RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLV NO. 8 P.O. BOX 3454, TUSTIN, CA 92781-3454 AUGUST 2004

THE PREZ SEZ:

It is a good thing that we humans can laugh at ourselves, and I can honestly say it is a very good thing that we have a sense of the ironic.

We were not at last month's meeting because we were making the final preparations for our week-long vacation up in the Bay Area.

We had planned this trip for a long time. We were going to visit two of our favorite places on the planet, Muir Woods and Yosemite. Of cause I planned this trip by programming my HT with all of the repeaters that we wanted to try. What was really going to be interesting was that Dorie suggested that we take a train back to LA from Oakland. So of cause I programmed the repeaters between there and LA.

The trip to Yosemite was planned for the beginning of the week, and that's where it happened. The antenna on the HT became caught between two other things and was ripped out of its base. Not a problem, except I did not have a small enough Allen wrench to loosen the set screw and replace it, and neither did any maintenance people we spoke with.

So, all my planning came to nothing more than providing a sense of frustration. Next time I will take an additional antenna, an additional HT, an additional charger for the second HT, appropriate size of Allen wrenches, and of cause an additional suitcase to carry all of this and other stuff.

73,
Steve, KB1GZ

THE OCARC AUCTION - OCT

The yearly OCARC auction is coming October 15, 2004, the third-Friday,

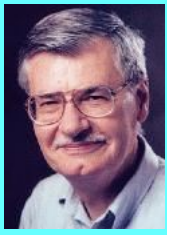
Here is your chance to buy some ham gear or to sell some ham gear that you no longer use (like that "spark gap" transmitter in your attic). In order to increase attendance at our yearly auction, we want to publish lists of equipment that people (members and non-members, alike) plan to bring to the auction. If you e-mail a list of equipment (and description, model, etc.) to me, I will publish the list of equipment-for-the auction on the Orange County ARC WEB SITE:

http://www.w6ze.org

Full details of the OCARC auction will be published on our WEB site,

See **Auction** on page 7

Art Goddard, W6XD, ARRL Southwestern Director and noted DXer and DXpeditioner announces his SWD retirement.



See **ARRL SWD News** on page 7.

AUGUST PROGRAM:

Are you afraid of heights? Come join Dino Darling, K6RIX, as he talks about the changing of the guy wires on KFI's 760' radio antenna located near the Fullerton Airport In March of this year, Dino and his crew climbed the KFI tower to replace guy wires that had been in place since 1957.

Be sure not to miss this meeting! Dino will have some interesting pictures and mementos from this task.

The next regular meeting will be:

Friday, August 20th 2004 @ 7:00 PM

We will be meeting on the 2nd floor in the east bldg.

In This Issue: ***Page***

THE PREZ SEZ 1
OCARC Oct. AUCTION..... 1
THE JULY PROGRAM 1
CLUB INFORMATION 2
RPL: The Ham's Future? 3
TECHTALK: Build a Balun 4
AUG. BOARD MINUTES 7
JULY MEETING PICTURE 7
ARRL SWD NEWS 7
JULY MEETING MINUTES 8

