



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLVII NO. 04

P.O. BOX 3454, TUSTIN, CA 92781-3454

April 2005

The Prez Sez:

Lot's of ham radio things are happening in our club, it seems, all at once. So it is easy to keep busy!!

The OCARC has decided on holding FD this year at the Los Alamitos JTF base. Willie-N8WP, our FD Chairman, will be starting the Field Day planning sessions soon.

The Wednesday night club 10M net will be moving to 15M (21.375 MHz) starting immediately. The idea is to take advantage of the occasional skip openings on the net, that happen more on 15M than on 10M in the evenings. Look for Net-control Bob W6ZE (AF6C) at 7:30 PM local time. We need a little more club participation in the nets.

There is a big event for DXers planned at the yearly Visalia gathering on the third week-end of April. It really is a big, international, fun event for DXers. Our April club meeting might have a few less members present than is normal because of the Visalia event.

The Baker-2-Vegas race event by law-enforcement teams will be held April 23 & 24 and quite a few OCARC members will be helping the cities of Orange and Cypress and Garden Grove to have communications support during the 120-mile relay race.

Finally, the club breakfast at the new Katella Grill had good food, good service, and a good turn out. It was a little noisy for conducting a business meeting, though. We will try it one more time at Katella Grill, but start at 7:30 AM in May to see if this works better for us. It certainly has an easy-to-get-to location in Orange.

I hope you will participate in the club nets.

...de Ken W6HHC

The next general meeting will be:

**Friday, April 15th
@ 7:00 PM**

**We will be meeting in Room 208
in the
East Red Cross Building**

The speaker at next meeting will be April Moell from HDSCS. April, WA6OPS, will discuss the organization and functions of the Hospital Disaster Support Communications system.

HDSCS is a specialized unit of the Amateur Radio Emergency Service (ARES) in Orange County. ARES is the nationwide public service and communications arm of the American Radio Relay League (ARRL), which is the largest national association of Amateur Radio enthusiasts. HDSCS is the first and largest ARES unit dedicated solely to hospital support.

All members of HDSCS are FCC-licensed Amateur Radio operators who have their own portable radio equipment ready to respond to nearby hospitals.

Don't miss it! All members and visitors are welcome.

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**THE ORANGE COUNTY
AMATEUR RADIO CLUB,
INC.**

P.O. Box 3454, Tustin, CA 92781



2005 Board of Directors:

President:

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

Vice President:

Willie Peloquin, N8WP
(714) 318-4047
n8wp@arrl.net

Secretary:

Rich Helmick, KE6WWK
(714) 343-4522
R2535@sbcglobal.net

Treasurer:

Cheryl Peloquin, KG6KTT
(714) 318-4047
Chercool@escapees.com

Membership:

Cindy Hughes, KC6OPI
(714) 971-3448
cr_hughes@juno.com

Activities:

Kristin Dankert, K6PEQ
(714) 544-9846
kdankert@comcast.net

Publicity:

Bob Eckweiler, AF6C
(714) 639-5074
AF6C@arrl.net

Technical:

Kenan Reilly, N6CCE
(714) 543-5073
N6CCE@yahoo.com

Members At Large:

Dan Dankert, N6PEQ
(714) 544-9846
N6PEQ@dxer.com

Steve Brody, KB1GZ
(714) 974-0338

stevebrody@sbcglobal.net

2005 Club Appointments:

W6ZE Club License Trustee:

Bob Eckweiler, AF6C
(714) 639-5074
AF6C@arrl.net

Club Historian:

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

RF Editor (rotating):

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

Kristin Dankert, K6PEQ
(714) 544-9846
kdankert@comcast.net

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
Katella Grill (Main & Katella)
1325 W. Katella Ave.
(2 miles west of 55FWY)
Orange, CA

Club Nets (Listen for W6ZE):

7.086 ± MHz CW **OCWN**
Sun- 9:00 AM – 10 AM
Rick KF6UEB, Net Control

21.375 ± 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 more.

Club Dues:

Regular Members ...\$20
Family Members* ...\$10
Teenage Members ..\$10
Club Badge**\$3

Dues run from January thru Dec and 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.

