

# Sierra Signals

Sierra Foothills Amateur Radio Club  
Auburn, CA  
An ARRL Special Service Club

September 2008

P.O. Box 1005, Newcastle, CA 95658

## Compass in Trouble

(Submitted by Greg, KO6TH)

No, we're not talking about the north-pointing little needle thingy. That would be really big news. Probably really bad news, too, come to think of it. The COMPASS in this case is a Cubesat, a complete orbiting satellite in a tiny 4-inch cube.

COMPASS is the first satellite project from the Aachen University of Applied Sciences in Germany. It was launched on April 28 2008, into a circular polar orbit, meaning that the satellite's orbit runs from pole to pole, so as the Earth spins below it, the satellite's path takes it over the entire surface every day. This makes for an excellent platform for taking pictures of the planet below,

which is one of the satellite's primary objectives. To accomplish this, the satellite also has to have the ability to orient itself in space, otherwise you'd be pretty much guaranteed to take a picture of something else. For this it has an experimental system of magnetic field and sun sensors, and the attitude control circuitry to use them. The evaluation of this system is another of the satellite's mission objectives.

(continued on page 2)

At the Key of S.F.A.R.C.

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#### **REPORTERS**

**Satellites:** Greg, KO6TH

**History:** Gary, KQ6RT

**Misc Radio:** Fred, K6DGW

### RESOURCES

#### **REPEATERS**

145.430 (-0.6 MHz/PL 162.2)

440.575 (+5.0 MHz/PL 94.8)

223.860 (-1.6 MHz/PL 100.0)

#### **CLUB NET**

Thursdays, 7:30PM, K6ARR/R

145.430

#### **CLUB MEETINGS**

Second Friday of the month,

7:30PM at the Library, 350

Nevada St, Auburn CA

#### **CLUB BREAKFAST**

Last Sat of the month at Susie's

Café, Cirby at Riverside, Roseville

- 8:00 AM

#### **NET CONTROL OPS**

Dave Jenkins, WB6RBE

Gary Cunningham, KQ6RT

Norm Medland, W6AFR

Casey McPartland, W7IB

#### **EDITOR**

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### 2008 Calendar of Events

Sept 6	VE Session – 8:00 – 10:00am
	Raley's - Douglas/Auburn Folsom
Sept 6	Sacramento Valley Hamfest-Lincoln H.S.
Sept 12	Regular Meeting
Sept 27	Club Breakfast – Susie's – Cirby/Riverside
Oct 4	VE Session
Oct 10	Regular Meeting – White Elephant Sale
Oct 25	Club Breakfast

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

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## 50 Years Ago At The SFARC

(Reported by Gary, KQ6RT)

Sierra Foothills Amateur Radio Club

The meeting of September 3rd, 1958 was brought to order at 8p.m.

General discussion was held on having a "ham" booth at the fair. Harry Grieb, Frank Towne and Woody were to handle the arrangements, with help from volunteers.

Buzz LaBonte gave us a very interesting demonstration and talk on his amateur T.V. station and equipment.

Carl Rolufs, and Harry Grieb, our activities committee, wanted suggestions as to what the club would like to do at the meetings. After refreshments the meeting was adjourned at 10:30 p.m.

These minutes are respectfully submitted for correction or approval.

Arlene Murch

Secretary

Buzz LaBonte, Jay Peat, Carl Rolufs, Don Richier, James Carmen, Seeichi Otow, Earl Wilson, Bruce Witwer, Kay Woods, Frank Towne, Ed and Ivy Glass, Gus Gercke, Charles Cooke, Mike Bauman Jerry Murch, Bob Hicks, T. Woods, Arlene Murch Bruce Morrow.

Refreshment Committee

Kay Woods, Arlene Murch

73,

Gary - KQ6RT

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## Compass...

(Continued from front page)

But, to the troubles. In some respects, COMPASS is a fairly "ordinary" satellite, in that it is powered by solar cells, and has an on-board battery to power the spacecraft while it is in the earth's shadow each orbit. There is also an on-board heater to keep the electronics and batteries from getting too cold, an on-board computer to control things, and a pre-programmed set of

instructions and threshold values, to coordinate what to do when something goes wrong. Pretty mundane stuff, satellite-wise. The problem is that the satellite has gotten itself into a bit of a corner, and is asking for help to get out.

In mid-August something happened on-board that caused the satellite to reset itself. A reset is a pretty standard method for getting out of trouble. We do it (nearly daily, it seems) with our PC computers. When all else fails, give it the "three-fingered salute" (meaning "control-alt-delete", though the other kind of salute is popular too), and try again. After the hard reset, those default instructions are supposed to take over to put the satellite back in a safe state. But in this case, they can't. The satellite is too cold.

Because of the low temperatures, the default instructions tell the satellite's heater to come on. Unfortunately, the satellite's battery is exhausted, and the even with the satellite in full sun, extra load from the heater causes the under-voltage detect to reset the satellite again. When the satellite resets, all the threshold values and settings go back to their defaults, so it's a vicious cycle. The only way to break the cycle, and allow the satellite to recover, is to prevent the heater from coming on. That's where we come in.