Next Club Breakfast & Open Board Meeting Sat. Sept. 4th 2004

THE ORANGE COUNTY AMATEUR RADIO CLUB, INC.
P.O. Box 3454, Tustin, CA 92781

2004 Board of Directors:

President:
Steve Brody, KB1GZ
(714) 974-0338
stevebrody@sbcglobal.net

Vice President:
Ken Konechy, W6HHC
(714) 744-0217
kkonechy@pacbell.net

Secretary:
Rich Helmick, KE6WWK
(714) 343-4522
r2535@sbcglobal.net

Treasurer:
Bob Buss, KD6BWH
(714) 534-2995
kd6bwh@aol.com

Membership:
Chris Winter, W6KFW
(714) 543-6943
cwinter727@aol.com

Activities:
Carl Schmid, WA6BSV
(949) 679-6970
wa6bsv@arrl.net

Publicity:
Matt, K6LNX
(714) 546-2228
k6lnx@arrl.net

Technical:
Tom Thomas, WA6PFA
(714) 771-2917
eelmert@aol.com

Members At Large:
Larry Hoffman, K6LDC
(714) 636-4345
k6ldc@earthlink.net

Lowell Burnett, KQ6JD
(714) 997-0999
LBur729028@aol.com

2004 Club Appointments:

W6ZE Trustee:
Bob Eckweiler, AF6C
(714) 639-5074
af6c@arrl.net

Club Historian:
Bob Evans, WB6IXN
(714) 543-9111
bobev@netzero.net

***RF* Editor:**
Bob Eckweiler, AF6C
(714) 639-5074
af6c@arrl.net

WEB Master:
Ken Konechy, W6HHC
(714) 744-0217
kkonechy@pacbell.net

ARRL Assistant Director:
Ken Konechy, W6HHC
(714) 744-0217
kkonechy@pacbell.net

ARRL Awards Appointee:
Larry Beilin, K6VDP
(714) 557-7217
k6vdp@aol.com

OCCARO Delegate:
Bob Buss, KD6BWH
(714) 534-2995
kd6bwh@aol.com

Monthly Events:

General Meeting:
Third Friday of the Month
At 7:00 PM
American Red Cross
601 N. Golden Circle Dr.
(near Tustin Ave & 4th St)
Santa Ana, CA

Club Breakfast:
First Saturday of the month at 8:00 AM
CowGirl's Cafe, Too
2601S. Harbor Blvd.
(just south of Warner)
Santa Ana, CA

Club Nets (Listen for **W6ZE):**

7.086 MHz CW **OCWN**
Sun - 9:00 AM - 10:00 AM
Rick KF6UEB, Net Cntl.

28.375± MHz SSB
Wed - 7:30 PM - 8:30 PM
Bob AF6C, Net Control

146.55 MHz Simplex FM
Wed - 8:30 PM - 9:30 PM
Bob, WB6IXN, Net Control

VISIT OUR WEB SITE
http://www.w6ze.org
for up-to-the-minute club information, the latest membership rosters, special activities, back issues of ***RF***, links to ham-related sites, vendors and manufacturers, pictures of club events and much much more.

Club Dues:
Regular Members $20
Family Members* $10
Teenage Members $10
Club Badge** $3

Dues run from January thru December & are prorated for new members.

*Additional members in the family of a regular member pay the family rate up to $30 per family.

**There is a $1 charge if you'd like to have your badge mailed to you.

RPL: The Ham's Future?

[*Editor's note: the following unsolicited article was received for publishing with the agreement that the author stay anonymous due to certain political ramifications. Therefore we will just refer to him as* L.E.R.]

Figure 1 - The heart of RPL

Amateurs and the ARRL alike are in the middle of a battle against BPL – 'Broadband over Power Lines'. Our current government administration has finally reached the point where they believe they are so powerful that they can change the laws of physics by legislation. Thus they can claim that BPL will create no interference to existing legitimate users of the radio spectrum. Anyone with the basic knowledge of antenna and transmission line theory can see the flaws in BPL; and contrary to what politicians, and those on their payroll say, there have been no technological breakthroughs. BPL will likely happen, and when it does, it will become apparent to all that BPL is a major source of interference to many services, not just ham radio. By that time, the money spent and infrastructure installed will be so large that there will be no turning back[1] – Will it be a black day for amateur radio?

I say NO! I'm hoping BPL comes to be(!) even with all its dire consequences! Why? Because it opens up a totally new technology to amateurs. That technology is RPL – '**Radio over Power Lines**'; more specifically 'Amateur Radio over Power Lines'. RPL is not new. When I was in college our dorm complex had a small AM radio station that transmitted a few watts coupled to the power lines. The signal could be received by anyone with an AM radio within the complex. However losses on the power transmission grid, low power, and possibly even an RF trap to limit the signal, prevented any long range propagation over the power lines.

Along comes BPL and the power companies are going to become concerned with RF losses as well as AC losses. They will strive to make the power lines efficient at frequencies way above 60 Hz, where they formerly had no interest. They will also need to make the power lines consistent in impedance. A residential high-voltage power line using 0000 gauge wire spaced 10 feet apart on a pole has an impedance on the order of 760 ohms, a value that would not be difficult to match to the typical ham transmitter; many hams today are using 600 ohm parallel feedline.

