TRW W6TRW AMATEUR RADIO CLUB

CROSSTALK

A Publication of the TRW Amateur Radio Club

TRW SEA

0CTOBER 1994 CALENDAR

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

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

Every Thursday: Club Net on 145.32 Repeater at 7 PM, Club news, etc.

Every Friday: Club Breakfast in Bldg S cafeteria, 7-8 AM

Oct 4: Executive Board Meeting, E2/1200, 5:30 PM

Oct 11: Emergency Communications Team Meeting, R3/1413, Noon

Oct 11: Eyeball QSO Meeting at Petrelli's, 230 N Aviation Blvd, M. B., 5:30 PM

Oct 21: Technical Chairman's Meeting, Bldg S Shack, Noon

Oct 29-30: CQ WW DX Contest, Phone

Oct 29: Swap Meet, Parking lot, NW corner of Aviation & Marine, 7-11:30 AM, T-HUNT at Noon

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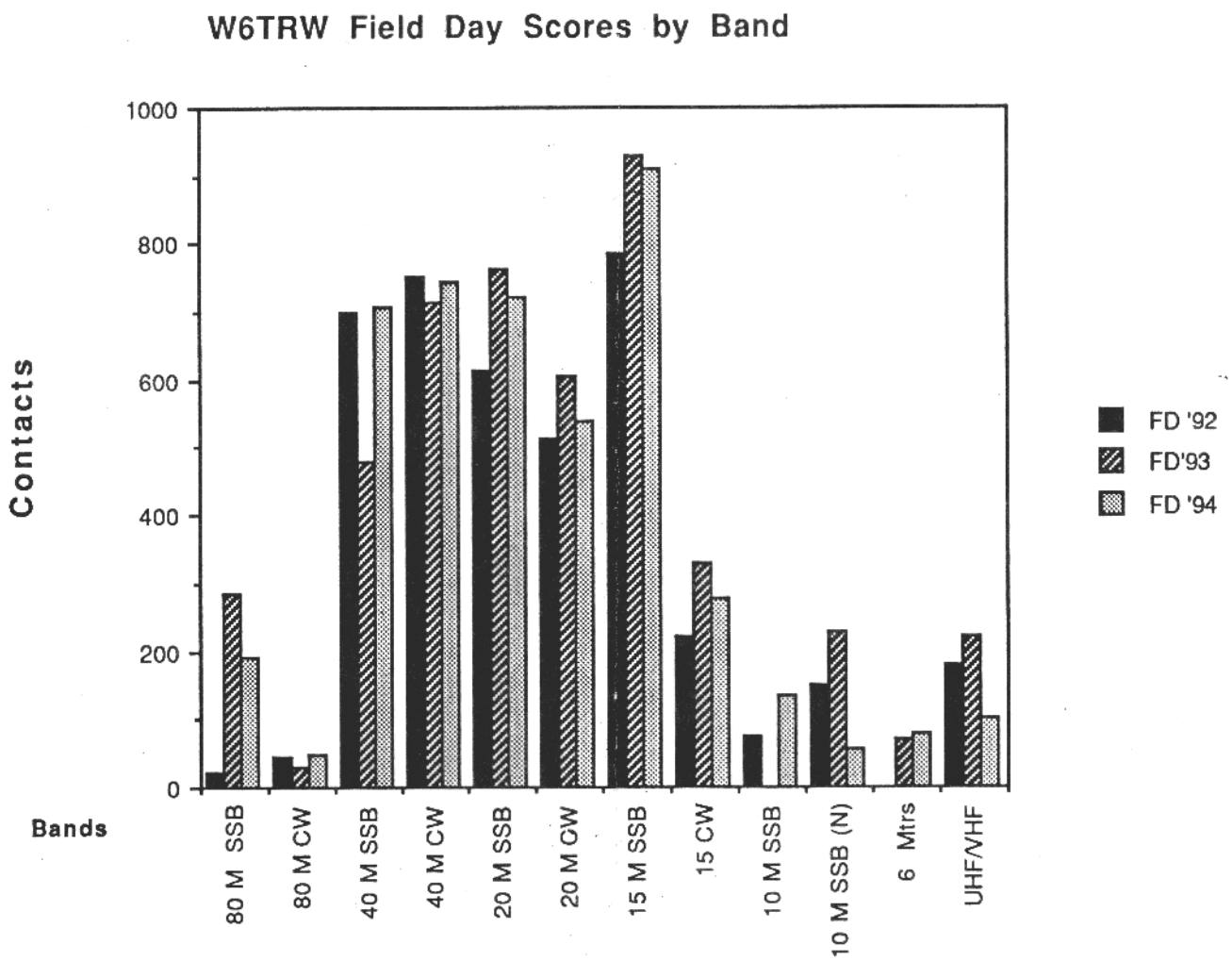
EDITORS NOTES: The deadline for CROSSTALK submissions is the executive board meeting on the first Tuesday of each month. If you have something and will be later than that please call and I will try to accommodate you.

