Foothills Amateur Radio Society
Relay

August 2005 Volume 35, Number 8

August Club Meeting

Date: Friday, August 26, 2005.

Time: Socializing at 7 pm, Meeting at 7:30

Place: Covington School, 205 Covington Road, Los Altos

Speaker: Kristin McIntyre, K6WX (Bio later in Relay)
Topic: Understanding HF Propagation and Prediction

Software Defined Radio, or SDR, replaces analog radio components with digital signal processing. Many believe SDR to be the future of radio. As computers increase in speed and power requirements decrease, what we used to consider impossible is becoming commonplace. SDR is on this path and this talk will explore several aspects of this emerging technology which offers the promise of smaller, more flexible radios with characteristics not realizable with conventional circuitry. We will look at what SDR is, how it's done, aspects of modulation/demodulation, adjacent signal rejection, power requirements and other topics.

The club also offers pre-meeting code practice, Anderson Power-pole crimping service, *refreshments*, and *raffle prize (Garmin eTrex GPS or Yaesu VX-170)* at the meeting. Be sure to attend for an enjoyable evening.

Don't forget to bring your questions to Dr. Know-it-all.

July Meeting Report

Steve Stearns, K6OIK, spoke about HF propagation and effects that govern HF band behavior. He also described propagation prediction programs and gave a demonstration.

Steve, K6OIK, demonstrates HF Propagation Software (see note later in this Relay).

Upcoming Events

Aug 26	7:00 PM, Club meeting, Covington School
Sep 1	7:30 PM, Board Mtg at the Los Altos Town Crier
Sep 10	Electronics Flea Market hosted by FARS
Sep 17	8 AM to 9 PM, AM-Tech day, SLAC
Sep 23	7:00 PM, Club meeting, Covington School Home Brew Contest!
Oct 14-16	Pacificon, http://www.pacificon.org
Thursdays	8:00 PM, FARS net, 145.230(-), 100 Hz PL

See more events, FARS Calendar <http://www.fars.k6ya.org/events/calendar>

Presidents Corner

Club Meeting. August 26th at 7pm. The topic is "**Software Defined Radio**," with Kristen McIntyre, K6WX. Software Defined Radio replaces most of the functionality of a radio with software.

Our September 23 meeting is our **Home Brew Contest**. Bring your favorite project to show and describe to the audience. The best project presentation wins a cash prize of $40.

Am-Tech DAY. The next Am-Tech Day is unchanged for September 17th. Check the FARS web site (www.fars.k6ya.org/) for the latest details and changes. Subscribe to the FARS Announcement list (www.fars.k6ya.org/mail/) to make sure you get an email reminder.

Flea Market. FARS is sponsoring the next Electronics Flea Market on September 10th. Check www.asvaro.org for details and directions. We need several volunteers to bring supplies and run the food concession. Contact Howard, KG6GRO to sign up to help out.

- de Mikel, KN6QI

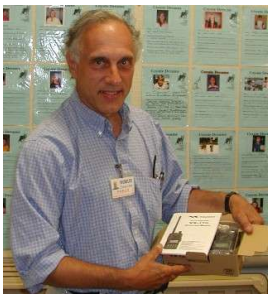
Board of Directors Meeting Minutes

Thursday, July 7, 2005, 7:30 p.m.
Present: Dave Cooper (KE6PFF), Robert Flemate (KE6TFU), Ron Green (KG6RLG),), Phil Hawkins (KA6MZE), Ruth Lacey (KG6RZG), Mikel Lechner (KN6QI), Steve Stearns (K6OIK), Howard Takaoka (KG6GRO).
Absent: Richard Baldwinson (N6ATD), Rob Goodson (N2RAG), Mark Hardy (KG6GRR), and Steve Leander (KV6O).
Visitors: Martin Liberman (KD6WJW), Paul Zander (AA6PZ).