Of course an RPL tuning unit would have to be specially built to match the power line RF impedance as well as to limit losses at 60 Hz. Preliminary design thoughts were to use a parallel LC circuit, resonant at 60 Hz., across the power line to prevent any AC power flowing in the tuning unit. However, a young engineer on the staff suggested that we make the circuit highly capacitive and help the power company reduce the inductive AC power factor common on power lines (perhaps with the power company offering a rebate for such service?) Another possibility is to sell a deluxe tuner unit that monitors the power factor used by the household and changes the reactance dynamically to keep the household power factor near zero, reducing the electric bill.

Many people may scoff at the idea of RPL. One person, when presented the idea, said, "Won't that cause interference to the BPL transmissions?" The answer is academic. Our lawyers feel that the BPL advocates will have made interference an acceptable byproduct of the technology by then. Also, one solution offered by someone who is 3dB short of the power to fire a synapse, is to filter out BPL frequencies that fall within the ham bands.[2] Since BPL will not be using those frequencies they will remain open to amateurs; and their use by amateurs will cause only 'incidental' interference to BPL.[3]

What about power limitations? Current power limitations may be lifted for two reasons. First, the power grid is capable of handling massive amounts of power, so a ham feeding 10 KW into his power line tuning unit will have hardly any effect at all on the power grid; and second, since little if any of the RF power moving along the power lines will be radiated,[4] the FCC will not be overly concerned with RF exposure from strong radiated RF fields. Perhaps the biggest concern for using large amounts of power will come from the power companies themselves. There is a question as to how the existing kilowatt-hour meters that measure electricity usage will react to RF traveling backwards through them. If RF energy is registered on the meter, it will cause the worst kind errors in the billing of power – those that don't favor the power company. Also, some unscrupulous people may create an SWR mismatch on the line so that the standing current at the meter is at a very high point causing the meter to slow considerably, or even turn backwards. You can bet the power companies will be testing and possibly modifying their kilowatt-hour meters if BPL and RPL become reality.

So what can we expect from RPL? At first communications may be limited to hams within the same

[1] Notes appear on page 6

See: **RPL** on Page 6

Bob's TechTalk #31
Building a W2DU HF Balun:

I have taken on an assignment. John, K7KF, will be flying from Asia to Arizona early this month and will have access to an HF radio. Communications will be on 20 and 40 meters. Right now I don't have a 40 meter antenna so I've assigned myself the task of putting up an inverted vee. This is a perfect opportunity for me to build a 1:1 balun to use with the antenna.

We covered baluns in the Oct. 2003 column. Here's a quick refresher: Balun stands for **bal**anced/**un**balanced. It is a device that matches an unbalanced circuit, such as coaxial cable and a balanced circuit, such as a dipole antenna. The balun works in both directions. Why is this necessary? In a lot of situations an antenna will work fine without a balun. In some situations though, not using a balun will result in a lot of RF floating around the shack, with resultant feedback problems, hot mikes, TVI and erratic operation - especially with newer solid-state rigs. The cause is related to the fact that RF travels along the surface of a conductor and not throughout the conductor. Thus in coaxial cable the energy from the transmitter travels along the inside of the shield and the outside of the center conductor, creating a field in the insulating dielectric. When the energy reaches a balanced load, such as an antenna the energy on the center conductor can only go to one side of the antenna. However, the energy on the shield can go not only to the other side of the antenna, it can also travel back down the outside of the shield, which looks like a separate wire to the RF. Whether it does or not depends upon what the impedance of the outer shield looks like to the RF. If the impedance is high compared to the antenna then little current will flow on the outer shield. However if it's low then a lot of current will flow. A balun effectively isolates the inner and outer surfaces of the shield, either by using a transformer or a choke.

One very effective balun is the W2DU balun. In this balun the coaxial cable is passed through numerous ferrite beads. The ferrite has no effect on the RF in the coax, but creates a high impedance to RF flowing on the outside of the coax shield. The W2DU balun is the one I chose to build for my inverted vee.