ELECTIONS: It's getting close to the end of the year and that means the election of club officers. If you would like to run for office please contact one of the current officers. As far as I know all offices are up for grabs and the present group would welcome some competition (and relief!). There is one board meeting a month where the club's business is transacted so the extra work is minimal but the satisfaction is great.

VE TESTING: An updated list of local VE test locations and dates can be found on KB6AXK-1, 145.690 packet. There are VE test locations in the L.A. area almost every weekend. If someone prints a clean copy for me I'll be happy to publish it in *CROSSTALK*.



Revised Field Day Results - last month's chart had an error on 20 M SSB

Beginners Guide to VHF/UHF Propagation

by Bill Shanney, KJ6GR

You don't have to be a scientist to understand enough to enjoy the wide variety of propagation modes present in the VHF/UHF bands. This article contains a brief summary of the most popular modes. Except for line-of-sight and tropospheric ducting. These are weak signal modes where CW and SSB are generally used. The actual physical causes of these propagation modes can be quite complex and won't be covered here. Those readers interested in a greater theoretical understanding should consult the references at the end of this article, they are all available from the local ham stores or the ARRL.

Line-of-sight (LOS)

As the name implies LOS is simply a straight path between two points. The maximum distance for reliable communication depends on power output, antenna height and obstacles in the direct path. Signal levels are reduced by the square of the distance between two stations, so farther distances require more power. Experience tells us that the higher we go up the greater the distance to the horizon (i.e.: greater LOS). Antennas should be as high as possible and in the clear for best performance. Radio waves do propagate over and around obstacles but the signal levels are reduced or attenuated in doing so. The higher the frequency the worse the effect of these obstructions. We can now see why repeaters are so popular. Their antennas are usually placed on tall buildings or mountain tops to increase their LOS coverage. They use high gain antennas and transmitters with moderate power outputs to increase our communications range. This allows amateurs to use low power HTs and still achieve reliable communications, only the obstacles between us and the repeater are a problem.

Satellites also utilize LOS propagation and overcome the horizon and obstacle problems when they are high overhead. I won't discuss this exciting facet of VHF/UHF here since specialized equipment is usually required.

Tropospheric Ducting

Hams in Southern California are fortunate to have the necessary conditions for tropospheric ducting present on a semi-permanent basis. Temperature and humidity changes with altitude alter the electrical properties of air so radio waves in the VHF to microwave region are bent back to Earth instead of escaping into space. The refractive index of air normally decreases with height, causing a gentle bending of radio waves back to Earth. This accounts for commonly observed propagation past the visible horizon.

When there is a temperature inversion, dry warm air overlaying cool moist air causes the ducting effect. Large high pressure systems are responsible for this condition. Propagation of up to 1000 miles over land and greater than 2000 miles over water is possible. The California to Hawaii duct is one of the best for long distance work. Contacts have been made as high as 5.7 GHz over this path. Ducting between the Los Angeles area and San Diego is almost a daily occurrence, causing the interference we often experience between the W6TRW and San Diego repeaters. The Bermuda high is responsible for similar conditions in the Southeastern states during summer.

Tropo scatter is different from tropo ducting although both are sometimes referred to as "tropo". Tropo scatter propagation is caused by reflections in an area of atmospheric turbulence. The signal is scattered in many directions so high power is

required for reliable communication. Rapid fades and random doppler shifts make this propagation mode challenging.

Sporadic E

Highly ionized clouds formed at E-layer altitudes (i.e.: 60-70 miles) provide communication over distances of 300-1500 miles for a single hop and up to 2500 miles on a two hop path. These clouds form and dissipate in an unpredictable manner, rarely staying more than an hour or so, hence the name Sporadic-E or E_S. The peak of sporadic E is from May through July with a lesser peak in December and January. The most likely occurrences are 0900-1200 and 1700-2000 local time.

Sporadic E is also present on ten meters. A reliable indicator of VHF E_S is when the 10 meter skip gets shorter than normal. Six meters is the most popular band for E_S operating. There is some activity on 2 meters but openings are rare; when E_S permits 6 meter contacts under 500 miles it is time to check 2 meters for an opening.

Low power and simple antennas are all that is required for successful sporadic E operating. Most activity is on SSB but CW and FM are also used. The unpredictable nature of this mode adds excitement to the openings (it even got me on SSB).

