge Exchange session. In attendance were George W3AB, Eric WA6HHQ, Fred KF6N, Ben KG6FNK and Ron W6WO. Not a bad turn-out given such the short notice.

Eric brought a selection of books from his library and we discussed their content in some detail. We discussed how crystal filters work and how they might be designed using individual crystals.

Fred had questions about wearable antennas and that produced a lively debate about how to make them efficient.

Ben brought a number of books on the C++ language which were mainly for Ron's benefit. Eric made the observation that Ben's questions on how to find one's way in electronics were a mirror image of Ron's questions on C++.

Ron described a TI chip, the UAF-42, that implements a variety of active filters in the audio range and the associated free software filter design program. We examined response curves showing that Bessel filters minimize ringing and would be the design choice for digital signals such as CW.

The group decided to return to the Surf City coffee shop on Porter St. in Soquel Village (Hwy 1 Bay/Porter exit) for our next meeting.

For those interested in discussing technical items our next meeting will be on Jan 26th at 10:00 AM

Disclaimer: The advice given during CAKE meetings are those of the contributors and the SCCARC shall be held harmless for any actions taken as a result ;-))

Modern RF Power Measurement

Part 1 of this article provided some historical background on the topics of energy and power. It was noted that the indirect measurement of RF power by separately measuring current and voltage was difficult and that direct measurement using a Wattmeter was preferable. The Bird Company products have for decades been the staple tools of amateurs for measurement of RF power. One of the most popular models is the BIRD 43 ThruLine® Wattmeter.

This instrument measures both forward and reflected CW power in 50 Ohm coaxial transmission lines. It is rugged and introduces low VSWR and insertion loss with $\pm 5\%$ of full-scale accuracy. Plug-in elements provide a wide choice of frequency ranges from 2 to 1000 MHz and power levels from 1W to 10KW.

coaxial cable between a source and a load. The result is displayed on an analog meter calibrated in Watts. Both forward and reflected power can be measured in a manner very similar to how SWR bridges operate. There are number of drawbacks, the first being cost. A used unit in poor shape can still be found advertised for over \$100 and the many plug-in modules needed to cover amateur bands and power levels each sell for around \$50 each. The cramped non-linear meter scale makes accurate readings difficult. The Bird meter is virtually useless for power levels as found in receivers or the low level stages of a transmitter. Clearly this type of instrument still has its traditional role to play but it is time for new technology to step in.

Continued page 4



Bird Wattmeter

As the name "ThruLine" implies, power is measured by sampling the direction and magnitude of power flowing in a 50 Ohm

A TIME FOR RENEWAL

Time to renew your club membership again. Dues for the 2002 calendar year are payable as of December 1. Regular memberships are \$25, memberships for additional family members at the same address are \$6 each, and full time students under the age of 18 can become members for \$10. This has got to be one of the best deals going, dues prices haven't increased for over 10 years! We look forward to having you as a member again in the coming year.

Make out your check to: SCCARC

Send it to SCCARC, PO BOX 238, SANTA CRUZ CA 95061-0238

CLUB MEETING FRIDAY JANUARY 18, 7:30P.M.



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Quick Numbers from the Secretary/Treasurer

Current (2001) club members: 142

Life members (members for each of last 25 years): 11

Paid 2002 club members: 16 (plus 11 Life members)

2001 Holiday brunch attendees: 58

SCCARC ARRL members at last report: 83

Shortskips mailed each month: 128

End of 2001 balance in SCCARC accounts:

Money Market account	\$2957.37
Checking account	\$43.82
Petty Cash	\$30.23
Total	\$3031.42

In 2001 SCCARC took in \$10.46 more than it spent. This is an improvement. In each of the last several years, SCCARC had to withdraw some funds from our Money Market account to cover expenses toward the end of the year. This was not required in 2001, for the first time in several years. It'll take everybody's membership renewal, fiscal discipline, and some good luck to repeat this feat in 2002. One reason we didn't need to dip into the Money Market account is that an unusually small amount of money was spent on the club's repeater systems in 2001. That could change at any moment if something fails, so it's essential that we maintain our Money Market account "buffer" as we enter the new year.



And what a great holiday season it has been. I hope everyone comes to the New Year in good health and spirits. New Years is a time to sit back a little and take stock of the fun and camaraderie of last year's club activities. Could it get any better than this?