Ferrite beads are not inexpensive! Smaller sized beads that fit over RG-58 sized coax (0.192 in. OD) are less expensive than beads that fit over larger RG-8 (0.405 in. OD). Unfortunately, RG-58 cannot safely handle the legal power limit, especially if the SWR is less than ideal. Thus, I chose to use RG-142 (Belden 83242) which has the same diameter as RG-58 but has Teflon jacket and dielectric and two braided shield. It will also easily handle the maximum power allowed with lot's of room to spare! It is not cheap either; but luckily you only need a piece about a foot long. The ferrite beads used in this balun are FB-73-2401. They measure 0.380" OD x 0.197" ID x 0.19H. I used 50 beads for a balun that will work on all the HF bands from 160 through 10 meters. Figure 1 shows the cable and beads.

Figure 1 - RG-142/U and bag of 50 FB-73-2401 ferrite beads. Dime is included for size comparison.

I decided to build the balun in a piece of PVC pipe, similar to numerous commercial baluns. Finding a female UHF connector was a bit of a challenge. One was purchased from The Wireman (Part # 1147). It arrived with no instructions so some measurements with a pair of calipers had to be made. Figure 2 shows the connector, prepared cable and trimming measurements.

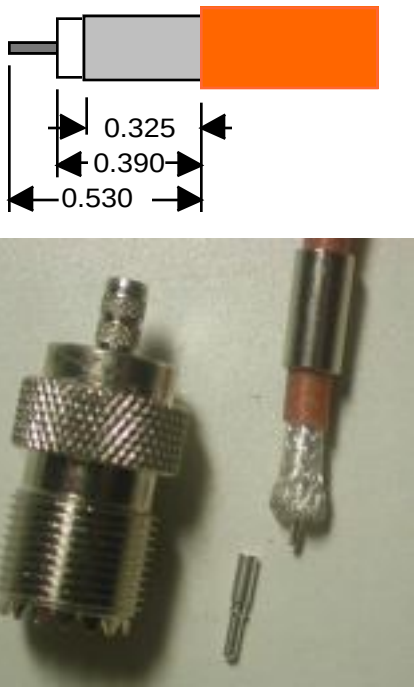


Figure 2 - Photo of prepared end of RG-142/U coax with trim dimensions for female UHF crimp connector (Wireman #1147)

Once the connector and cable were attached and weatherproofed with shrink tubing, electrical tape was wound around the cable at the connector to provide a cushion for the beads. A few rubber grommets would work as well. Next, the 50 beads were strung onto the cable and the other end of the cable was trimmed and prepared. Two lengths of #12 or #14 insulated wire was soldered to the end of the cable, one to the shield and one to the center connector and that end of the cable was weatherproofed.

The enclosure was made from a piece of 1" ID schedule 40 PVC pipe cut to 12-1/2 inches. Two end caps were drilled as shown in Figure 3. Three 3/16" x 1-1/2" stainless eye bolts are attached to a PVC end cap. The eye bolt in the top hole was backed by a 3/16"

fender washer; it is used to support the balun if needed. The two side eye bolts support the antenna wires. They pass through the end cap and the PVC pipe inside. To assure alignment, drill these holes with the end cap temporarily installed on the pipe. The nuts are attached to the inside of the PVC pipe by temporarily inserting the eye bolt with nut attached; holding the eye bolt in a vise; and heating the nut with a soldering iron until it begins to melt into the PVC. A wet towel is used to cool the nut, which should then be firmly adhered to the pipe. A little epoxy can be used to help hold the nuts, though I found it unnecessary. A 0.52 diameter hole is drilled in the other end cap to form a tight fit for the coax connector. You can start with a 1/2" hole and carefully file it to fit. The connector is then epoxied in place from the inside. A bead of epoxy along the outside helps to seal the hole and further secure the connector. Two holes are drilled about 3/4" below the two antenna eye bolts for the balun wires.