Recent studies have shown the presence of tilted sporadic E layers. I believe these are what is commonly referred to as Field Aligned Irregularities or FAI. FAI are often present after an intense E_S opening, pointing your antenna 15-25° north of the direction of the sporadic E cloud can provide communication off these tilted layers when conditions are right. These tilted layers can provide communication on 6 meters any time during the E_S season, calling CQ even when the band seems dead can bring surprise contacts.

Meteor Scatter

When meteors enter the atmosphere they leave a trail of ionization at E-layer heights as they burn up. Signals are reflected by these trails over paths from 500-1300 miles. As expected the ionized trail only lasts a short time. Reflections last a few seconds for a single meteor to several minutes during an intense shower. Contacts are very short and special operating protocols have been established. These are explained in several of the references and The ARRL Operating Manual.

The most popular band is two meters but 6 meters is also good and the bursts last longer. Meteor scatter contacts take time to complete and many operators prefer schedules. Reference 3 contains several excellent articles that describe the major meteor showers and antenna pointing. The dates of upcoming showers are reported in the VHF columns in QST and CQ. I recommend making your first meteor scatter contact with the help of an experienced operator.

Aurora

This is not a mode we experience in the Southern portions of the U.S. but is interesting if you ever travel to the northern portions of the country. Streams of charged particles from coronal mass ejection's from the sun (not flares as was once believed) interact with the Earth's magnetic field near the poles. Electrons spiral around magnetic field lines at E-layer altitudes, the resulting reflected signals have a characteristic raspy sound or buzz. Reflections from these moving electrons also are shifted frequency, called a doppler shift. CW is used since SSB is unintelligible due to the buzz.

F Layer Propagation

During the peak of the solar cycle DXing is possible on 6 meters using F-layer reflections. When the solar flux is very high for a few days and 10 meters is wide open its time to check 6 meters. DXCC has been worked on six meters using this propagation mode. High power and super antennas are not required to enjoy F-layer DX on six meters.

Trans Equatorial (TE) propagation is an exotic mode that occurs during the peak of the solar cycle. Stations out to about 2500 miles each side and equidistant from the equator can work each other using this mode. TE occurs mostly in the spring during late afternoon or early evening. Signals reflected from the ionosphere in the TE mode are not reflected from the Earth mid-path as expected but are refracted between points on the ionosphere. This is due to tilts in the F_2 layer near sunset when the height of this layer begins to increase. This reduces path loss considerable and allows distant communications to take place on six and two meters.

Earth-Moon-Earth (EME)

EME requires high power and extensive antenna systems, however, less well equipped stations may be able to contact the "superstations" during EME contests. On 70cm and higher frequency bands antenna systems are smaller and it may be possible to build an effective EME station on a city lot. Consult one of the references if you are interested in this exotic mode.

Conclusion

VHF/UHF propagation has been a popular amateur radio topic since the early 1930s. After World War II interest really took off and hasn't slowed since. Many of these modes can be worked with modest equipment and antennas. There are plenty of TRW ARC members very active on the weak signal modes so if you need more information just come to a club meeting and ask. The club has equipment for most VHF/UHF operating so there is no excuse. Try something new in ham radio, the worst that can happen is that you may have fun.

References

1 - The ARRL Handbook for Radio Amateurs. ARRL, Newington, CT (any recent edition).

2 - VHF/UHF Manual, GR Jessop, G6JP (ed.) RSGB, Hertfordshire, England, 1983.

3 - Beyond the Line of Sight, E. Pocock, W3EP (ed.) ARRL, Newington, CT, 1992.

4 - The VHF "How To" Book, J. Lynch, N6CL. CQ Communications, Hicksville, NY, 1994.

More Books

by Bill Shanney, KJ6GR

Antennas are the most written about topic in amateur radio and one of my personal interests. Two books published recently deal with one of my favorite antennas, the cubical quad. "The Quad Antenna" by Bob Haviland, W4MB (CQ Communications) thoroughly covers all the technical details of quad design. The subtitle of this book, "A Comprehensive Guide to the Construction, Design and Performance of Quad Antennas," says it all. Based on extensive MININEC analysis theoretical and practical design data is presented for a large number of quad configurations.

This text does a good job of explaining design tradeoffs and the operation of the quad in its environment. Feed systems, mechanical design, design variations and how to optimize your design are covered. This is not a beginners book nor is it for those who simply want to put up a commercially designed antenna. The amateur who enjoys tweaking his antenna system for every ounce of performance will really appreciate this book. It is the most comprehensive treatise on this popular antenna I have seen and should be in every serious quad builders library.

"More About Cubical Quads" by George McCarthy, W6SUN (Worldradio Books) is a totally different book. This book should be considered required reading by anyone who wants to build their own quad. A little history, an honest comparison with the Yagi, a little theory, a great deal of experience (both personal and from other quad builders) and a lot of useful information provides interesting reading and really exposes quads for what they are (no kidding!). Even if your interest is just buying a quad the discussions on tuning are worthwhile reading.