- President Lechner called the meeting to order at 7:45 p.m.
- The minutes were accepted as read.
- The Board reviewed the Field Day Report details. Tentative plans for next year were discussed including the possible goal of four stations with more emphasis on voice transmission. Other suggestions were given.
- President Lechner moved to give Maryknoll a $100 donation. Seconded by Howard Takaoka. Unanimous approval.
- A brief discussion followed about cataloging and "getting rid of" surplus equipment.
- Visitor Paul Zander (AA6PZ) reviewed the glitch with the KT34 antenna 15-meter transmission discovered during Field Day setup. A balun replacement, on loan from Dick Baldwinson (N6ATD) solved the problem.
- Program Director, Steve Stearns, reported on the up-coming July 22 program "HF Propagation." The suggestion was made to have a program on "The Mystery of the Balun."
- Phil Hawkins volunteered to take charge of the FARS net and find net control volunteers for each Thursday night.
- Treasurer Dave Cooper reported on the bills presented for payment. President Lechner moved, and Steve Stearns seconded, to pay the bills. Unanimous approval.
- Dave announced the next Am-Tech Day, July 23. Discussion followed to include it under the club's general liability insurance. Ruth Lacey moved and Ron Green seconded the inclusion of FARS use of the SLAC facility under FARS' general liability insurance on Am-Tech Day. Unanimous approval.
- Meeting adjourned by President Lechner at 9:35 p.m.

- de Ruth Lacey, Secretary

Prize Winners



Dave Lion, N6MUB

Phil Hawkins, KA6MZE

Dave Lion, N6MUB, took home the Raffle prize – a YAESU VX-170. The "Wish You Were Here" number for Phil Hawkins, KA6MZE, was chosen. Congratulations to both!

CLUB INFORMATION

President:	Mikel Lechner, KN6QI
Vice President:	Steve Stearns, K6OIK
Treasurer:	David Cooper KE6PFF
Secretary:	Ruth Lacey, KG6RZG
Radio Officer:	Phil Hawkins, KA6MZE
Training Officer:	Steve Leander KV6O
Relay Editor:	Mark Hardy, KG6GRR

FARS Board: Dick Baldwinson N6ATD, Howard Takaoka KG6GRO, Robert Flemate KE6TFU, Rob Goodson N2RAG, , Ron Green KG6RLG, Mike Zensius, KG6GUE.

Station Trustee:	Stan Kuhl, K6MA
FARS Web Page:	http://www.fars.k6ya.org
Download Relay:	http://www.fars.k6ya.org/relay

Club members and non-members are encouraged to subscribe to the FARS Announcement list by browsing www.fars.k6ya.org/mail, clicking on Subscribe/Unsubscribe and following the instructions under "Subscribing to fars-announce.

You may submit announcements to the FARS Announcement at fars-announce@svpal.org. The list is moderated and messages will be posted as approved by the list moderator.

The FARS board of directors may be reached at fars-board@svpal.org

Club meetings are held at 7 PM on the fourth Friday of each month except January (Winter Banquet); and sometimes there are changes for June (for field day) and Nov. & Dec (for holidays).

Annual club membership is $20. Club badges are $6. Visitors are always welcome! Directions in this newsletter. Talk-in: N6NFI (145.23-, 100 Hz) or W6ASH repeater (145.27-, 100 Hz).

FARS *Relay* is the official monthly newsletter of the Foothills Amateur Radio Society. Contributions to the newsletter from members, family, and guests are earnestly solicited! Contributions subject to editing and/or compression. ASCII files via Internet preferred; but all readable forms welcome.

Here is how to reach the editor:
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Voice: 408-243-0701 (Before 9 PM, preferred)
Fax: 408-243-0701
Email: kg6grr@arrl.net, At FARS meetings.

FARS FD, HF SSB

The operating philosophy at the SSB station seemed to be Just-In-Time, which is probably good practice for an emergency.

It started with the antenna. After an incredible amount of time and effort by many club members, we got the tri-band beam working Friday afternoon. By the time the antenna was fully assembled and verified as fixed, there were not enough people to safely erect the tower. So that waited until Saturday morning (A more detailed story about the KT-34 appears later in this Relay).

When the station was assembled, everything was working and ready by 10AM. We made some test QSO's and got good reports from the new Heil microphone. Everything was in order, EXCEPT for the microphone base, which arrived at 10:55.

Several hours later, everything was working well. The 40 meter antenna was up and tested, but operation on that band would not begin until evening. Then Dick N6ATD asked about the 80 meter antenna. Last FD he and I spent several hours putting up different antennas for 80 only to operate 40 all night. Well he talked me into going home for the 80 meter dipole.

