RF

ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLII NO. 6 P.O. BOX 3454, TUSTIN, CA 92861-3454 JUNE 2001

The Prez Sez:

What a spring we have had; between work and radio, not a moment to spare.

We have already gone through a Baker to Vegas and for the most part all of us have survived. This year the city of Garden Grove teamed with the city of Cypress. The city of Orange did not run, so that gave us the opportunity to concentrate the OCARC hams in a joint effort.

Speaking on behalf of the Garden Grove PD, they are extremely pleased with the results. Garden Grove finished the race with a much better time than anticipated and in fact advanced to a better slot for next year. Last year the team had to run without the benefit of ham radio, and they truly know how valuable communications become during the race.

There were the unanticipated snafu's that cropped up. I ran into car troubles and ended up being towed from the Silverton Casino to Pep Boys to have an in-tank fuel pump replaced. That meant some intense moments just getting to the Silverton. But then nothing that a little money and time could not fix.

Then there was the crew that stopped by my station at Ibex Pass to help set up the antenna and visit. The first thing that I heard was one saying to the other when they stopped, "Why did you lock the door?" Guess what, they only had one set of keys. After several unsuccessful attempts to get into the pickup, I heard a loud smash of glass. Then the keys were fished out of the ignition from the rear window of the pickup.

All of the items were minor compared to the message that I received from Cypress:

Date: Tue, 08 May 2001 07:21:12 -0700
Subject: Fwd: Officer Steven Lipton
To all R.A.C.E.S. B2V volunteers:

Steve Lipton ran in this year's B2V. Several of us knew him at this time. After the B2V run he experienced some vomiting and went to the doctor a few days later. That was when he was diagnosed with a brain tumor. Please remember his family in your prayers. –Jay

It gives me great sorrow to report the passing of Officer Steven Lipton on Monday, May 7th, at 5:45 p.m.

Steve was diagnosed with a brain tumor a few weeks ago. He underwent several surgeries during the past week. Steve developed a complication after one of the surgeries, and had to be placed on life support.

Steve was an organ donor. His gift of life will save the lives of countless other people.

Funeral services will be local, however the date is still pending. We will notify you as soon as final arrangements are made.

Steve is survived by his wife, Carrie, age 28, and two young children, ages 7 and 4.

Should you wish to send a card or letter, it can be sent in care of the police department, and we will see that it is delivered.

David Brozi, Cypress PD

Bob - KD6BWH

Note: This ***The Prez Sez*** article was received too late for the May issue of ***RF***. Sorry the information is late.

The June Program:

Ken Konechy - W6HHC will present a slide show and talk on our club's Field Days of the past. Ken has an extensive set of slides that goes back over thirty years of W6ZE F.D. operations. Join the club as it operates from a cemetery, atop Lemon Heights, from local military bases and other areas.

Don't miss our next meeting on:

Friday, June 15th @ 7:30 PM

We will meet in the **Anaheim** Room in the east Red Cross Bldg.

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Reminder:
JULY 7th 2001
Next Club Breakfast and Board Meeting

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

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Monthly Events:

General Meeting:
Third Friday of the month
at 7:30 PM
American Red Cross
(near Tustin Ave & 4th St)
Santa Ana, CA

Club Breakfast:
First Saturday of the
month at 8:00 AM
IHOP
1001 E. 17th Street
(west of Lincoln)
Santa Ana, CA

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

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

146.55 MHz Simplex FM
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.

Radio Still Saves Lives

The RFDS "The Royal Flying Doctor Service of Australia"

by: Larry - K6LDC

Ham radio, medicine and aviation pioneers, working as a team, can be credited with saving countless lives in the early part of the 20th century and continuing to this day.

In 1912, a minister named John Flynn recognized the need of a medical safety net for the isolated people of the Australian outback. To get medical help in that period an injured or sick person had to travel days over areas with non-existent roads, by trail, to reach help if they could survive that long. In 1920, the founder of Qantas Airlines identified a plane suitable for carrying doctor/pilot and patient. The missing link was communication.