I am looking forward to our next meeting knowing that we can build on last year's success. I am sure Jim KF6YRD has a fun program in store for us (thanks Jim) and Sue Ann KG6BXD will bring lots of goodies to enjoy (thanks Sue Ann). It looks like we will follow the same path of fun and success into this year. The more we put into our organization the more we get out. Could it get any easier that that my friends? See you on the 3rd Friday of January at the usual place.

— Richard KG6AXD

JANUARY SPEAKER

The speaker for the Jan 2001 meeting will be Jeff Liebermann, WB6SSY, who will demonstrate how to do direction finding with two receivers, one repeater, oscilloscope, calculator, map, and a piece of string. If you can hear a station on the input to the repeater, as well as the repeater output, you can determine a line of position. If enough stations do the same thing, a "fix" can be established. The system is based upon the principle used by the WWII German "Y-Gerat" navigating over London during the blitz.

Time permitting, a scheme for building an HF direction finding network, using a similar propagation time principle will be presented. The system will consist of numerous HF receivers, remotely controlled by a central server, communicating over the internet. Each receiver will measure the modulation envelope signal delay from a GPS reference to the central server, which will compute the estimated position. Some notes on the FCC interferometer DF system may be included.

HAPPY BIRTHDAY:

JOHANNES KEPLER AT AGE 470

VK2KGM notes the 470th recorded birthday of Johannes Kepler last December. Kepler was the first astronomer to determine a mathematical relationship existed that could be used to predict the motion of planets. This became the basis for the Keplerian data we use today for satellite orbits. (AMSAT)

LICENSE TESTING

19-Jan-2002

02-Feb-2002

16-Feb-2002

02-Mar-2002

16-Mar-2002

Sponsor: SILICON VALLEY VE GROUP

Time: 8:00 AM (Walk-ins allowed)

Contact: EMMETT F FREITAS

(408)243-8349

VEC: ARRL/VEC

Location: TANDEM COMPUTER CO

19333 VALLCO PKWY BLDG #2

AE6Z@ARRL.NET

START TEST ANYTIME BETWEEN 8&11

CUPERTINO, CA 95014

26-Jan-2002

Sponsor: SILICON VALLEY VE GROUP

Time: 3:00 PM (Walk-ins allowed)

Contact: EMMETT F FREITAS

(408)243-8349

Email: AE6Z@ARRL.NET

VEC: ARRL/VEC

Location: EMERGENCY OPERATIONS CENTER

855 N SAN PEDRO ST

ESCORT BY SECURITY GUARD

SAN JOSE, CA 95110

CONDOLENCES

The Santa Cruz Sentinel newspaper reported on the loss of our SCCARC club member Sam KD6MTE and on the loss of Helen Taylor, wife of our Dave K6GHA, as shown below. Our condolences to Sam's family and to Dave's.

—73, Cap KE6AFE

Samuel D. Cranke, KD6MTE SK

No services are planned for Samuel D. Cranke, who died Thursday after a long illness. He was 78. Mr. Cranke was born in Stigler, Okla., and was raised in Tulsa, Okla. He was a machine parts inspector for Lockheed Missile and Space Co. in Sunnyvale for 28 years and retired to Paradise Park in 1987.

Helen Taylor

Services will be Saturday for Helen Taylor, who died Dec. 2 in Watsonville. She was 85. Mrs. Taylor was born in Pawtucket, R.I. She had lived in Santa Cruz for more than 50 years. She is survived by her husband of 55 years, David Taylor, K6GHA of Santa Cruz.



By Art Lee WF6P

CHATTER

Was tuning around the 40 meter band and came to a station booming in on 7.260 at 0800 Sunday. A woman's voice in clipped, precise English, read the news from the Voice of Russia station. They have a slightly different slant on the world's happenings. Seems strange to be referred to as "the Americans." I checked and they were on again on Friday, and probably daily. I guess they have that freq while the propagation is good.

Correction: I notice that in December's Short Skip I referred to my Vietnam article but failed to mention which publication it appeared in. Check the December issue of Vietnam Magazine for a look at forgotten wars.

