



CROSSTALK

A Publication of the TRW Amateur Radio Club



FEBRUARY 1993

CALENDAR :

Every Monday: DCS Net on 145.32 Repeater @ 7:30 PM

Every Wednesday: Emergency Communications Team Net on 145.32
Repeater at Noon

Every Friday: Club Breakfast in Bldg S Cafeteria, 7 to 8 AM

Feb 2: Eyeball QSO meeting, 5:30 PM, location to be announced,
informal get together to discuss club business and present
new ideas for club activities, all members welcome

Feb 2: Emergency Communications Team meeting, R3/1413, Noon

Feb 9: Executive Board Meeting, E2/1200, 5:30 PM

Feb 20-21: ARRL International DX Contest, CW

Feb 23: Club Meeting, E2 Presentation Room, Noon

Feb 27: Swap Meet, parking lot on NW corner of Aviation and
Marine, 7 to 11 AM

Feb 27: T-Hunt following the Swap Meet @ Noon, Meet in O3 parking
lot near the Porta Potties

EDITORS NOTES : I'm sure many of you received some new equipment over the holidays, why not write an article about it and share your experience with the rest of the club. There must be some of you who are active on VHF/UHF who could write about some interesting project you are involved in, a lot of new hams are active on those bands and would benefit from your experiences. Any articles of interest to radio amateurs would be greatly appreciated.

I'd be interested in hearing from the newcomers to this hobby to let me know what type articles you would be interested in seeing in Crosstalk. Some hams can be encouraged to write about their special interest if they know someone is interested. The deadline for Crosstalk submissions is the Eyeball QSO meeting, the first Tuesday of each month. 73 de KJ6GR

EMERGENCY COMMUNICATIONS TEAM NEWS

Rich Sauer, N6CIZ

The TRW Emergency Communications Team is looking for help from club members who work at TRW. At the December meeting of the Team, we discussed a wide range of ideas for the coming year. Our goals include updating and maintaining facilities and equipment as well as publishing procedures for the team to follow.

Whether your interest is HF, Packet, ATV, or Emergency Communications management, there's a place for you in the Team. Please call me at the number listed on the back of this Crosstalk or come to our next meeting.

One high-profile thing our team is doing are the weekly nets on Wednesday's at noon. Nina, N6ZJT, has put together a roster of operators who take check ins from local amateurs. The DCS members who check in to the net are reported to K6CPT Station 3 (Lennox Sheriff's Station) on the Monday night DCS net. You don't have to be a member of the Team to check in. Just let us know that you'll be available in case of an emergency situation in the South Bay.

I must thank Dave Qualls, K6AYK, who has led the ECT for the past year. He has done a great job working with TRW Security and Health and Safety promoting the Team and getting a lot of people involved. Thank you, Dave, for a job well done!

Thanks also go to Ray, KD6IGI, and Norm, N6NS, for their volunteer efforts. Ray has taken over the management of the ECT Communications Van. If you haven't seen our van recently, come by the swapmeet and check it out. (And thanks to Ray's son Dixon, KD6IGH, for the wash and polish job!)

Norm has agreed to manage the R3 Emergency Communications Center. If you work in Space Park, the R3 ECC is a convenient place to go to operate. It's a complete ham shack with bands from HF to 440 MHz. Check with me or Norm for information on operating in the ECC.

The ECT Meetings are normally held at noon on the second Tuesday of each month in the R3 EOC, but due to a scheduling conflict with the Imagination Center, the January and February meetings will be on the FIRST Tuesday. Confused? OK. Here are the dates for the next few Emergency Communications Team Meetings:

January 5th, February 2nd, March 9th, April 13th.

All meetings are at noon. Hope to see you at one soon!

160 METERS FROM A CITY LOT

"Top Band", 160 meters has always intrigued me. Several of my 30 meter CW pals told me of its unique character and I've read several articles about the "Gentleman's Band". My latest challenge has been getting on 160 meters from my 70' by 70' city lot. Since a quarter wavelength at 1.8 MHz is 136' a full size antenna was out of the question. Even if I had the linear space for a dipole it must be up over 70' to have a reasonable radiation resistance and to prevent excessive ground losses (Note 1). I decided to limit my study to vertical antennas.