Ham radio was still in its infancy but the usefulness of it prompted the radio link (although much of it was actually bootleg communication). Alfred Traeger invented the pedal powered generator, allowing transmission from the remote areas, on the lower ham bands.

The first call for help on radio was from Julia Creek in Queensland, 137 km. from Cloncurry, Queensland on May 17, 1928. Dr. Welch performed two minor operations there that day. The use of the pedal powered radios spread throughout the outback and the RFDS became an Australian treasure.

In the beginning, there wasn't any voice modulation, so CW had to be used. Not many pioneers of the outback knew the code. Some of the early radio enthusiasts developed a machine to send the code. This allowed the sender to do something similar to Teletype.

Today, they are still involved in the same service; now they fly twin engine Beechcraft King Air planes. They still rely on radio (although not pedal powered) and telephone for communication. The truly amazing part of this is that they rely on donations with a small assist from the Australian Government. The patient receives this service absolutely FREE!

The first pedal powered transmitter and receiver with code machine

The Code Machine

An early RFDS Base station

The RFDS Radio Museum

Tech Talk

by Bob, AF6C

RF Exposure Evaluation: (Part II)

Last month the basics for evaluating your ham antenna to meet the FCC RF Exposure Guidelines were discussed. This month two antennas will be evaluated. The prime tools for the evaluation will be the tables in the ARRL book *RF Exposure and You*, referred to in the text as the "ARRL book". If you do not have a copy of this book I suggest you consider adding it to your ham library. Less extensive tables are available in Supplement 'B' of the FCC's OET Bulletin 65, Version 97-01 available on the FCC web site at:

http://www.fcc.gov/oet/rfsafety

Be sure to download the original document as well as supplement 'B' (Supplement 'A' relates to commercial broadcasting and is not needed.) If you use the FCC tables remember that the FCC tables measure distances in meters while the ARRL tables are in feet (One meter equals approximately 3 1/4 feet.)

Though there are many different ways of evaluating your antenna for RF exposure, the most sensible for the average ham is to use the tables supplied by the FCC and expanded by the ARRL. Three different sets of tables are available:

The first set of tables (starting on page 8.2 of the ARRL book) gives controlled and uncontrolled compliance distances based on antenna gain, power and frequency. The tables are based on the far-field equation over real-world ground conditions:

$$S = \frac{2.752PG}{4\pi R^2}$$

Where S is the power density in mW/cm^2, P is the power in watts, G is the antenna gain over an isotropic antenna (dBi) expressed as a decimal number and R is the distance from the center of radiation of the antenna in feet. The calculation assumes the point is at the height of the antenna in the path of maximum gain. It offers a conservative answer.

The second set, comprised of 181 tables (starting on page 8.10 of the ARRL book) is based on the NEC 4.1 antenna modeling program. Separate tables are given for different antenna types, frequency band, and antenna height above ground. Controlled and uncontrolled compliance distances for different power levels are given at the antenna height as well as at 6', 12' and 20' above ground. The distance is measured horizontally from the nearest part of the antenna.

The third set of tables (starting on page 8.75 of the ARRL book) are derived from the FCC Supplement 'B' tables. They give estimated distances to meet MPE limits in the main beam of antennas commonly used by amateur stations. As with the other tables ground reflection is taken into account.

Which table should you use? The choice is yours. My preference is the third set if your antenna type is included, then the first set which is quite conservative and finally the second set, which probably will give you the most accurate answer but is somewhat less conservative.