After my return, Steve KV6O helped as I shot the line over a tree branch to pull the 120 foot wire into an inverted Vee. I admit to mumbling about how few QSOs we typically make on 80. I also have to admit that I am glad we put the antenna up. Around midnight, 40 meters is usually good to the East Coast. This year, propagation never reached that far. After a period of frustration, it was fun to try 80. Being the "new guy" on the band we quickly had a couple pages in the log book. The unofficial total for 80 meters was 80 QSOs, not bad for a band we might not have tried.

In short, anyone who thinks they know everything there is to know about Field Day obviously hasn't been to enough Field Days.

- de Paul Zander, AA6PZ

Did You Miss the Party?

Reflecting on Field Day it was obvious that a number of FARS members did not attend. Field Day is the biggest multi-mode activity of the year. There are so many different things going on that it is a great way to way to try out different aspects of the hobby. It is all hands-on; one can see actual contacts being made, or even make some himself.

It starts with the challenge of assembling large antennas and towers and getting them all to stand up. It's like an Erector Set (TM) that has been super-sized. The full-sized antennas for 80 and 40 meters are so big that most of us would have a challenge finding space for them up at our homes.

Technician Class Hams can experience the excitement of the HF bands where contacts across the continent are common. There are books which discuss the theory of propagation. We have had speakers at club meetings talk about it. Then there is the reality of putting a rig on the air and actually find what is happening at different times of the day and night. One might try SSB, CW, as well as various digital modes. Each mode has its unique character which is hard to describe in a few words. Field Day is a good way to sample them all.

This year, I had a ball on 6 meters. I to used to operated "The Magic Band" a lot when I was a tech, but haven't had 6 meter equipment for some years. Because of my experience at FD2005, I will soon have 6 meters again.

Another FD "special" is amateur radio via satellite. All Technician class hams are authorized to operate satellite, but few actually do because it takes some special equipment and antennas, not to mention computer programs to help one track the bird across the sky. FARS is fortunate to have an expert bring and set it all up. Anyone wanting to learn more about amateur radio satellites can simply ask Phil, KE6MZE for an explanation. The only tricky part is to ask when the passes are expected and make sure you come back at the proper time.

Operating VHF and UHF bands on simplex is an interesting change from just sticking to repeater frequencies. On a daily basis, most of us use repeaters. In a real disaster, some repeaters will not be functional. The ones that are working will doubtless be very busy. Simplex experience will be very valuable.

Speaking of emergency operations, suppose you don't care about HF or technical stuff, you just want to be helpful in an emergency. Operating FD through the night will give you a lot of useful experience, if only that your go-bag needs to include some instant coffee, sun block, and warm clothes even in the summer.

FARS Field Day would not be the same without Peter's BBQ and the pot luck. We had some really great food. All I can say is that if you missed Field Day this year, you missed a great party.

- de Paul Zander, AA6PZ

Information on Propagation Software - July Meeting

The trouble with hot July meetings is that the chocolate chips melt out of the cookies into one's hands.

The HF prediction software that I featured at FARS July meeting is a suite of three programs that inter-operate: Ham CAP, DX Atlas, and IonoProbe. Ham CAP is free. DX Atlas and IonoProbe give you a free 30-day trial. After that, there is a modest shareware registration fee. This suite of programs costs far less than the competition.

Competing programs: WinCAP Wizard 3 by Kangaroo Tabor Software costs $65 and as a promotion includes two related programs.

The other competing program is ACE-HF Pro which costs $99, and is overpriced but otherwise quite good.

All of the above programs use the US government's free VOACAP propagation program, which you must install first. You can get this free program from www.voacap.com. Because Ham CAP, WinCAP Wizard 3, and ACE-HF Pro all use the same engine (VOACAP), no program is "best" in terms of prediction accuracy. The choice of program depends only on features and price.

The programs mentioned above are the only ones an amateur need consider. There are hundreds of other inferior or obsolete programs that either run under DOS but not Windows, or use an algorithm inferior to VOACAP (such as MiniMUF, maxiMUF, microMUF, ...). Avoid these.

I'll be giving the presentation again at NorCal DX Club (NCDXC) in Menlo Park in November when it will be cooler.

- de Steve, K6OIK

The Three Year Antenna Project
by Paul AA6PZ

A crack team of FARS members spent countless hours restoring an antenna that had given many years of good service, and now can be expected to be useful for many more.