Ever do a dumb thing? En route to the club Christmas party I tried to check in on the K6BJ repeater. Our doggone Kenwood TH-28A handheld keep beeping and cutting out. Cap and Elaine could hear me trying but no joy. When we arrived at Chaminade, we pulled in next to them so I borrowed Elaine's radio to finish my transmissions. I checked and found that my antenna was slightly loose. That should fix the problem. Wrong. The faithful Kenwood worked on low power just enuff to bring up the repeater for a second. When I checked the output power bar I discovered that a new set of AA batteries was all that was needed. Oh well.

The Christmas party was great. Great food, great camaraderie and a fine time overall. We missed Norm, N6DAC, and Beth, W6RYL, who, because of colds, could not make it this year. Got a chance to rag chew with lotsa folks, both old and new. Ralph Evans, W6ENE, flashed his "Ruptured Duck" as I passed his table. You say you don't have one? You had to be a veteran of WWII to earn it. It is a gold lapel emblem displaying an eagle perched within a wreath. It was presented to vets when they were discharged. I can't find mine, but there are

plenty of our more senior club members who have them. This was akin to giving a retiring employee a gold watch - only without the gold. It was a nice gesture. The real gold was in the G.I. Bill that we benefited from.

Sat with Rich Hanset, KI6EH, who has relieved the ARES district head. Rich is reassuming a role he played for many years. We used to meet when Rich's company was located in Harvey West Park. Gene Piety, KH6PP (SK), and I were with Rich, in the mid-1980s, as were many others. Rich will need help in reforming his team. If you'd care to help, give Rich a call.

Talk about studying for radio exams. I received this e-mail today from Wayne Thalls, KB6KN: On my bookshelf I have a copy of "Mathematics Essential to Electricity and Radio (with answers)" by Nelson M. Cooke, Lt. USN. This edition was published in 1943. It is identified as Education Manual EM 972. I used it in a correspondence course from the Armed Forces Institute.

Even in this day of computers, the book is still relevant. In fact, if someone really wants to understand why a computer works they need to study the math. Not to mention why semiconductors work.

When I studied for the commercial radiotelegraph license in 1944 I used "Radio Operators Questions and Answers" (study guide) by Nilson and Hornung, and the "Marine Radio Manual". Both are heavy into the care and feeding of storage batteries and charging systems. They also devote a lot of space to the maintenance of ship-board antennae including the rigging of temporary radiators.

The FCC exam asked questions about regenerative receivers, as well as superhets. There was nothing on SSB of course. Nothing about GPS either.

The radiotelegraph license exam took almost a full day. As I recall it started at 9 AM and I finished around 3 PM. Must have been allowed a half hour for lunch. I had one week of leave between assignments and I arranged to stop off in Chicago to visit the FCC office for the exam. Several months later, I traveled from Yuma to San Pedro where I obtained my Coast Guard Radio Officers license.

There were no fees connected with any of these licenses of course.

Wayne

EVENTS

Livermore Swap Meet - 1st Sunday of each month at Las Positas

College in Livermore, 7:00 AM to noon, all year. Talk in 147.045 from the west, 145.35 from the east. Contact Cliff Kibbe, KF6EII, (209) 835-6715, e-mail: larkswap@usa.com.

RadioFest 2002. Saturday, Feb. 16, 2002, 7:00AM to 3:00PM

at the General Stilwell Community Center, Ord Military Community, 4260 Gigling Road, Seaside, CA.

Talk-in 146.97- PL 94.8. Sponsored by the Naval Postgraduate School Amateur Radio Club. See www.k6ly.org/radiofest for additional details.

RF Measurement Continued

What follows is a condensed description of a power measuring set-up that was designed and described by Wes Hayward W7ZOI, in the June 2001 issue of QST. Wes is one of the Ham Radio's DIY Greats, author of "Solid State Design for the Radio Amateur" and many project articles. When Wes writes I pay attention.

The key new technology for measuring low levels of RF power is the AD8307 Logarithmic Amplifier chip from Analog Devices Inc. The output voltage of the device is proportional to input power at 50 Ohms with a high degree of linearity. In a wattmeter application the power source to be measured is terminated in a 50 Ohm resistor at the input of the device. The device output is then measured on an analog Volt meter (or more accurately a digital multi-meter) calibrated in dBm. For low power levels it is very useful to express power in dBm which is dB with reference to 1

milliwatt. The AD8307 covers the range of over +10 dBm to below -75 dBm (that is from over 10 milliwatts to less than one tenth of a nanowatt) at frequencies from audio up to 500 MHz.