Short verticals have their own set of problems but have been demonstrated with good performance and high efficiencies by many hams who have taken the time to understand this versatile antenna. Short verticals have low radiation resistance and require large values of inductance to tune them to resonance. With radiation resistances of <10 ohms it is easy to see how overall antenna efficiency can be significantly reduced by ground system and matching inductor losses. A ground mounted vertical requires at least 30 radials to reduce ground losses to an acceptable level (120 radials for a really good ground). Capacitive top loading can be used to increase the radiation resistance and reduce the amount of inductance required to resonate the antenna. This can be accomplished in several ways:

- A top hat can be used but that requires a sturdy structure
- An umbrella of top loading wires which can double as guy wires
- An inverted "L" or "T" configuration

After a month or so of analyzing alternative configurations I elected to purchase the 160 meter resonator kit for my Butternut HF-2V vertical. This design is not a lossy loading coil but a parallel tuned circuit that resonates with the short vertical element (33' for the HF-2V). My vertical is up 20' on the roof and I chose to try the coax radials I wrote about in the October 1992 issue of Crosstalk. I used 2 radials made from RG-213 to keep the losses low. The resistance of a single 90' radial made from RG-213 coax is about 3.3 ohms, a pair has only 1.7 ohms which is comparable to the best ground mounted radial systems. While I was at it I also changed the 40 and 80 meter radials to coax.

On the air performance has been great, my signal is consistently stronger than ground mounted short verticals and low dipoles. In the December 1992 ARRL 160 Meter contest I made 80 contacts in 26 states as far away as New York and worked 4 Japanese stations. As far as DX is concerned I've worked VE3, T32, KH6, JA and HF0(South Shetland Islands).

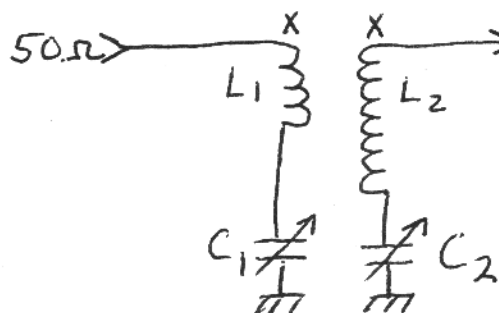
Note 1: November 1992 QST Technical Correspondence "Dipoles above real earth" by Charles Michaels, W7XC contains an excellent account of losses due to low dipoles over real ground.

The bandwidth of my Butternut vertical is only 20 KHz wide centered at 1.820 MHz, the impedance quickly drops as you move off center frequency where the VSWR is 1.5:1. I was able to match the impedance from 1.8 to 1.9 MHz in the shack using my MFJ-986 Differential T Tuner but the differential tuning capacitor arced at power levels over 400 watts. This is not due to defective components but is a limitation on this tuner design (it can not be used to 3 KW on 160 meters even into a perfect 50 ohm load, beware of manufacturer's claims). Since my vertical is rated at 500 watts on 160 meters I wanted to be able to run that power level for contests and DXing.

I set about investigating matching network designs that would permit matching to impedance levels of 5 ohms or less at moderately high power levels. An article in CQ magazine about 160 meter antenna matching had several good suggestions (Note 2). The first was to use a 4:1 step up transformer in front of the matching network. I adjusted the length of coax feedline from the vertical to present the minimum reactance to the tuner using my noise bridge to measure the impedance at the end of the feedline. I built and tested two transformers from Jerry Sevick's excellent book "Transmission Line Transformers" (2nd edition, ARRL, 1990). The first design was a three wire unun similar to figure 6-5 in the book but I used a 2.4 inch toroid to increase the power handling capacity. This transformer worked fine but got warm at 500 watt power levels. I next tried a Guanella unun design shown in figure 6-6a that uses coax. I didn't make special 25 ohm coax as the author did, I used RG-58 with the outer jacket removed and it works great, no noticeable heating was observed so I stuck with this design. The impedance seen by the matching network is between 20 and 200 ohms using this transformer.

The second suggestion was to use a series tuned, link coupled transmatch. The design equations for this type matching network can be found in the ARRL Handbook, ARRL Antenna Book, and Solid State Design for the Radio Amateur by Doug DeMaw and Wes Hayward (ARRL, 1986). The final design for my transmatch is shown in the schematic below along with a list of components. I've tested it up to 700 watts with no arcing.

This project was really fun and I learned a lot of new things about antennas and matching networks in the process. I'm really enjoying operating 160 meters, it is truly the "Gentlemen's Band".



C_1 : Radiokit 860 pf, 1.7KV
 C_2 : Kilo-Tec 500pf, 7.8KV
 L_1 : 13 Turns #12 on "X"
 end of L_2
 L_2 : B&W 2006T, 51 μ H

Note 2: "160 Meter Dipole Matching", by Frank Van Zant, KL7IBA, CQ, April 1990, pp 46-51.