Prologue

In the 1970's there was a company called KLM in Morgan Hill. They made a series of VHF and UHF antennas that were popular with hams. There was also a line of other antenna products which no doubt helped the company finances. Being hams, they also had an interest in HF antennas.

There were other companies making antennas for 20 meters and the other HF bands. Some had traps allowing operation on 20, 15, and 10 meters. Traps created various problems with construction, power loss, and water causing shorts and corrosion. Hams who wanted best performance, used mono-band antennas. Perhaps they had separate antennas for each band. A 10 meter beam is not very big. However, a 20 meter beam required elements approximately 33 feet long. That is a big structure for most residential lots.

The people at KLM decided to investigate something called linear loading. The idea of folding the element back on itself to reduce the overall size had been around for many years. There were a few experimental antennas built on this concept, but none were produced in any quantity.

Anyway, the folks at KLM built some experimental models. During the testing, they found that folding the elements created some extra resonances. By persistence and trial and error, they eventually were able to tune the resonances to work on 15 and 10 meters. Eventually they had created not just a compact antenna for 20 meters, but also a tri-band antenna. This was all done without the benefit of computer programs, which did not exist at the time. The result was the 4 element KT-34. There was also a KT-34XA, which had 6 elements.

Field Day 2003

As had done for several previous years, FARS used a KT-34 antenna for one of the stations. As we were assembling it, we noticed that the plastic parts had become severely degraded by time and exposure to the weather. It was agreed that something needed to be done before the next Field Day.

Spring 2004

The original KLM company had long been out of business. M2 Antenna Systems had taken over the KT-34. The original antenna had been redesigned to be mechanically more rugged. Plastic parts were made of new materials chosen to be much more resistant to ultra-violet from the sun. M2 offered an upgrade kit with the new parts. Dick, N6ATD ordered a kit for the club.

A "crack" team including, Dick, Phil KE6MZE, Ron KG6RLG , Mikel KN6QI, Steve K6OIK, and Paul AA6PZ gathered at Charlie's, KE6CUU where the antenna was stored. We naively thought it would only take a few hours to put everything together. It took a good chunk of time on two different days to completely disassemble the old antenna and figure out how to put it back together. The antenna had four elements. Each element had two ends. No two assemblies were exactly alike. The left and right ends were assembled as mirror images. The dimensions for each element are different. The original design had some tubes, which

were bent into a U. The U needed to be cut off because the new design only has straight tubes. The old design had parallel tubes connected by straps of sheet metal. The new design uses precision machined parts. The new parts are definitely more rugged. They also refused to slide into place on old tubes, which had either become slightly out of round or slightly roughened by corrosion. Our solution was to polish the tubing and to also ream out the holes on the new brackets until they would fit. Fortunately, Charlie had a good work shop including some uncommon tools, which really helped. All of the connections were coated with anti-corrosion compound, which also makes a mess when it gets on hands and tools. Each assembly had several dimensions that were critical to the tuning of the final antenna.

We disassembled one end of the reflector, and eventually convinced ourselves we had put it back together correctly. Then we started on the other end. When the reflector was reassembled, we started on the next element. One team did the left end; another team did the right end. When both ends were done, we checked to confirm that they were indeed mirror images and that both teams had agreed on the measurements. Eventually everyone agreed both assemblies were correct.

Having spent a couple weekends doing the disassembly and re-assembly, we didn't have time to fully assemble and test the antenna before Field Day. Besides, we had checked and re-checked everything. What could go wrong? We should have known better. After all this is Field Day were Murphy's Law rules.

Field Day 2004

We assembled refurbished KT-34, mounted it on the tower and put it up. The SWR looked reasonable on 20 and 10, but was really high on 15 meters. We lowered the antenna, re-checked everything, but couldn't find the cause. The clock was ticking. The only choice was to carry on and use the antenna we had. We made a lot of Quos on 20. On 15 we used the tuner in the transmitter. As it turned out, propagation on 15 wasn't too good, so the band was not as important as it sometimes is.

After we took the antenna down and were transporting it back to storage, a couple of joints came apart. Adjusting for the written dimensions had left very little overlap. OK that must be the cause of the SWR problems. A call to M2 and longer replacement tubes were sent.