OCARC General Meeting Minutes

March 18, 2005

There were 29 in attendance. All Board Members were present. Due to the fact that the speaker for the evening had been out to dinner with some of the members prior to the meeting and the service was apparently slow, the meeting was called to order at 7:22 P M. Following the Pledge of Allegiance and the roll call of club officers, Steve Egert K6UX was introduced. Steve gave a program regarding AMSAT and ECHOSAT. More information regarding this contact opportunity can be found at AMSAT.org. We had one visitor, Ron, who is currently re-obtaining his license. President Ken, W6HHC reminded everyone that club dues are now due and the grace period ends on March 31st. Those in attendance were also reminded that ARRL dues could be paid through the club with the club getting a small monetary return from ARRL. The minutes of the last general meeting were approved; Cheryl, KG6KTT, reported that the club had \$2483.27 in the bank accounts. Vice President Willie, N8WP stated that the April program is still under construction.

OLD BUSINESS- Field day will be at Los Alamitos. A food facilitator is still needed for this event. The next Board Meeting will be held at the Katella Grill at Main and Katella in the city of Orange.

NEW BUSINESS- Discussion was held regarding the purchase of filters as approved by the Board.

GOOD OF THE CLUB- a new informational brochure created by Bob, AF6C, was passed around. The Orange County Fair is coming soon and Ken; N6CCE has the sign up sheet. Due to the fact that Frank, WA6VKZ, will be leaving the area he is giving much of his equipment to the club with the caveat that should at anytime the club sell this equipment he wants the proceeds. The 30 meters event will be coordinated by Bob, AF6C.

DX REPORT, Dan N6PEQ reports conditions have been very good. Due to the fact that some of the members will be at a convention next month, Bob, A6FC will conduct the raffle. Ken, N6CCE, reports that the Tri County net has changed frequencies and you can contact him for more information. Ken, N6CCE also reported that there is a need for HAMS for an event on 4/23/05. (I did not get the name of the event so please contact Ken for more information) V.P. Willie is the RF editor for April. The meeting was adjourned at 9:07 PM.

Respectfully Submitted

Rich Helmick KE6WWK
Secretary

OCARC Board Meeting Minutes

April 2, 2005

The meeting was held at the Katella Grill in Orange. Meeting was called to order at 8:20 am. There were 14 members and visitors present. All Board Members were present except Cindy-KC6OPI, Kenan-N6CCE and Steve-N1AB.

N8WP, Willie vice president, reported that the April program will be presented on the Hospital group and be presented by April Moen. The program for May is not yet confirmed.

The club secretary, KE6WWK informed the group that his schedule at this time does not allow filling out information to be submitted for the reinstating of the club Special Service club status. Unless someone wants to take on this task, it will be the middle of July before he can get to the forms.

KG6KTT Cheryl club treasure gave a report regarding the club's finances. The OCARC currently has \$2,680 in the treasury. A detailed printed report was made available to the attendees and will be available at the general meeting. The IRS questionnaire has been sent in. She also reported that papers she received that appeared to be from the State were in fact an advertisement and needed no response.

Kristin K6PEQ, Activities chairperson reported that a club potluck will be held this summer.

No report from the chairpersons of Technical and Membership as they were not in attendance.

Bob AF6C Publicity chairperson reports that the club brochures are still in the works. He and Willie will be meeting regarding the tasks the club can perform while at the OC Fair.

Dan, N6PEQ Director at Large reports there was nothing new in his area of responsibility recently. Dan offered to mail "snail mail" newsletters in April.

OLD BUSINESS

Willie, reports that Los Al is a go for the Field Day activities for the club. He also reported that a field day meeting needs to be held soon. Willie also made a motion that \$350.00 be allocated for FD expenses. After discussion the Board voted to approve this motion.

A discussion was held regarding the equipment Frank WA6VKZ has donated to the club.

Discussion was held regarding the location of the next Board meeting. The Board decided to meet again at the Katella Grill with breakfast being at 7:30 am with the meeting at 8 am.

NEW BUSINESS

Bob AF6C volunteered to update the club roster and it will be available in the Club newsletter.

Continued on Pg 4...