We evidently have a gap between the levels of power easily read on a Bird Wattmeter and the +10 dBm limit of the AD8307. Wes Hayward's solution is a resistive voltage divider to tap a fraction of the voltage between the source and the load. To increase the range of the chip to 10 Watts we need a tap that lowers the power level to the chip 1000 times which is the same as saying we need a 30 dB tap. For 100 Watts we need a 40 dB tap.

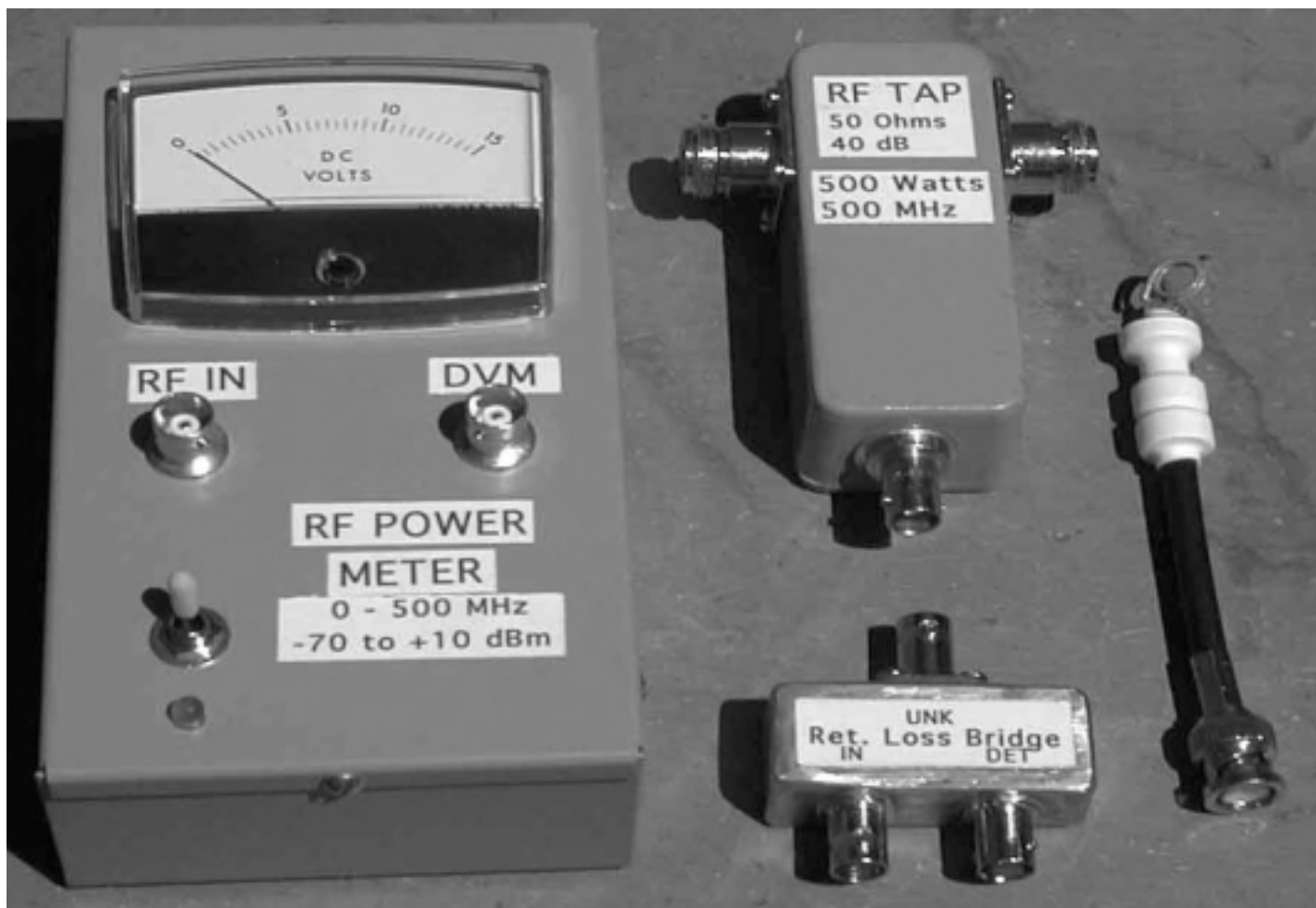
The Bird Wattmeter is a bi-directional device so we can easily measure both forward and reflected power within its power range. In contrast the AD8307 refers to power in 50 Ohms and as such does not measure reflected power. In many situations it is important to determine the degree of impedance

mismatch by measuring reflected power, the most common need is to know if an antenna is tuned correctly. Matching impedance is also important when dealing with filters, amplifiers, mixer ports and other low level situations. Once again Wes provided an elegant solution in the form of a return loss bridge.