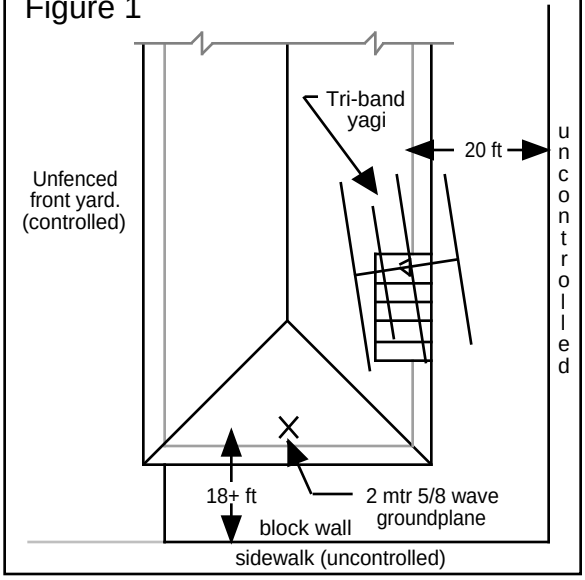
Bands	Evaluation required if Power* (watts) Exceeds:
160 – 40 m	500 w
30 m	425 w
20 m	225 w
17 m	125 w
15 m	100 w
12 m	75 w
10 – 1.25 m	50 w
70 cm	70 w
33 cm	150 w
23 cm	200 w
13 cm & smaller	250 w

*PEP input to the antenna.
(Repeater rules differ.)

Table One

The process of evaluating an antenna can take on many forms. The procedure I'm going to follow here is to start using the most conservative method and add refinements that tend to be a bit less conservative (yet still meet the safety criteria) and offer more practical results for those of us living in less than ideal locations. Sometimes the most conservative method yields acceptable results, and since it's the easiest, that's as far as you need to go. If the results are unacceptable then you can refine your

Figure 1



analysis and hopefully reach a point that is acceptable. Of course, you can start with the highly refined analysis, but that may add a lot of unnecessary work to your analysis.

Here is a path you can take:

1. See if your power is low enough to meet the requirements of Table 1. Even if it does you should continue to the next step to assure compliance.
2. Assume lossless coax, a 100% duty cycle and carrier down conditions. Use ARRL table set one and assume two-dimensions. (This gives very conservative results!)
3. Recalculate the distance using Pythagorean's Theorem if your antenna is above ground level.
4. Correct power for coax loss and duty cycle of the modulation. (See Table 2) and repeat the previous two steps.
5. Locate your antenna type in ARRL table set two (assuming it is there or approximated there.) Select heights depending on your surroundings and evaluate at both full PEP power and power corrected for modulation duty cycle.
6. As a last step you can take into consideration averaging time exposure as was discussed last month. This should be done last as it's hard to control if you are in the heat of a long QSO.

Remember, if you evaluate your station using modulation duty cycle and/or averaging exposure time, you must continue to operate your station within these conditions.

A Two-Meter Antenna:

Let's look at our first antenna, a two-meter Mosley Diplomat 5/8 wave ground-plane. The manufacturer claims a gain of 3.4 dBi. It is mounted on a six-foot pole attached to a roof vent pipe. The antenna base height is 18 feet above ground level. The antenna is fed through 50' of RG-8X mini-coax rated at 4.6dB loss per 100' at 144 MHz. The rig is a Yaesu FT-9100R that has a maximum output of 45 watts FM.

Forty-five watts is below the power level of 50 watts in Table 1 (repeated from last month's Tech Talk) so we can stop here. Instead, lets look at the power level to the antenna after taking into account the loss in the coax. This is usually significant at VHF and above unless you are using expensive feedline. Since the power levels in Table 1 are given as "power to the antenna", the loss due to the RG-8X can be included. The loss for 50' of coax is 2.3 dB or half of the stated 4.6 dB/100'. If we start with 45 watts, a 2.3 dB loss will result in only 26.5 watts of power at the antenna; that's way below the value in Table 1 and no further investigation is needed. (It also points out that there would be a benefit to using better coax!). Even though we've met the FCC criteria with this antenna, let's continue a bit further. A simple step would be to view the antenna layout in a two-dimensional sense. From Figure one, a layout of the area around this antenna, we note that the closest uncontrolled space is the sidewalk. It is located 18' horizontally from the antenna. Using the first set of tables* from the ARRL book we can interpolate for an antenna with a gain of 3.4 dBi to show the minimum safe uncontrolled distance for 100 watts is 15.5', close to our 18'. Since the field varies by the square of the distance, we can correct the power using the following equation to find the safe power for another nearby distance:

$$P_2 = P_1\left(\frac{D_2}{D_1}\right)^2$$

where P_n is the field measured at distance D_n. Solving for 18' shows that a power of up to 135 watts at the antenna would not exceed the MPE in the controlled sidewalk area. This assumes **100%** modulation duty cycle; valid for FM.

Above, we assumed only horizontal distances. The answer is very conservative. Let's look at the distances in three-dimensions. Since the antenna is up in the air, the distance is actually greater than 18'. For someone 6' tall standing in the uncontrolled sidewalk, the closest distance to the antenna is actually 21.6' [See side bar entitled "Pythagorean's Theorem" on page seven.] Correcting for this distance shows a power level of 194 watts to be within the MPE.

So far we have also assumed the direction we're measuring is in the same direction as the antenna's direction of maximum gain. Since a 5/8 wavelength groundplane antenna has its highest gain horizontally at the height of the antenna, the actual field will be even less at the six foot level. The ARRL table set two can be used to further refine the maximum power that meets the MPE in the nearest controlled area by taking the radiation pattern into account. To show how conservative the earlier measurements were, the bottom table on page 8.42 of the ARRL Book (Table set two) shows 1KW to be within the uncontrolled MPE if the antenna was raised another two feet to be 20' high.

What about the MPE in the controlled area? A similar process can be followed to show the areas within the controlled area where people would normally be during the operation of the radio are substantially below the controlled MPE at levels below a few hundred watts and would not be of any concern. However, if higher power operation is planned, common sense would dictate that the antenna be raised. It is more cost effective and results in stronger signals in both directions! Of course that RG8X has to go. There is a piece of LDF-4 coax waiting to replace it (0.83 dB loss/100' at 144 MHz).

Mode	Duty Factor
Carrier	100%
Conversational SSB	20%
Heavy Processor SSB	50%
Conversational CW	40%
FM	100%

Table 2

A Three Element Tri-Band Beam:

The second antenna we're going to look at is a Hy-Gain TH-4 tri-band beam (Specified gain is 11 dBi on 10 meters, 10.6 dBi on 15 meters and 10.1 dBi on 20 meters – [I wish!]). It is on a crank-up tower that allows the antenna to be raised from a low height of 26' up to 60'. The antenna is fed with 150' of LMR-400 coax (loss: 0.7dB/100' at 30 MHz). The radio is normally 100W PEP output. There is a 1500W PEP output linear amplifier that is used occasionally. Modes used are CW and SSB. Processed SSB is used only during DXing.

Table 3 shows the distances for this antenna in two dimensions as well as at 26 and 60 feet using ARRL table set one and full carrier. Distances are shown for both controlled (C) and uncontrolled (UC) space.

Even at 60 feet the results are not acceptable at the higher power. By using table set two from the ARRL book, (pages 8.50 to 8.55) which takes into consideration the antenna pattern below the antenna, results are more acceptable.

Some interpretation of the tables are needed since the antenna heights are given only at multiples of ten feet. However, operation with the antenna at 26 feet and 100 watts is unrestricted on all three bands. Rersults sing 1500 watts are more interesting. On 20 and 15 meters operation is unrestricted if the antenna is at 60'. Operation on 10 meters would be restricted if there was a two story house within 66 feet of the end of the antenna, even with the antenna at 60' elevation. However the MPE would not be exceeded using conversational SSB (even with processing on) or CW. Tuning up for long periods, or full carrier modes would exceed uncontrolled second story MPE levels. Luckily, there are no two-story houses within 66 feet of the antenna. For this antenna MPE levels will not be exceeded as long as the antenna is raised prior to turning on the linear amplifier.