GOOD of the Club

Kristin passed around a sign up sheet for the OC Fair.

Bob, AF6C reports the 10m net has moved to 15m at 21.375. He will be sending an e-mail regarding this to the members.

Kristin moved that the club donate \$50.00 to OCCARO for OC Fair expenses. AF6C seconded the motion and after discussion it was approved by the Board.

The meeting was adjourned at 9:19 am.

Respectfully submitted

Rich Helmick KE6WWK
Secretary

Puzzle Corner Provided by Bob – AF6C

The Ham Census:

Once a year the rare country of Minerva offers a ham test for its subjects. It has been doing this for the past 75 years.

Recently, the King of Minerva wanted to know how many hams there are in the country and how long they have been licensed, so he ordered a ham census to be taken.

During the census, a census taker knocks on the door of a house with a tower and beam in the backyard, and asks the lady of the house if there are any radio amateurs living in the house.

She replies "I have three children, and they are all 'hams'. The number of years they have been licensed (in whole years) when multiplied together equals thirty-six. The sum of the number of years they've been licensed is the same as the house number of the house next door."

"Thank you." replies the census taker, and he leaves.

A few moments later he returns and says to the woman, "I need more information."

The lady replies, "The child, who's been a ham the longest, is on the air as we speak."

"Thank you." says the census taker, and he enters how long the three children have been hams into his book.

How long has each of the lady's three children been a radio amateur?

Answer to Last Month's Puzzle:

There are seven possible ways the hats can be distributed (R = Red Hat, W = White Hat):

Contestant: 1 2 3

Case: 1 R R R

Case: 2 R R W

Case: 3 R W R

Case: 4 W R R

Case: 5 W W R

Case: 6 W R W

Case: 7 R W W

Obviously, if either of the two sided contestants saw white hats on both of the others they would know they are wearing a red hat. Since they didn't, Cases 6 and 7 can be ruled out.

Here's the part that takes a while to figure out: If the second possibility was true then contestant 2 would know he's wearing a red hat, because if he was wearing a white hat the first contestant would then see two white hats and know he's wearing a red hat!

Ruling out cases 2, 6, and 7, the third contestant could only be wearing a red hat!

The Baker-to-Vegas Race

April 23 – 24

Communications Support Needed

Every year, over 170 different law-enforcement teams compete in a 120-mile-long running relay race. B2V contains a total of 20 individual relay legs and starts outside of Baker, goes through the cities of Shoshone (Calif) and Pahrump (NV), goes over the mountain at Mountain Springs and ends in Las Vegas

COAR (City of Orange Amateur Radio), Cypress RACES, and Garden Grove RACES are combining forces to jointly provide radio support for their respective running teams at this years Baker to Vegas Challenge Cup run. The run starts Saturday April 23 and ends Sunday April 24. You are invited to join the communications effort. We need HAMS to operate throughout the course and even if you can only give us a short part of your day, we welcome you. For more info, contact Rich Helmick KE6WWK (714) 343-4522 R2535@sbcglobal.net or Debbie Klein at the Orange PD (714) 744-7328 volunteers@OrangePD.org.



*** New Product Review ***

**Comet CHA250B
HF/VHF Vertical Antenna**

By: Dan Dankert N6PEQ

In February, Mick Stwertnik of NCG offered me the opportunity to test the new Comet CHA250B HF/VHF vertical antenna. With the ARRL SSB DX contest just a couple of weeks away, the timing was perfect! I had the opportunity to A/B the CHA250B against my home antenna system knowing that plenty of DX stations around the world would be on the air. The main selling points of this antenna is ease of assembly, simple installation, elimination of ground radials and an SWR of 1.5:1 or less from 3.5 MHz to 57 MHz. An antenna tuner is not needed, thus making portable operation that much easier. I was intrigued by the possibility of this antenna being an answer for numerous hams that live in areas that frown upon large antennas. How would the CHA250B fair on a crowded HF band during a contest? Would the antenna be “quiet” on receive? Lastly, how would it perform across all the ham bands from 6 meters to 80 meters?

simplicity, and the CHA250B is the “aerial embodiment” of these two words!