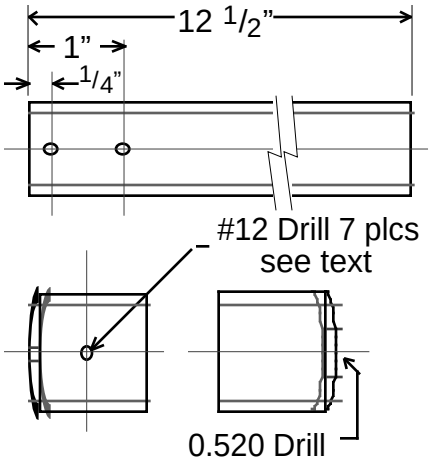


Figure 3 - Drill dimensions for PVC pipe and end caps for enclosure.

The balun can then be assembled. The two balanced wires connect to the antenna leads that are attached to the two horizontal eye bolts. I recommend using a wire thimble here. Buy extra stainless nuts that fit the eye bolts to tighten down on the outside of the enclosure. Also, use a stainless lock washer between the fender washer and the nut holding the top eye bolt so the bolt won't back out due to vibration.

This was a fun project and easy to build. You might consider making one as part of your next antenna project. They also work at VHF and UHF frequencies with fewer beads of a different (#43) material.

Next month, maybe things will slow down and I can get back to designing a fancy code practice oscillator? Other ideas or topics are also welcome.

73,
de AF6C

Figure 4 - The balun, with enclosure, ready for final assembly.

TechTalk Balun Parts List:

Available at the Hardware Store:

12.5" PVC Pipe, 1" (ID), sched. 40.

2 ea. PVC End cap, 1"

3 ea. Eye bolt, 3/16 x 1-1/2 (stainless)

8 ea. Nut, 10-24, to fit eye bolts, (stainless)

1 ea. Lockwasher, #10, (stainless)

1 ea Fender Washer, #10, 1" OD

20" wire, stranded copper, #14 AWG, insulated (#12 OK)

misc. Electric tape, 5 Min. Epoxy, assorted shrink tubing

Available from **The Wireman** (see our website Supplier's page)

50 ea. Ferrite beads, FB-73-2401, The Wireman part # 912, $9.00 / 50 (Amidon or Palomar are alternate sources)

1 ea. Connector, UHF, Female, cable crimp, The Wireman part # 1147, $4.14

12" Coax cable, RG-142/U, 50Ω, The Wireman part # 153, $1.50 / foot, (Belden 83242 is an alternate)

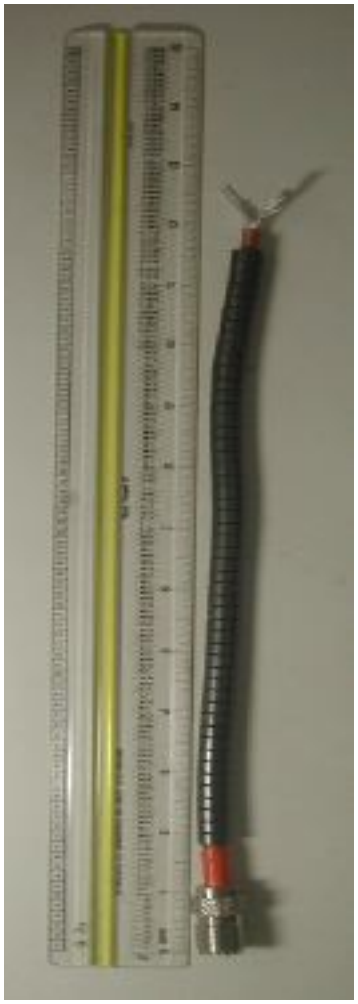


Figure 5 - The completed cable covered with 50 ferrite beads.

RPL from Page 3

power grid. However, this will be a temporary problem with hams soon developing coupling networks to transfer signals between power grids. This service may already be solved by the BPL designers, who have to couple the broadband signals between power grids. It depends upon where they put their notch filters to protect the ham bands.[5]

Figure 2 - The prototype RPL matching unit. Though marked for 5 KW, this unit really only handles 3 KW. Note the 25A AC plug.

DX, especially to countries separated by large bodies of water, will be difficult or impossible to contact when RPL is first implemented. Ham's, however, will soon find solutions to this predicament. Stations containing RF to wire repeaters, located away from the BPL environment, will allow DXing once again.