MAJOR AMATEUR RADIO EVENTS -- 1993

JAN	1	ARRL Straight Key Night
	2-3	ARRL RTTY Roundup
	23-25	ARRL Jan VHF Sweepstakes
	30-Feb 7	ARRL Novice Roundup
FEB	8-12	School Club Roundup
	20-21	ARRL International DX Contest, CW
MAR	6-7	ARRL International DX Contest, phone
APR	5 (Mon)	ARRL 144-MHz Spring Sprint
	13 (Tue)	ARRL 222-MHz Spring Sprint
	16-18	Northern CA DX Convention (Visalia)
	21 (Wed)	ARRL 432-MHz Spring Sprint
	23-25	Dayton HamVention (Dayton, OH)
MAY	1 (Sat)	ARRL 902-MHz Spring Sprint
	1 (Sat)	ARRL 1296-MHz Spring Sprint
	1 (Sat)	ARRL 2304-MHz Spring Sprint
	22-23 (Sat-Sun)	ARRL 50-MHz Spring Sprint
JUN	12-14	ARRL Jun VHF QSO Party
	26-27	ARRL Field Day
JUL	10-11	IARU HF World Championship
AUG	7-8	ARRL UHF Contest
	21-22	ARRL 10-GHz Cumulative Contest
SEP	11-13	ARRL Sep VHF QSO Party
	17-19	Southwestern Division Convention (Ventura, CA)
	18-19	ARRL 10-GHz Cumulative Contest
OCT		
NOV	6-8	ARRL November Sweepstakes, CW
	20-22	ARRL Nov Sweepstakes, phone
DEC	3-5	ARRL 160-Meter Contest
	11-12	ARRL 10-Meter Contest

Southwestern Division Convention

**SEPTEMBER 17 - 19, 1993
VENTURA, CALIFORNIA
VENTURA FAIR GROUNDS**

ONLY PAID REGISTRATIONS ARE ELIGIBLE FOR PRIZES.

YOUTH UNDER THE AGE OF 15 ARE ADMITTED FREE.

**ALL TALK IN FREQUENCIES PL 141.3 (4A): 146.67-, 224.18-, 446.75-
SHUTTLE BUS SERVICE EVERY 15 MIN BETWEEN FAIRGROUND PARKING AND
HOLIDAY INN**

PRE-REGISTRATION PICK UP ONLY AT HOLIDAY INN ON FRIDAY 17TH.

ALL OTHER REGISTRATIONS AT FAIRGROUNDS

EXHIBITS OPEN SATURDAY 8AM

Special rates at the host hotel, Ventura Holiday Inn, and other selected nearby hotels available via the Ventura Visitor's Bureau (800) 333-2989.

Detach below and return with your check or money order payable to: Hamcon '93
Mail to: HamVenture'93, 3463 State Street, PO Box 3000-267, Santa Barbara, CA.
93130

**REGISTRATION FORM - ONE PER PERSON
PRIZES AWARDED FOR EVENTS IN BOLD PRINT**

Please print clearly. If we can't read it, we can't acknowledge it.

Name _____ CALL _____

ADDRESS _____
CITY _____ STATE _____ ZIP _____

Total Amount Submitted: _____ CHECK NO. _____

CHECK BELOW THOSE EVENTS AND SUBMIT TOTAL

- ☐ **Early Bird Registration** [(includes pin) - Early Bird Ends on December 31, 1992] @ 10.00.
- ☐ **Pre-registration** (includes pin while they last) [Pre-Reg - Jan 1, 1993 till July 31, 1993] @ 12.00.
- ☐ **Registration** from August 1993 through September 1993 is \$15.00.
- ☐ **Need more information on Tours.**
- ☐ **Friday Night Harbor Cruise** (1 hour) @ \$20.00, limited seating, first come basis.
- ☐ **Saturday Tour 1-Santa Barbara Historical, Mission, Waterfront** -with lunch \$34, without lunch \$25.
- ☐ **Saturday Tour 2- 2 hr Boat ride & 2 hr shopping at Marina** - with lunch \$55, without lunch \$46.
- ☐ **YL Lunch @ \$ 15.00.**
- ☐ **Saturday Night Banquet @ \$30.00** - [] **Special Dietary Requirement at Banquet:** _____
- ☐ **Wouff Hong** - need head count - register upon arrival at Wouff Hong table.
- ☐ **Sunday Special Interest Group Breakfast @ \$12.00.**
- ☐ **Sunday afternoon T-Hunt** - need head count- **CASH PRIZE EVENT.**
- ☐ **VE Exams Saturday** - need head count if your thinking of attending.
- ☐ **Need information about Child Care.**
- ☐ **RV parking required, need vehicle count** [] **Need information for RV parking locations** [].
Handicapped parking is available at fair grounds and Hotels.