The antenna is designed to mount to a mast with a diameter ranging from 1” to 2”. I decided to place the antenna atop some aluminum military mast sections that I have set aside for antenna projects. Using 4 sections of mast, the base of the antenna would be at approximately 15’, making the top of the vertical roughly 38’. I taped a few turns of coax to form an RF choke as indicated in the instructions, then connected the coax to the antenna’s SO-239 connector. Hoisting the antenna into position was a breeze thanks to the antenna’s light (7 lbs!) weight construction. I secured the antenna/mast assembly to the eve of my house, and connected the transceiver end of the coax to one of the remote antenna switches located at the base of my antenna tower. This would make for effortless switching between the CHA250B and other antennas when comparing signal levels.

Comet CHA250B Manufacturer's Specifications	
Bands Covered	6, 10, 12, 15, 17, 20, 30, 40 & 75/80 Meters
TX Freq. Range	3.5 to 57 MHz
RX Freq. Range	2.0 to 90 MHz
SWR	<1.5:1
Height	23' 5"
Weight	7 lbs 1 oz
Wind Survival	67 mph
Power Rating	250 Watts SSB 125 Watts FM

Table 1

Once the antenna arrived at my home, I was anxious to learn how complex (or painless) the task of assembly would be. Since the instruction sheet is a single page leaflet (front & back), with one side comprised of the antenna’s specifications, I asked myself, “How difficult could this be?”. The antenna consists of 5 sections of aluminum tubing of various diameters. These 5 sections slide into one another, and are fastened by either a hose clamp, self tapping screws or Allen screws. The bottom section of aluminum tubing is supplied with the matching network already mounted, which minimizes installation time. There are only two length measurements that need to be taken when fastening the sections together, and these are quite straightforward. Without exaggeration, the antenna was assembled in less than 10 minutes. This included opening the box and removing any packaging material. I love efficiency and

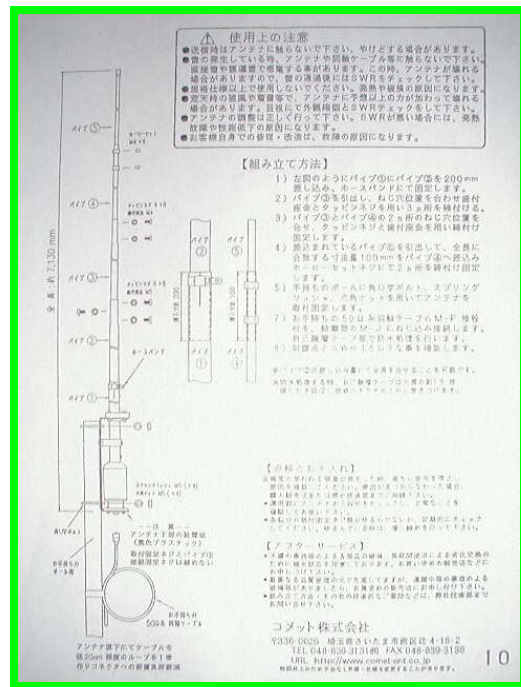


Figure 1

The antenna comes with a single sheet of instructions (Figure 1). Although it is printed in Japanese, the detailed drawing clearly indicates how the sections are joined together. Also specified are the two dimensions (in millimeters) that are to be measured during installation.

You certainly do not need to know how to read Japanese in order to understand the assembly instructions. Ideally it would be nice if in the future that the instructions are provided

Continued...

in English.



Figure 2

Figure 2 shows the CHA250B mounted on a military mast. The antenna has a low wind foot print, and it almost seems to disappear into the air. This was the setup used for the A/B testing.



Figure 3

Figure 3 shows the base of the antenna mounted to an aluminum mast section. Notice the exceptionally small matching network (black cylindrical section) of the antenna. No extended radials, this is it!