As you can see, the negatives to RPL all have solutions; so let's talk about the positives. The most obvious one is there will no longer be a need for an antenna. Perhaps this is why antenna and tower manufacturers are fighting so heavily against BPL and the resulting RPL? Hams operating from an apartment will have the same 'antenna' advantage as the big guns with their useless 40 acre antenna farms. People living in areas that limit or outlaw outside antennas will be able to operate once again with efficiency. Portable operation will be easy. You can operate from any hotel room, a friend or relative's house, your office, anywhere there's AC power, just by plugging in your rig (which will soon become available with a built-in RPL tuning unit.) Of course, HF mobile-in-motion operation will not be possible without some clever technical breakthroughs.[6]

RPL will not affect most of the HF contests that hams have been known to participate in. What it will do is bring a new meaning to the Field Day rule about operating "independent of power mains". HF direction finding technology will need to be reinvented; but once established there will be a lot of support from government agencies to improve the technology to catch criminals and terrorists who use BPL to communicate and support their dastardly deeds.

Yes, I say BPL, through its cousin RPL, represents a bright future for amateur radio. I hope, after reading this, you think so too! By the time BPL gets established in the US, look for us to have our company in place[7] with patents for effective designs for RPL tuning units for all the major HF ham bands and popular radios. However, our company won't forget the thriftiness shared by so many of our kindred souls; look for a construction article in an upcoming April issue of one of the more popular ham magazines for an inexpensive, easy-to-build, RPL tuning unit. We also plan to make RPL tuning units available in kit form; thus RPL will provide another benefit to many amateurs – relief for those of us suffering from HWS.[8]

Look for me soon on the wire! (Power line wire – that is!)

73, L. E. R.

RPL Notes:

[1] Which is just as our government planned it!

[2] This solution will mean that other users will want their spectrum notched out too. Besides numerous HF military frequencies, there are the foreign broadcast bands of interest to US SWLers, the HF frequencies of interest to radio astronomers, commercial HF aircraft frequencies, ad nausium. By the time the notching solution is implemented, the 'broad' in broadband won't exist. Besides, any nonlinear circuit acting as a mixer along the vast power line infrastructure can produce signals in the 'protected' bands.

[3] Recently BPL advocates dropped their claim that BPL won't cause interference to amateur radio. Now they claim it won't cause 'harmful' interference. See the August QST *Happenings* for further details.

[4] Just ask any BPL advocate.

[5] If in fact notching is implemented; it is not something a technically savvy person would bet on.

[6] This may become academic. With the recent growth of cell phones and all the vehicle accidents attributed to their use, it won't be long before mobile communication operations of all kinds are outlawed and mobile ham radio operation will become illegal.

[7] We are currently well funded and are not looking for capital investors. Please do not contact us asking for investment opportunities. Our sponsors are very interested in controlling communications in the US and have been extremely generous to the BPL and RPL campaigns.

[8] HWS – Heathkit Withdrawal Syndrome, a disease that began appearing in the mid nineties. It tends to strike amateurs and electronic enthusiasts born before 1980.

Board Meeting Minutes:

August 7, 2004

President Steve Brody, KB1GZ, called the Meeting to order, at 8:00 am. A quorum of Board members was present. Missing were Membership, W6KFW and Activities, WA6BSV.

Minutes of the last general meeting were accepted and approved (my thanks for Bob Eckweiler, AF6C, for taking notes for me).

Committee **Reports**: None**;**

Old Business; The Auction is coming in October. Publicity needs to start soon.

New Business: The World Radio renewal was approved. Discussion was conducted regarding the form needing to be sent to the Secretary of State of California. It was felt that a change in "Agent for Service" was needed and ~~Vice President Ken Konechy W6HHC~~ *the club license trustee, Bob, AF6C* will be listed on the form to be sent in. ~~The club trustee for the license will be Bob, AF6C.~~ Larry Hoffman K6LDC asked if the club trustee should be on the board and after discussion, it was felt this was not necessary. Vice President Ken brought up the topic of the web server. We are at the end of our "contract" with the current server and after discussion approval was given to change servers. The new server will give us 1 GB of disk space for $10.00 less a month. The new server One & One will be tried on a trial basis.