The satellite command team has requested that the satellite operators down here on earth send commands to the satellite to turn off the heater, and alter some of the thresholds, in the hope that the satellite's battery system can recover just enough to prevent the reset loop. Once that happens, the satellite should be firmly on the road to recovery. Information on the satellite's status, and the simple DTMF commands to send, are on the command team's website at <http://www.raumfahrt.fh-aachen.de>, along with some tools for decoding the satellite's beacon and telemetry.

Reports from some of the ground stations helping out with the recovery have indicated that what little telemetry the satellite is able to send is sounding somewhat better, but the heater is still turning on, and the bird is still resetting. There is speculation that the logic connecting some of the satellite's systems is not functioning, likely due to the low battery voltage condition. Only time will tell if the attempts to recover the satellite will be effective.

73s,

Greg KO6TH

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## August Meeting Minutes

(Reported by Leslie, K7NYE)

Minutes of the SFARC Board and General Meeting, August 10th, 2007 at the Auburn, CA main library:

Board of Directors meeting began at 7:10 PM with a quorum officers and directors in attendance. Old business discussed

included final preparations for the club picnic. New business was focused on how best to present information to the club about an alternate back-up club repeater and how to solicit donations from the club for this purpose. Current expenses and balance for the club were presented by George, KG6LSB. Meeting was adjourned at 7:25 PM.

#### SFARC General Meeting Minutes:

7:35 PM Meeting started by SFARC Club President, Don Hay, WB6LPJ. Meeting started with Pledge of Allegiance, introductions of general members and officers. Twenty Nine members and guests were attendance. Reports were given by VE, ARES and ARRL representatives.

Old Business: Preparations for the upcoming Club picnic were confirmed. Bob Boeckman, WA6ULL reserved a picnic location at PineBrook Mobile Home park in Folsom on Saturday, August 18th. Members were reminded to bring a side dish, salad or dessert, as well as chairs for their own use.

New Business: Gene, KG6NYH mentioned that he has been asked to do some long-range planning for communications for both the Tevis and the Western States annual races. The goal is to coordinate the communications efforts between the various entities, such as SOS, OES, Placer Search and Rescue, SFARC, etc. He suggested that SFARC solicit a representative that can support this initiative and represent communications from the club. Other business talked about was a new repeater/site for SFARC. Parts required to make a new repeater operational include a duplexer and a control board, which will require private donations to purchase. The repeater itself and other components have already been acquired. Bob B. and Richard K. are part of the committee supporting this project. A nominating committee for future club officers was formed, with Richard K. and Casey M, volunteering to head this up. Jim, K7ARR requested club funds for maintenance for the current repeater. A club vote was taken, seconded and passed to provide K6ARR up to \$150.00 for maintenance purposes.

Presentation: There was no formal presentation this month.

Gene, KG6NYH held the monthly Drawing. Meeting was adjourned around 9:30 PM.

Respectfully submitted:

Leslie, K7NYE

Secretary

## Miscellaneous Radio

### Diversity Reception

(or "How to get rid of annoying QSB")

QSB (technically, "I am bothered by fading") is constantly with us, both in the HF range as well as at VHF/UHF. At HF, there are many sources ... rapid changes in the ionosphere being one. We often think of multi-path, where the original signal arrives at our antenna from two different paths due to reflections to be a VHF and above phenomenon, but it happens at HF as well. The signals take slightly different paths which changes their relative phase as they reach your antenna, and they begin to interfere with each other. If one drifts 180° out of phase with the other, they will tend to cancel each other, and if they are close to the same strength, your QSO partner will just disappear.

Diversity reception is one way to combat QSB, and the concept has been around a long time. It just hasn't been common in ham radio. That is changing. I'm going to use non-ham example to illustrate the concept because it is neatly illustrates all three types. However, this will connect back to ham radio.

Not all of the 3 ½+ years that my team and I spent in the two



Vietnam and Laos in the 60's were spent in combat. Every now and then, we'd get a more "vanilla" mission as sort of a respite, and on these, we got to play around with some really cool radio toys. One such "toy" was the AN/MRC-98 Heavy Mobile Troposcatter communications system. It would give you 60 telephone voice channels over a range of maybe 550 km under ideal conditions. It operated in the 450- 490 MHz range. It consisted of three semi-trailers and two 9.1 meter dish antennas that collapsed neatly into two trailers. Two of the semi-trailers contained the electronics and were backed up to each other in operation. The third semi-trailer had two 250 KVA GM diesel alternators and normally was behind the other two. Five tractors could convoy the system, and in the 60's, the only aircraft that could carry something this big was the very old (and slow!) C-124. The first photo is the MRC-98 that was set up at Clark AB in the Philippines which our depot maintenance troops used to duplicate problems we had over on the mainland. You can see the two back-to-back trailers between the antennas and the power trailer behind them. There's a second power trailer behind that one in the photo. The second photo illustrates the size of the waveguide for these frequencies. It was taken at Udorn, Thailand (extreme north of Thailand on the Mekong River across from Laos) by one of my comrades on another team. The two guys on top are working



on the installation, the two idiots below are clowning around. The guy in civilian clothes was an Air America pilot and a ham.