Next month we'll look at another antenna as well as a software program for evaluating exposure. We will also refine operating and mode duty cycles further.

			Height: Two-Dim		@ 26 feet		@ 60 feet	
Band	Coax Loss	Ant Gain	Xcvr Power	C	UC	C	UC	C	UC
				Distance ft					
20	0.7 dB	10.1 dB	100	6.3	14.1	0.0	0.0	0.0	0.0
20	0.7 dB	10.1 dB	1500	27.4	61.3	18.7	57.9	0.0	29.0
15	0.9 dB	10.6 dB	100	10.6	23.7	0.0	12.7	0.0	0.0
15	0.9 dB	10.6 dB	1500	41.0	91.7	35.8	89.5	0.0	74.1
10	1.1 dB	11.0 dB	100	16.4	36.8	0.0	30.9	0.0	0.0
10	1.1 dB	11.0 dB	1500	63.7	142.5	60.5	141.1	33.8	131.9

Table 3 - Triband Beam at Various Heights

Field Day is Almost Here!

By: Ken - W6HHC, Field Day Chairman

Field Day will occur on **Saturday, 23-June**, and **Sunday, 24-June**, at the north end of Portola Park in north-east Santa Ana (on Santa Clara Ave. ...see map below). We need you help to make this fun event successful this year. Come out and look around and cheer-on (and maybe even participate) for a few hours. You will enjoy yourself.

Times:

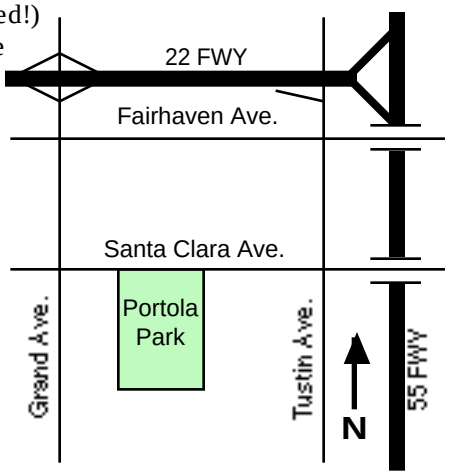
- Setup starts 7:30 AM Saturday morning
- Operating starts 11:00 AM Saturday morning
- Operating finishes 11:00 AM Sunday morning
- Teardown finishes by 12:30 PM Sunday afternoon

Team Captains:

- VHF/UHF/75M - Chris - KF6LEX 949 470-4288
  (Note: UHF will not start until 3 PM due to Chris' return from trip to JA-land)
- 10M - Tom - WA6PFA 714 771-2917
- 15M - Bob - AF6C 714 639-5074
- 20M - Larry - K6LDC 714 636-4345
- 40M - Bob - KD6BWH 714 534-2995
- Satellite - Chris - KJ6ZH 714 542-1785

Food:

- Don - KC6ONZ is our Field Day Food Chairman
- OCARC will provide Dinner (Sat) and Breakfast (Sun) to entire crew and visitors (Donations are accepted!)
- Team Captains traditionally make arrangements for lunch (give them a call to check)



Minutes of the June 2001 Breakfast Board Meeting:

The June board meeting was called to order at 8:43 AM after the club breakfast. Breakfast attendance was eleven people. Only five board members were in attendance so an unofficial meeting was held due to the lack of a quorum. Some of the board members were working the Police Expo. Board members present were: President Bob - KD6BWH, Secretary Bob - AF6C, Treasurer Ken - W6HHC, MAL Larry - K6LDC and MAL Bob - KD6XO.

The Treasurer reported our current balance at $2,110.92. He also reported that the post office box has been renewed for another year.