With the antenna safely secured and the coax run, it was time to see how this antenna performs! It was just past 0000Z, and the ARRL DX SSB contest had already started. I fired up the IC-7800, and switched to the CHA250B. I was hearing plenty of signals, and many were quite loud. I measured the SWR, and sure enough it was 1.3:1 or less across the entire 10 meter band. Hmmm, I wondered what it would read on the other bands. I checked 12 meters, then 15 meters and so on. Sure

enough the SWR was 1.3:1 or less on all bands from 6 meters to 40 meters. On 75/80 meters, the SWR peaked at the low end of 80 meters with a reading of 1.5:1, then gradually dropped across the band until it reached a minimum of 1.2:1 at the high end of 75 meters. I was beginning to wonder if this antenna was simply a real long dummy load, or would I actually be able to work some DX with it? Time to go make some Q's!

I set the transmitter output power to approximately 100 watts, and began calling stations. Within a short period of time, I had worked several stations in South America on 10 meters, and 15 meters provided contacts into Asia, South America, Central America and the Caribbean. I generally acquired contact within 1 or 2 calls. So far, so good. Signal levels on 10 & 15 meters were definitely lower than on a my tri-band yagi, but the CHA250B is an easy to put up vertical designed to be quickly raised and lowered in areas that are "antenna unfriendly". You obviously cannot achieve this simplicity with a yagi, rotator and tower

The following day would bring many more contacts on 10, 15, & 20 meters. Approximately 90 countries were worked over the weekend with minimal operating time. 10 meter contacts included: R1ANF, 9Y4W, KH7X, HP3BS, PJ4G & ZF2NT. 15 meter contacts included: OH0R, SK0X, ES5RW, S9SS, OH3RR, S58A, R1ANF & 8R1EA. 20 meter contacts included: TF3CW, EA8ZS, SO2R, OH6KN, UW2I, J68RI, RU1A, CN2R & EI7M. Over the next week, I made abundant contacts on bands from 10 thru 30 meters using several modes, including SSB, CW, RTTY & PSK. Some of which included: BG1JJR, ZD8AD, 9M6BG, YB7M, EA9EU, T77CD, HG3X & 9Z4FE. What was surprising is how well it played on 30 meters. Some of the stations logged on 30 meters were: JW0HS, TO7C, XT2JZ, V31TR, FS/KT8X, VP2V/DL7DF, FG/F5CWU, CE/W3WKP/M and even managed to work FT5XO on Kerguelen Island!



Figure 4

The top photo shows a snap shot of the IC-7800 spectrum

Continued...

scope while on 20 meters with the CHA250B. The frequency range displayed is 14.140 to 14.340 MHz. Notice the large number of strong signals across the band.



Figure 5

Figure 5 is a snap shot of the 31 meter shortwave broadcast band. The frequency range displayed is 9.465 to 9.965 MHz. Plenty of strong signals to listen to here!

As I proceeded down in frequency, it became more difficult to make long haul QSO's. 10, 12 & 15 meters were quite easy to work whatever DX stations you could copy. 17 & 20 meters were more difficult, usually taking a few more calls to establish a contact. The weaker stations tended not to respond to me. 30 meters was surprisingly easier to make contacts than 17 & 20. This is most likely due to the less crowded band conditions, plus stateside stations are limited to a maximum power of 200 watts output on 30 meters. 40 meters was more of a challenge, although the signal levels seemed relatively decent with state-side stations typically hearing my signal. I was able to work into Central America and the Caribbean as well, but that was the extent of the DX on 40 meters. 75/80 meters were very difficult as would be expected. The antenna is only 23' tall, so the fact that the antenna loads up well and is broad banded on this band is an accomplishment in itself. I was able to work west coast stateside stations on 75/80 meters, and I was able to work one station in Alaska. The antenna also seemed "quiet". I live in an area that is generally quiet as far as noise is concerned, and I did not seem to acquire any greater level of noise with the CHA250B. In addition, I did not appear to attain any "new" noise.

I did not work any stations on 6 meters. This was not the fault of the antenna, but rather the fact that I live in Southern California, which happens to be "the pits" for 6 meter propagation. However, I was able to verify that the antenna does load on this band.

Another nice feature of the CHA250B is that not only is it resonant on the ham bands, but it is also resonant on the shortwave broadcast bands. The CHA250B does an admirable job as an

all around receiving antenna for the shortwave broadcast bands. Signal levels were excellent on the major SWBC & UTE bands. Being an avid shortwave listener, I found this to be a nice attribute. An SWL that would like an antenna that is "all bands in one", low profile and simple to erect, should find this antenna to fit the bill nicely.