The transmitter consisted of four exciters, two in operation and two for back-up, and two 10 KW power amplifiers that used Eimac klystrons about 1.7 meters long. The PA's were in each end of the trailers, and were on two separate frequencies feeding each antenna via waveguide. One feed horn was vertically polarized, the other horizontal. There were four identical receivers, two on each frequency of the far site, and again, split between the two antennas and polarizations. Each pair of receivers had a common local oscillator so that the phase of the received signals remained constant relative to each other. The receiver basebands went into a 4-channel analog combiner that mixed them to achieve the best signal to noise ratio.

So, we transmitted the same 60-channel baseband on the two frequencies, at two polarizations, from two antennas separated in space, at 20 megawatts EIRP. We received signals from the other end on two frequencies, two polarizations, and from the same two separated antennas and it illustrates the three common diversity reception techniques – space (separated antennas), frequency, and polarization – all in one system. It was called Forward Propagation Tropospheric Scatter (FPTS), and it worked by squirting a huge amount of power at the horizon, a miniscule fraction of which would scatter in the troposphere, and some of that would hit the receiving antenna. The scattering process was anything but stable, and the signal strength on any one receiver would vary all over the place. But when one faded, it was highly likely that another would be strong, so the combination was de-QSB'd, so to speak. It was highly unlikely that all four receivers would fade simultaneously.

For a long time, a ham station comprised one receiver, one transmitter, and one antenna. As time went on, the transmitter and receiver migrated into the same box and became a transceiver. Right around the end of the 20<sup>th</sup> century, high-end ham transceivers began to show up that had two separate receivers in them, although the receivers weren't always identical. Recently, the Elecraft K3 showed up, and its second receiver is identical to the main receiver. What's more, it has the option of phase-locking the local oscillators and ganging the VFO's which has opened the possibility of true diversity reception on the HF ham bands. And some folks have begun

using it. They put separate antennas on the two receivers, listen to one receiver in each ear, and voila! -- space diversity! In this case, the "baseband combiner" is buried in the wetware between the operator's ears, and it works! Bob, K6XX, has been playing around with it and has promised to make some stereo recordings that will be posted to the NCCC website. Stay tuned, I'll advise you when it happens. You can get some of the benefits of diversity reception with any two non-identical receivers, but the receiver differences and the fact that they are not phase-locked introduces effects that mask some of the diversity benefits.

There have been numerous examples over time where techniques pioneered by hams have found their way into commercial practice. Sometimes it works the other way around. Diversity reception is one of those.

73,

Fred K6DGW

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## Sacramento Valley Hamfest

The Sacramento Valley Hamfest will be held on Saturday Sept. 6, 2008, from 07:00 – Noon at Lincoln High School in the Parking Lot.

*Buy & Sell – Ham Radio Related Stuff Only*

*Prize Drawings*

*VE Session*

Presented by these Sacramento Valley Amateur Radio Clubs:

North Hills ARC – [www.k6is.org](http://www.k6is.org)

River City ARCS – [www.n6na.org](http://www.n6na.org)

Sierra Foothills ARC – [www.sf-arc.org](http://www.sf-arc.org)

Western Placer ARC – [www.wparc.org](http://www.wparc.org)

Yuba Sutter ARC – [www.ysarc.org](http://www.ysarc.org)

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## FCC Vanity Call Sign Fees to Increase

*(Reprinted from ARRL Special Bulletin 8-ARLX008)*

On August 11, the Federal Communications Commission announced that the cost of an Amateur Radio vanity call sign will increase 60 cents, from \$11.70 to \$12.30. Now that notice of the increase has been published in the Federal Register, the increase will take effect in 30 days, September 25, 2008.

The FCC is authorized by the Communications Act of 1934, As Amended, to collect vanity call sign fees to recover the costs associated with that program. The vanity call sign regulatory fee is payable not only when applying for a new vanity call sign, but also upon renewing a vanity call sign for a new 10 year term.

The notice in the August 26, 2008 Federal Register, entitled "Assessment and Collection of Regulatory Fees for Fiscal Year 2008," includes regulatory fees expected to recover a total of \$312,000,000 during FY2008, encompassing all the services the FCC regulates.

More information is available at,

<http://www.ar1.org/news/stories/2008/08/11/10257/?nc=1>.

**SFARC Picnic August 2008**



Every wonder what net control operator Dave, WB6RBE looks like? That's him on the left!



How many cooks does it take to make hamburgers and hotdogs for SFARC?



SIERRA FOOTHILLS AMATEUR RADIO CLUB  
P.O. Box 1005  
Newcastle, CA 95658

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**SIERRA FOOTHILLS AMATEUR RADIO CLUB  
2008 MEMBERSHIP APPLICATION**

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Phone Number: \_\_\_\_\_ Application: (Circle One)    New            Renewal

Member Dues: Circle Amounts That Apply.      Applications (for new members only) received in the middle of the year will be pro rated. Contact the President or Treasurer for exact rate.

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