A return loss bridge can distinguish between the direction of power flow. Provided the bridge has directional discrimination of at least 25 dB an accurate measurement of reflected power can be achieved.

In conclusion we can construct an accurate power measuring capability that has a wide bandwidth with superior accuracy and at a very much lower cost compared with our traditional approach. Incidentally Wes is working on his next book that will focus on the many technical myths of Ham Radio. I can hardly wait, it will surely be a winner. Thank you Wes!

— Ron W6WO



New power measuring components

A HAM SOLUTION FOR A TV RECEPTION PROBLEM

Ever since Channel 8 moved their transmitting antenna from Mt. Madonna Ridge to Fremont Peak, Elaine (my XYL) has complained about the poor reception with the little TV in the kitchen. It only has a telescoping whip (a single rabbit ear?), and picks up audio but usually not the picture. With the various antennas sprouting from my roof, she figured I could at least hook her up to one. I tried the 2m J-pole, 10m "L", 20m inverted vee, and 15/40m longwire. They all helped a bit, though none were resonant on the Channel 8 frequency. Well, I was gonna have a problem sharing an antenna anyway, or risk blowing up the TV when I transmitted, so I half-heartedly perused the Radio Shack catalog for a "good" antenna. Then for some reason I became inspired to make my own, turning this from a chore into a fun project!

Having built a few dipoles for HF, and assuming TV signals are broadcast with horizontal polarization, I decided to try a simple 2 element array. I looked up the frequency of Channel 8 (180-186 MHz) and decided to use 183 MHz. I pulled out the ARRL Antenna Book to double check the length for a reflector and the spacing and tripped across a 2 element quad for 2 meters. Hey, this would be fun, I've never built a quad. So far my antenna-building experience has been limited to longwires, dipoles and ground plane antennas. I've always passed up quads on HF because of the size and spreaders required. Basically the driven element is a full wave loop, which can get pretty cumbersome at HF (twice as much wire as a dipole, with spreaders to keep it square), but at 2 meters it becomes a square only about 20" per side, and a bit smaller for 183 MHz.

I didn't realize what good antennas loops and quad arrays are until I gave them serious consideration for this TV problem. A single full wave loop, erected vertically, has propagation similar to a dipole, with more gain perpendicular to the antenna and nulls in the parallel directions. But a loop is a little more directional, with about 2 dB gain over a dipole in the favored directions. A loop also is less sensitive to proximity to the ground. A dipole lower than 1/2 wavelength above

ground is notorious for having a steeper takeoff angle than desired for DX. A loop also has this problem, but the takeoff angle is 4-5 degrees lower than a dipole when in the range of 1/4 to 1/2 wavelength above ground.

When used in an array, the additional gain over a Yagi is still there. Adding a reflector adds another 3 dB (for 5 dBd total) and makes the antenna directional rather than bi-directional. Of course the same can be done with a dipole, creating a 2 element Yagi with about 3 dBd gain. There is, however, an impedance matching problem with a Yagi, which tends to have feed-point impedance well below 50 ohms. This is usually handled with something like a delta, gamma, or hairpin match. I'll save experimenting with them for a later date. You see, a two element quad has impedance somewhere between 50 and 100 ohms, depending on the spacing between the reflector and driven element. Coincidentally, TV coax is 75 ohms! Boy, this is too easy!