This book could be better if it contained more theory and design data but with W4MB's book on the market and the popularity of PC based antenna analysis programs the serious quad-phile has plenty of information available. I enjoyed reading this book and will definitely pull it out when I get ready to put up a quad again.

For Sale:

- New IC-736 HF + 6 meter Transceiver, won in contest. $1700. (List is $2250, HRO price is 1879+tax)
- Ten Tec Argonaut II QRP Transceiver, 5 watts out on all bands 160-10 meters, general coverage receiver. $1000 . Excellent condition.
- Kent Iambic Paddle Key. Excellent Cond. $50.

Call Bill Shanney, KJ6GR (310) 542-9899 evenings after 6 PM.

For Sale:

-DigiMax D-1200 1.2 GHz frequency counter. Excellent condition. $200.

Call Tim Travis, W6OQR, x30589 or evenings after 6 at (310) 474-4229.

"Preparedness is the Key For 1993"

EARTHQUAKE SURVIVAL PROGRAM
A KEY TO SURVIVAL

Published by: California Office of Emergency Services

● **Learn what earthquakes are and what causes them.** Explain why the ground and buildings shake. Go to a museum, a theme park, or an expo that has an earthquake simulator so everyone can experience the shaking sensation. Remind everyone that the shaking will stop. Incorporate the discussion into everyday events. Read stories or sing songs and let your children ask questions. Learn the difference between fact and fiction.

● **Discuss aftershocks.** Talk about the possibility that aftershocks as strong as the earthquake itself may occur and continue for some time. Make sure everyone understands that aftershocks are normal.

● **Develop a family earthquake plan.** Develop your earthquake plan and conduct a home hazard hunt as family projects. Eliminate potential hazards in your home. Check out possible evacuation routes. Locate utility shutoff valves and teach responsible family members how to turn them off if necessary. Identify an out-of-town contact and discuss plans for reuniting if family members are separated. Discuss the possibility that it may take time for everyone to reunite. Talk about plans for reuniting if your children are at school and you are unable to pick them up. Determine alternates. Also discuss plans with your children's schools.

● **Assemble earthquake kits.** Include water, food, battery-operated flashlights and radios, medications, first aid kits, as well as cooking and sanitation supplies. Also include food for pets and persons with special dietary needs, as well as photos, games, treats, and other items that will reduce anxiety.

● **Learn first aid and CPR.** Enroll responsi-ble family members in a first aid and CPR class. Practice with friends and family members.

● **Learn to operate a fire extinguisher.** Show responsible family members where fire extinguishers are located and demonstrate how to use them. Have family members simulate operating one.

● **Practice earthquake procedures**. Conduct earthquake drills during the day and at night to test your plan. Have everyone duck, cover, and hold, or physically place themselves in a "safe" spot. Doing so will enable everyone to react instinctively when an earthquake strikes. Check for "damage" to your home and for gas "leaks." Simulate turning off the utilities if there's a "leak." Practice evacuating the house. Call your out-of-state contact to ensure that the number is correct and to remind your contact of their role.

● **Conduct camp outs.** Conduct "camp outs" in the back yard so that everyone can become accustomed to living outdoors. Cook and eat food that will be part of your emergency food supply. Include foods that you like. Practice using a toilet that is inoperable by lining the toilet with a heavy plastic trash bag. Make sure you have plenty of disposable diapers for infants and toddlers. During the night, have everyone assemble a flashlight, replace the batteries, and operate the flashlight.

● **Accustom everyone to living without electricity.** Go through an entire evening without using electricity to prepare everyone--especially children--for the possibility of having to live without it. Conduct a "flashlight" walk around the block; hold a candlelight or "flashlight" dinner; tell stories instead of watching television.

After an earthquake, monitor family members--particularly children--for behavioral changes, including withdrawal from family and friends, overeating or loss of appetite, disobedience, and antisocial behavior. Parents and teachers can respond to such problems by encouraging interaction with family members and friends, providing additional attention and physical comfort, and by providing structured but undemanding responsibilities. Contact your local mental health agency for more information.

Extracted and adapted from "What To Expect After A Disaster: Typical Children's Reactions," jointly developed by the National Institute of Mental Health and the Los Angeles County Department of Mental Health.

This action sheet is produced as part of the Earthquake Survival Program (ESP). ESP is an awareness campaign designed to increase individual and home earthquake preparedness. ESP was developed by the County of Los Angeles and is coordinated by the California Office of Emergency Services (OES) and representatives from Imperial, Kern, Los Angeles, Orange, Riverside, San Bernardino, San Diego, San Luis Obispo, Santa Barbara, and Ventura counties.