Yet another antenna party was held. We put in the new tubes, and assembled the full antenna. Presumably, if a beam is pointed skyward with the reflector off the ground it will be "close" to the tuning installed on a tower. We tried to prop the antenna against a shed. The antenna tuning didn't look better. The plastic garbage cans supporting the reflector refused to hold steady. Finally the batteries in the antenna analyzer died. Well it gave us an excuse to quit for the day. However, we knew there was still work to do.

2005, Memorial Day Weekend

The antenna team, augmented by Steve KV6O, again went to Charlie's to try again with the antenna. A short tower was assembled and used to hold the antenna. The good news was this was more stable than leaning it against the shed. The bad news was that the antenna tuning was not any better. Yet another check of the dimensions was performed, and again nothing obvious was seen.

Another lengthy phone call was had with Mike, K6MYC. He had helped a lot of other people get their antennas working. However, he didn't have a clue as to the specific cause of our problem.

An Over-Simplified Theory of Beams

Every ham has been exposed to the half-wave dipole. The formula to compute the length of the antenna for a given frequency is in the study material for all would be hams.

In the 1930's Professor Yagi and colleagues discovered that if a second dipole was placed parallel to the first, current would be induced in the second dipole, without having a direct connection to the transmitter. Making the second dipole slightly longer or shorter would change the phase of the current. Many combinations of tuning and spacing could be used to make an antenna with gain and/or directivity. Many experiments suggested empirical guidelines were devised. The "reflector" element should be a little longer than a resonant dipole. Directors should be a little shorter. Spacings between .05 wavelength and .25 wavelength are useful, with spacings of .1 to .2 wavelengths most common. However, to the best of my knowledge, there are no simple formulas to design even a 2 element beam.

In recent years, it has become common to use sophisticated computer programs to analyze an antenna. The computer can analyze several combinations of length and spacing in a second. From that it can pick settings to give the most gain at one frequency, the highest front to back ratio at a specific frequency, or and antenna which gives reasonable performance across some range of frequencies.

When the KT-34 was designed, these programs did not exist. The entire design was done by trial and error and countless trips up the tower. One thing K6MYC did say is that recently they did a computer analysis of the KT-34. The computed results closely agreed with the measured results. Computer simulation suggested that the theoretical improvement in performance would not be noticeable to any ham.

Now back to the FARS antenna.

Field Day 2005

We went to FD with two options. "Plan B" was to make do and use the antenna tuner in the Yaesu.

"Plan A" was to take our time putting up the antenna. Dick N6ATD, Paul AA6PZ, and Robert, KE6TFU, did a set of experiments. Recall that the antenna is made up of four dipoles individually tuned to slightly different frequencies. We started with just the reflector. The reflector was put on one end of the boom. The short strap connecting the two sides of the element was removed. A coax and balun originally designed for a different antenna was connected to the element. The boom was used as a temporary mast to lift the reflector 10 feet above the ground. Dick used his MFJ analyzer to look for resonances. They were found at 13, 20 and 27 MHz. This was consistent with the fact that the reflector should be longer than resonance on each band. The same procedure was repeated with the other elements. Sure enough, the director resonated above the ham band. When all was done, one element had strange results. The front driven element only had one resonance, and it was at 24 MHz. Furthermore it was very broad. Ah ha, now we had one element that was suspect. What is different about the driven element? Well we had used the balun and feed network that is part of the antenna. We disconnected that balun and fed the element with the same coax used for the other elements. Now we had a sharp resonance for each band.

N6ATD went home and returned with a different 4:1 balun. We put it in and repeated the measurements. Again there were three sharp resonances. The frequencies were a little different.

So, we thought the problem was the balun. With some degree of confidence, we assembled the full antenna and put it on the tower. With the reflector just off the ground, and the beam pointed skyward, the SWR looked good on all bands. Gee just like a lot of wisdom says a beam should be.

After the tower was stood up and cranked up, the SWR was checked using the meter in the transmitter. It was low across the 20, 15 and 10-meter bands. Just to be sure, we repeated the measurements with the MFJ. The numbers were not exactly the same, but the antenna is certainly good for all bands. Oh and we made a lot of contacts.

Epilogue

Actually, one question remains. What exactly is wrong with the balun?

It had been "tested" at the time the rest of the antenna work was done. After becoming suspicious, A DC Ohmmeter showed good connection between all the terminals. This is a 4:1 balun. That is it is meant to transform impedance by 4 to 1. Specifically 200 Ohms at the antenna terminals are to be converted to 50 Ohms. N6ATD put a 200-Ohm resistor on one set of terminals and measured low SWR on the coax connector.