The Secretary passed around the Field Day letter that will go to homeowners neighboring Portola Park. The letter explains our operation and times of operation and invites them to visit. It will be sent out this weekend.

The [acting] editor - AF6C reports that Dick - W6RWY will be out of town when the RF mailing is due and is looking for a volunteer to fill in. Bud - WA6VPP accepted the challenge.

The raffle was discussed. Bob - AF6C would like to see less but more substantial prizes while keeping the total amount spent about the same. Other raffle ideas were discussed.

1) Reduce the number of tickets sold per dollar. Instead of three for a dollar (and three extra tickets for buying $5), go to one or two tickets per dollar (and an extra ticket or two for buying $5). The idea is to reduce one person from winning many times. (This will allow us to use a smaller raffle cage too.)

2) Or, limit the number of regular prizes a person can win to one or two excluding the jackpot (Any tickets removed would be replaced before the jackpot drawing.)

3) Draw for the jackpot prize first.

Field Day planning continued. Al - N6TEZ will bring some yellow tape to mark off antenna areas and limit access to dangerous areas near the antennas. Bob - AF6C has made up team packets with FD rules, section tables, check sheet operations, etc. These will be available at the June meeting. Bob - AF6C has also asked if someone is willing to take on the task of tabulating and submitting the FD scores this year. He feels that this will be too much of a task since he has to edit the RF too.

Larry - K6LDC is thinking of organizing another not-so-DXpedition for the last weekend in October.

The meeting was adjourned at 9:26 AM.

– Submitted by Bob - AF6C

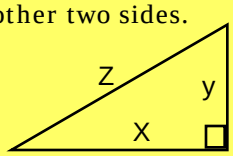
Pythagorean's Theorem

Often the height and distance to a point is known and you want to know the slant angle. For instance if you're forty feet from the base of an antenna that's 30 feet in the air, how far are you from the antenna?

The problem is one of a right triangle (a triangle where two sides are perpendicular, or 90º apart.) A Greek named Pythagoras solved this many QSOs ago. The square of the longest side (aka. the hypotenuse) is equal to the sum of the squares of the other two sides.