The following tables exhibit signal levels received on the CHA250B versus larger antennas at my station. As you can see, the signal levels on the CHA250B are consistently lower than that of the bigger antennas as would be anticipated. In spite of this, I was still able to work many stations as well as numerous DXCC countries!

Band	DXCC QTH	Comet CHA250B	2 Element Yagi @ 45'
	XE	S4	S9
	LU	S3	S8
10	CE	S2	S7
	W4	S3	S9
	VE7	S4	S9
	VK	S2	S7
	YB	S3	S8
	W4	S7	S9+20
	3D2	S3	S7
15	PY	S8	S9+20
	JA	S4	S9
	W7	S7	S9+20
	9G	S2	S7
	EA	S2	S7
	JW	S3	S8
	JT	S3	S8
	8R	S5	S9
	W0	S7	S9+20
20	W4	S7	S9+20
	V3	S6	S9+20
	EA	S6	S9+20
	G	S4	S9
	JA	S6	S9+20

Table 2

Continued on Pg 8...

Band	DXCC QTH	Comet CHA250B	Rotatable Dipole @ 45'
	W0	S9+10	S9+25
	W4	S9+20	S9+20
30	UA0	S7	S9
	ON	S9	S9+10
	YO	S6	S8
	LU	S9+10	S9+20
	W7	S9+15	S9+35
	W9	S8	S9+20
40	FT5X	S8	S9+10
	JA	S9+10	S9+20
	LU	S8	S9+10
	OE	S7	S9+10

Table 3

Band	DXCC QTH	Comet CHA250B	82' Long Dipole @ 35' (NW/SE)
	W7	S9+20	S9+35
	BV	S4	S7
75/80	UA0	S7	S9+10
	YV	S7	S9+10
	VK	S5	S9
	EI	S7	S9+10

Table 4

At the git-go of this antenna project, I found myself pondering if this antenna would radiate at all due to its small size and lack of an extensive radial system. As we all know, bigger is better in the antenna world, and if you have room to install a large antenna system, I highly suggest doing so. This antenna is not designed to replace a yagi or any other full size antenna, but rather is intended to assist a specific segment of the amateur market that is forced to manage with harsh antenna restrictions. If you are a ham or SWL and live in an antenna restricted area, or if you just prefer to operate incognito, without question you will be forced to make significant compromises. I found the CHA250B to be an excellent choice for these circumstances. One person can effortlessly raise the antenna at night when no one can spot it, and take it down before daybreak. This antenna is also a great choice for portable operations, such as quick and easy mini-DXpedition to a campground or a nice tropical island! In short, the Comet CFA250B is simple to as-

semble, painless to elevate and is easy on the eyes, while at the same time getting you on 6 meters thru 80 meters without the requirement of an antenna tuner and ground radials. You'll even be able to work some DX while you're at it!

More information on the Comet CHA250B can be obtained by contacting Comet's North American distributor:

NCG Companies Inc.
1275 North Grove Street
Anaheim CA 92806
Tel: 1-800-962-2611
Fax: 714-630-7024

Email: sales@natcommgroup.com
Website: <http://www.cometantenna.com>
Estimated price: \$400 to \$425.
Availability: Late April 2005

10 Meter Net Frequency Change

Effective this coming Wednesday night at 7:30 PM PDST (02:30 UTC Thursday) the ten meter net is moving to 15 meters. The new frequency will be 21.375 MHz. The time will remain the same. The reason for this is to see if we can pick up a little activity from outside the Orange County area.

A Little History:

The club nets began in the early seventies. It began as a informal on-air get together on 15 meters on Thursday nights by a few club members and grew into a weekly club function. After many years the net changed to Wednesday night for reasons that evade me at the time. The net often had not only local checkins, it also often got visitors from the Pacific area, including more than one 'rare' DX station.

When the FCC re-did the licensing structure and allowed coded technicians on 10 meters, the club decided to move the net to 10 meters to allow the coded technicians to join in the HF net. Unfortunately, reviewing the logs it appears that only one coded Technician ever checked in, and he has since upgraded.