I repeated the same experiments, but used an HP network analyzer. With a 200 Ohm resistor, it measures close to 50 Ohms from 10 to 30 MHz.

These measurements were all done at low power. But so were many experiments testing the antenna. Arcing from high voltage doesn't happen at milliwatt signal levels. Dick cut open the plastic housing. There is no evidence of arcing, corrosion, cracks in the ferrite or bad connections.

Possibly the balun was fine all along, but there was a problem with an external connection to the balun.

So, for those who like to ponder technical questions, a problem remains. The practical solution will be to get a replacement.

New PA System

If you haven't been to a meeting recently, you haven't seen the new public address (PA) system in use. The powered system makes it much easier to hear those who speak at the meeting. You can see Steve, K6OIK wearing the portable microphone in the photograph earlier in this Relay.

August Meeting Speaker Biography

Kristen McIntyre, K6WX, has been interested in radio since she was about 5 years old. She started in Amateur Radio in 1979 getting her ticket while at MIT. Kristen has worked in many diverse areas from analog circuit design to image processing to starting and running an ISP. She is currently working as a principal investigator at Sun Microsystems Laboratories where she is researching robustness and emergent properties of large distributed computer systems. She is a long time denizen of Silicon Valley and has worked at or consulted for many of the usual suspects. Kristen is an active ham and loves to chase DX on HF with her Elecraft K2 which she built while visiting her mother in Florida. She is an ARRL Technical Coordinator for the East Bay Section and is active in many local clubs. Kristen is often heard on the 9AM talk net, either as a regular check-in or as Net Control.

Interesting Websites

The Long Arm of Einstein Guides My Steering Wheel

http://www.nytimes.com/2005/08/16/science/16gps.html?ei=5090&en=616e75170d34be84&ex=1281844800&partner=rssuserland&emc=rss&pagewanted=print

Google Maps vs. Microsoft Virtual Earth

http://www.developerpipeline.com/169300240?cid=RSSfeed

Summit in Sight for Mars Rover Spirit

http://news.yahoo.com/news?tmpl=story&u=/space/20050817/sc_space/summitinsightformarsroverspirit

- de Paul, AA6PZ

September Meeting – Home Brew Contest

The September Meeting will be our regular Home Brew Contest. Past meetings have been very exciting and informative. This meeting should be no different. Remember to bring in your finished projects for all to see and enjoy. There will be a prize for the winner.

FARS Membership Form

PLEASE fill out the form for all new/renewal memberships.

FARS 2005 MEMBERSHIP RENEWAL FORM Date: _____

Name(s) & Callsign(s) & Class (E-A-G-T-N-None): _____

_____

Mailing Address: _____

_____

Home phone: _____ Work phone: _____

E-mail: _____ Packet BBS Address: _____

ARRL Member(s)/Expiration Date(s)? _____

Preferred modes: (e.g. HF-SSB/VHF/QRP/Other): _____

I'm willing to Elmer new hams with: _____

_____

Special topics of interest / suggestions for club meeting speakers:

_____

Dues: $20 per year, new members add $6 for badge fee. Please write one check for both banquet and membership.

Please note: Membership runs from January 1 to December 31.

Send your check payable to FARS, to:

David A. Cooper, KE6PFF
270 Redwood Shores Parkway
PMB 41
Redwood City, CA 94065-1173

How to get to regular meetings:
(Visitors always welcome)

Our meetings are held at the Covington Elementary School (directions below) on the fourth Friday. Socializing at 7 PM with the regular meeting at 7:30 PM. There may be changes in the meeting dates for January, June, November, and December.

DIRECTIONS:

From Interstate 280. take the El Monte exit Northeast. Cross Foothill Expressway. (A) At the first traffic light turn right on Covington. (B) Immediately at the fork take the left street (Covington). Go about 1/10th of a mile. Turn left into the parking lot. The gym is the tall building to your right with red and white stripes.

From Foothill Expwy. From Foothill Expressway, take the El Monte exit and go Northeast; then follow directions above at (A).

From US101 or El Camino: take San Antonio Road west (to Foothill Expressway). Then follow directions above at (A).

TALK-IN via the N6NFI (145.230-; 100Hz PL) repeater or the W6ASH 145.27- (100Hz PL) repeat