Upcoming Programs: This month's program will be on the change-out of the KFI tower guy wires. September's program will be an 'old-timers night', a social gathering for former club members . invite old, new and prospective members to the meeting to socialize. The Board authorized $150.00 for this event. Bob, AF6C, coordinating locating and inviting former members. Ken W6HHC will handle the food and drink.

Treasurer's Report: Bob Buss KD6BWH reports the club has $2397.87 in the accounts.

Good of the club; Bud WA6VPP, has the club coffee pot and banners and will get them to President Steve. Vice President Ken mentioned that he has an article on BPL interference available and will distribute it via email. An "FD Lessons Learned" meeting followed the Board meeting.

The meeting adjourned at 8:38 am

Respectfully submitted
Rich Helmick, KE6WWK
Secretary
[Correction made by Editor]

Auction from Page 1

soon, but in general: there are no charges to become a buyer or a seller, and the OCARC will take up to a 10% commission of any sold items at the auction. Here is a great chance to turn your old equipment into a treasure for some new comer.

Please let me know if you have any questions, or any equipment that you plan to auction this year.

de Ken, W6HHC
OCARC WEB master

kkonechy@pacbell.net

ARRL SWD NEWS:

The 2004 ARRL SWD Convention is being held one week after the club meeting. This year's event is being held at the Wild Horse Pass and Resort in Phoenix, AZ. See *The e-Communicator* 20 July issue for details on special transportation.

http://members.cox.net/arrlswd/20040720.pdf

This word from Art Goddard, W6XD: IN CLOSING – Serving as an ARRL official is a unique challenge and privilege. We are so fortunate to share the adventure of Amateur Radio together. Looking back from the vantage point of his final term as an ARRL official, Art Goddard, W6XD says, "The past 14 years have literally flown by - it just doesn't seem like it's been that long. But it has - so on Jan 1, 2005, I ride out of Dodge City on to the rest of life's episodes."

[We'll miss you Art! - Ed.]

July Meeting Picture

Kent Gardner, WA7AHY, presents a program on Amateur Radio Astronomy at the July 16, 2004 meeting of the Orange County Amateur Radio Club.

General Meeting Minutes:

July 16, 2004

Vice President Ken Konechy, W6HHC, opened the meeting at 7:05 PM. with the pledge of Allegiance, and then introduced this month's guest speaker,

Kent Gardner, WA7AHY, the President of the Fullerton ARC gave a very informative talk on Amateur Radio Astronomy and SARA (The Society of Amateur Radio Astronomers).

Following the program and a short break a roll-call of officers was taken. Absent were: President, KB1GZ; Secretary, KE6WWK; Treasurer, KD6BWH; Membership Chairman, W6KFW; and Publicity Chairman, K6LNX; Due to the lack of a quorum, Ken held an informal business discussion.

Visitors attending were: Janet, KL7MF; Chip, K7JA; and John, WB6AJE

Old Business Discussion: Kenan, N6CCE, had previously suggested a post Field Day 'Lessons Learned' meeting. AF6C will set something up. Those interested in attending are: N6CCE, WA6VKZ, KD6BWH, WA6BSV KC6OPI, KD6XO, W6HHC, and AF6C.

Ken W6HHC, announced that the program next month will be presented by Dino Darling, K6RIX. It will be on the KFI Guywire Replacement.

Ken, W6HHC, went around the room asking people's thoughts on Field Day. Lots of good comments were received on our FD operation, as well as how some members participated while on vacation or operating with other organizations.

Good of the Club: James Payne (call not given) is looking for a few hams to help provide communications at a Cub Scout camp event during the week of August 9th through 13th. An email has been forwarded to club members with the details.

Frank, WA6VKZ is looking for a small gimbal mobile mount for his rigs. He's installing radios in his truck so he can operate from the passenger seat. Janet suggested he come by HRO and see what they have.

Respectfully Submitted,
Bob Eckweiler, AF6C

Acting Secretary (ie. The guy who forgot and brought a pen and pad to the meeting!)

Next RF Deadline: Sept. 6th

ORANGE COUNTY AMATEUR RADIO CLUB, INC
P.O. BOX 3454
TUSTIN, CA 92781-3454

First Class Mail

Time Dated Material.
Please Expedite!!