Therefore, at today's board meeting, it was decided to switch the net back to 15 meters effective this coming Wednesday April 6th.

Feel free to check in and say hello. the net is totally informal and we usually keep the transmissions short and make three or four rounds among the group.

No changes have been made to the Two Meter Net

73, and hope you'll join us on one (or both) of the nets this Wednesday.

Bob, AF6C

Tech Talk #40: Ham Radio Station Protection – Part 4

Article courtesy of the PolyPhaser Corp.

In this month's installment, we go back and revisit the single point ground system and it's application not just to the ham shack, but to your entire house. I don't know about you, but there are many among us who believe that removing the coax from our ham equipment provides sufficient lightning protection, but as you read on you will soon discover that this isn't always the case and in fact can be quite dangerous!

In the previous installments of this article, we have focused on our ham shacks and the protection we can provide to our radios, coax cables and tower structures, but two more elements become the focus of this months article: protecting the power mains and telephone lines to our homes.

Antenna Support

Ground mounted vertical antennas require the same type earthing for lightning protection. A vertical antenna's impedance is half of a dipole's. Don't stop short of a good ground plane. The better the ground plane for RF, the better the earthing for lightning. This is assuming that the RF ground plane is in the ground.

If you have a antenna tuner-fed long wire and the pole is just supporting the antenna wire, it would be a good idea to have the grounded straps extend higher to intercept a strike or to divert energy to ground if the wire is struck. This can be done by either placing a high voltage gas tube (see Figure 1) between the long wire and the straps or by making an arc gap between the wire and the ground straps. A gas tube will not be adversely affected by temperature, humidity, pollution, or wind, while the air gap will be affected. It may be difficult to calculate the voltages present at the gas tube and it will change when switching bands. A rule of thumb is for about 7kV. An air gap would be about 0.175" at sea level with 50% humidity and grows larger with elevation/humidity. (Humid air is less dense)



Figure 1 - A straight gas tube that will pass DC signals up to 90 Volts and RF signals from DC to 2.4 GHz.

Another gas tube or gap may be added closer to the antenna tuner. For dipole antennas with baluns, use the same gas tube technique. Place gas tubes around the balun. Place one across the balun at the dipole wires and one from each side of the

balun to the ground straps. This will protect the balun from a strike to the dipole wires. The more strike energy you can divert to the ground before it reaches your equipment, the better off you and your equipment will be.

Just a word to those who tell us that they are safe from lightning because they always disconnect the coax from their equipment. When asked what they do with the disconnected line(s), they usually respond that it is placed on the floor. Now if you stop and think about the last few thousand feet that the lightning has jumped, you can see the fallacy of their thinking. In fact, they made it worse since arcing involves ignition temperature plasmas inside your house. True, the radio may still work, if it survives the house fire. Throwing the coax out the window is not a solution, especially if the coax has already entered the house from the antenna or the antenna is roof mounted without a ground path. Grounding switches will not last long with direct hits unless other good ground paths are provided. Grounding the antenna line and not disconnecting the coax shield can still allow strike energy to be shared with the equipment. The shield connects to the chassis and if a single point ground is not present with power/telephone protectors, the equipment will be damaged.

Main Power and Telephone Entrance

Full protection for a ham shack must cover not only strikes to your tower, but also hits from down the road to utility lines. By using single point grounding (Figure 2), your ham equipment will survive the hit to your tower. If the outside (tower/perimeter) ground has a low impedance at lightning frequencies, most of the strike energy will be dispersed into the ground and little energy will enter the shack. This is fine, but what if your ground has deteriorated over time or was never very good because of yard size?