$$Z^2 = X^2 + Y^2$$

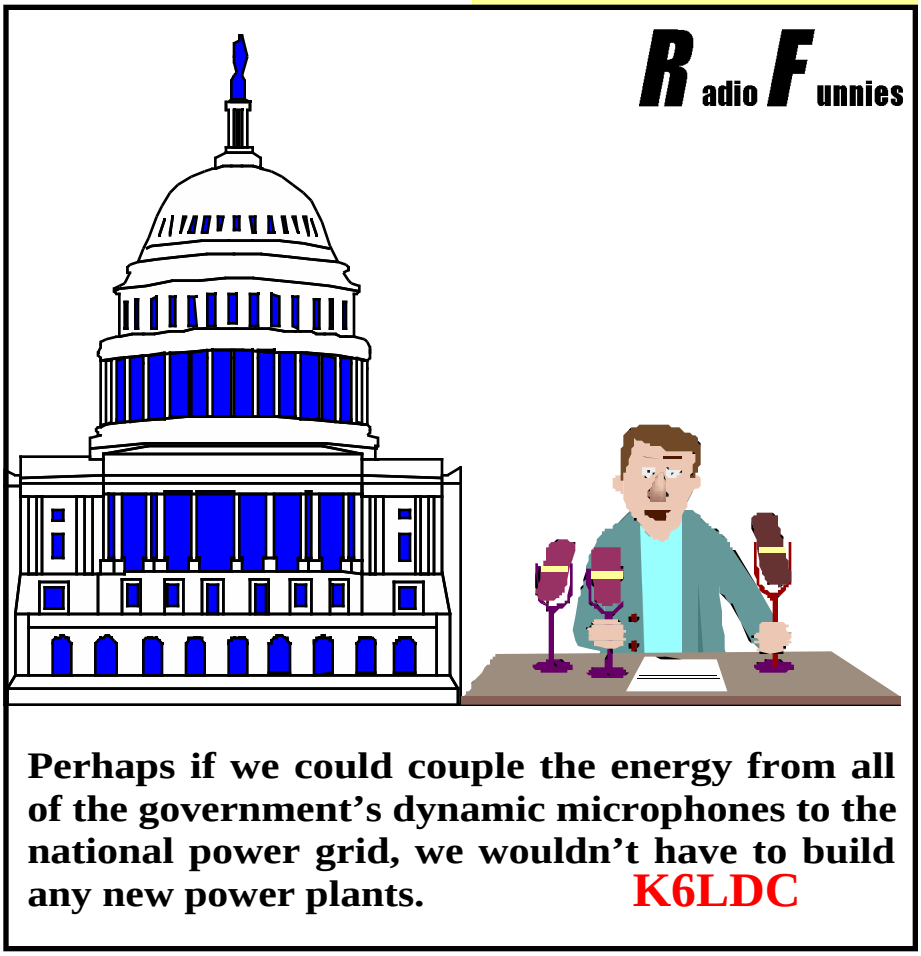
$$Z = \sqrt{X^2 + Y^2}$$



Thus, in the example above the slant height is:

$$Z = \sqrt{(40 \bullet 40) + (30 \bullet 30)}$$

$$= \sqrt{1600 + 900} = \sqrt{2500} = 50$$



Perhaps if we could couple the energy from all of the government's dynamic microphones to the national power grid, we wouldn't have to build any new power plants. **K6LDC**

Minutes of the May 2001 General Meeting:

The May 2001 general club meeting was called to order on Friday, May 18th @ 7:34 PM. Larry Beilin - K6VDP was the guest speaker. He spoke on antennas and his experiences using open-wire feedline, various types of antenna tuners and antenna designs. He also presented several clever ways to protect your antennas and feed line connections from the elements. Larry brought lots of examples that he passed around the room for examination.

Twenty-five people attended the meeting.

A business meeting was held after the break. All board members were present except Bob - KD6XO.

The Treasurer, Ken - W6HHC reported that the income so far this year is $1,261.01 and the expenses are $507.19, leaving a balance of 2,102.63. Ken noted that two big expense items, Field Day and the club's insurance policy are still pending.

The V.P. Cory - KE6WIU reported on future programs. The June program will be on past Field Day activities and will be presented by Ken - W6HHC. Ken will also present the July program which will be on Fuel-Cell technology. The August program will be presented by our Southwestern Division ARRL Vice Director, Art Goddard, - W6XD. He will be presenting his DX-pedition to Kazakhstan.

Publicity Chairman, Chris - KJ6ZH will contact the Orange Co. Register and possibly OCN for F.D. publicity.

Ken - W6HHC reported on Field Day. We are planning to run in class 4A. The F.D. team captains are Tom - WA6PFA on 10 meters, Bob - AF6C on 15 meters, Larry - K6LDC on 20 meters and Bob Buss - KD6BWH on 40 meters. VHF/UHF is still to be determined, however Chris - KJ6ZH will provide satellite capability.

A motion was made by W6HHC and seconded by Lowell - KQ6JD to allocate $250 for F.D. expenses. The vote passed unanimously. W6HHC also asked for additional donations for F.D. ($63 was collected.)

A discussion was held on switching the 10 meter net to 15 meters since all the tech-plus members have upgraded. The discussion will be continued and possibly a few trial 15 meter nets will be held.

The meeting adjourned at 9:38 PM, followed by the raffle. Grand prize winners were Lowell - KQ6JD (a Thomas Guide) and Cory - KE6WIU an indoor/outdoor thermometer.

– Submitted by Bob - AF6C

Next RF Deadline: July 7th

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

First Class Mail

Time Dated Material.
Please Expedite!!