I used the article "A 144 MHz 2-element Quad" in the 18th edition of The ARRL Antenna Book as a starting point and scaled the elements for 183 MHz. This method of building a quad is simply bending #8 wire (I used copper) into a square that is left open in the middle of one side for the driven element, and fed with coax to the two ends in that opening. The

reflector is 3% longer and the ends are fastened together to form a continuous loop. I used 0.75" x 1.5" pine strips to space everything out properly. The feed point should be on the bottom side for horizontal polarization. The dimensions for my antenna ended up being:

Driven element: 16.7" per side with a .3" space at the feed point

Reflector: 17.3" per side with a 0.5" bolted overlap

Spacing: 15" apart on the pine "boom"

Before I varnished the wood, I connected it to the TV while in the kitchen and pointed it through the wall in the general direction of Fremont Peak and was rewarded with a good picture and sound. And it is indeed directional; in fact I had to point it about 45 degrees south of where I thought Fremont Peak was to get the best signal, and after checking a road map found that Fremont Peak is indeed where I ended up pointing it. Well, I finally put it on the roof and the XYL is happy.

I have long considered improving the 20m inverted vee in the maple tree in my front yard, and have lately been caught staring at the branches imagining a quad loop up there! Now that the leaves are off the tree, I think I'll go out and look again, hi.

— Rich KF6QKI

FANTASTIC VOYAGE REDUX

The world of medical communications research has finally caught up with the lights of Hollywood. This, as the government approves a tiny radio camera-in-a-capsule that patients can swallow. It is a camera that will transmit pictures to give doctors a close-up view of what is inside of you. The new transmitting video pill is made by Given Imaging Ltd. in Israel. It is called the M2A Swallowable Imaging Capsule. It is also exceeding tiny. In fact it is so small that it is easily swallowed by the patient.

Its inventors say that it then painlessly winds its way through the digestive

tract and uses wireless technology to transmit full color pictures to a belt pack receiver worn by the patient. That unit also decodes the signal and records the information as the patient goes about his or her daily routine.

A U.S. spokesman for Given Imaging says that doctors who wish to use the video imaging pill will have to buy a specialized \$20,000 computer workstation. Each camera capsule costs about \$450.

—Amateur Radio Newline Mert Garlick, N6AWE

SCCARC Officers - 2002

President	Richard Trebbien	KG6AXD	426-0169
Vice President	Jim Welty	KF6YRD	685-9225
Secretary	Elaine Pennell	KE6FRA	429-1290
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	Allen Fugelseth	WB6RWU	475-8846
	Mike Doern	KF6UXB	477-1161
	Ron Skelton	W6WO	477-1021
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)
KI6EH 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
• SCARES Net Monday 8:30 PM 146.835-(PL 94.8)
• Watsonville ARES Net Thursday 8:30 PM 147.945-
SLVARC Repeater WR6AOK 147.120+ PL 94.8 Ben Lomond
• SLVARC Net Thursday 7:30 PM
SLVARES N6IYA 146.745- PL 94.8 Felton
• SLVRC Net Thursday 7:30 PM
• ARES Net Monday 7:30 PM
NPSARC K6LY 146.97- PL 94.8 / 444.700+ PL 123 (linked) Monterey
• Monterey ARES Net Wednesday 7:30 PM
• NPSARC Net Wednesday 8:00 PM
• Monterey Bay Traffic Net Nightly 9:00 PM
• Newsline (Ham News) Broadcast Wednesday 8:30 PM
6 Meter Local Net 52.8 MHz (PL-114.8) Sunday 8:00 PM
Mont. Bay Chapter 191 QCWA :Tuesday, 7:30PM, AA6T repeater, 146.700- PL 151.4

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

SCCARC Calendar of Events

SCCARC Meeting	Friday	Jan. 18
SHORT SKIP deadline	Monday	Feb. 4
SCARES	Tuesday	Feb.12
SCCARC Board Meeting 6:30	Friday	Feb. 15
SCCARC Meeting	Friday	Feb. 15

MONTHLY MEETINGS

The SCCARC Meets at 7:30 PM, on the THIRD FRIDAY of the each month (except December). Meeting are at Dominican Hospital, 1515 Soquel Drive, Santa Cruz.

Visit the SCCARC Website at -

www.k6bj.org

CLUB E-MAIL: yourcall@k6bj.org

NET CONTROL SCHEDULE (Subject to Change)

1/14	Tom K6TG
1/21	Jeff KF6BKG
1/28	Allen WB6RWU
2/4	Phil KE6UWH
2/11	Ron W6WO
2/18	Dave W6TUW



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

Meeting: Jan 18, 7:30PM

SPEAKER: WB6SSY on "Y-Gerat" Navigation

First Class