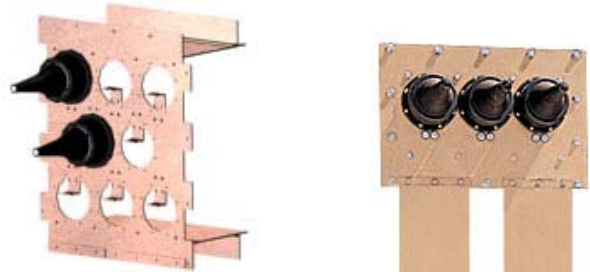
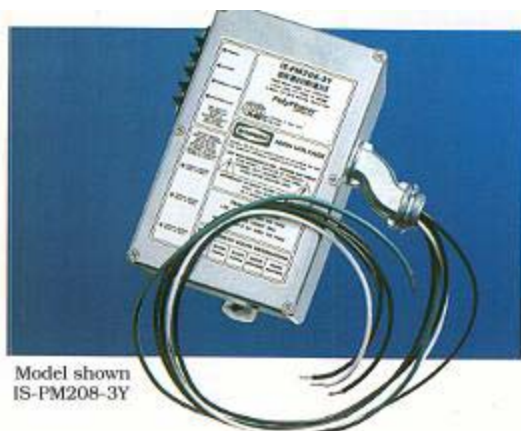


Figure 2 – A couple of examples of Modular, Single Point Earthed Entrance Panels

The ground system can absorb only so much energy before it becomes saturated. In 90% of the strikes, a traffic jam of electrons will be coming down your tower. If they cannot spread out in a reasonable time frame, the back up pressure (voltage) will find or create another path. The ground system, if too small in area, will cause more energy to traverse the cables and other lines to the shack. The I/O protectors can keep the voltage levels between the single point ground and the signal line(s) at survivable limits, but the energy is only diverted elsewhere. This could be the house phone lines and power lines.

Other house appliances may be at risk. When the ground

system is saturated, the energy is actually coming from the (utility) ground system and can go through your TV, for example, in an effort to leave the area by way of the cable TV drop. Satellite dishes will also have the same problem. The best way to protect the rest of the house is to provide protection at a single point. The easiest single point will be at the power and telephone entrance. The utility ground rod (which should have been already interconnected to your ground system) is used by both the power neutral and the telephone protector installed by the phone company. By placing a power mains protector (Figure 3) and a secondary phone line protector at this location, the entire house will be protected. The cable TV or outside antenna coax should be rerouted and a good coaxial protector installed at this point. The cable company installed protector is usually just a grounding block earthing only the outside shield and does nothing to the center conductor energy that can have as much energy as the outside shield! As the ground system rises in potential from a strike, the protectors will take the ground system energy and place it on the power, telephone, and cable TV lines while keeping the voltages between earth and the active lines within the limits of equipment survival.



Typical installation: external view (left) and internal view (right)

Figure 3 – A power mains shunt-type line lightning protector and how it is installed. (photo courtesy of Polyphaser)

The utility ground rod for the house should have already been interconnected to your ground system. What if this can't be done? If this is not done, the energy from the tower strike will traverse the house safety ground wires to this rod, causing problems. The reason to interconnect them in the ground using bare conductors was to reduce the inductance of the intercon-

necting path. It is true that the house wires are a parallel path and there is nothing we can do about it. If the interconnect path is better (lower inductance and resistance) the majority of the current will bypass the house wiring. The only alternative is to provide a copper strap path through the house. This may not be a sufficiently low inductance path and it will radiate to other wires/equipment inside the house.

The power and telephone feeds to your house can be either aerial or underground. Most people think underground is better from a lightning standpoint. Buried underground, it will not be hit directly, but if a nearby tree is hit, the amount of energy coupled through the conductive ground medium can be almost equal to a direct hit. By being underground, the shielding effect to the wires is not great. The buried depth does little when compared to the depth low frequency strike energy penetrates. When you consider the cost of underground utilities, these and the aesthetics must be weighed.

In the final installment on Ham Radio Station Protection next month, we wrap up our discussion by looking at the different and often-preferred type of materials used for grounding and lightning protection, and the advantages of copper strap versus copper wire. And last, but by no means least, is the discussion of how to properly maintain our new methods of protecting against lightning strikes. The methods described here and in the previous articles need to be checked on every so often. We must never forget that lightning protection is an ongoing process that involves our full commitment, and with minimal effort now can save thousands of dollars of radio and antenna equipment in the future.



Cheryl, Kristen and Linda; Hard at Work!



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