



# CROSSTALK

News Bulletin of the TRW Amateur Radio Club



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Volume 96 Number 6

July 1996

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**TRW Amateur Radio Club  
Executive Board Meeting  
4 June 1996**

**Attendees**

Elizabeth Twyford  
Dave Nelson  
Jan Parker  
Rich Sauer  
Nina Whiddon  
Pat Anderson  
Chris Wachs

- Pat Anderson presided in Bob Briggs's absence.
- Building S Antennas - Dave Nelson got a copy of the blueprints and is proceeding with installation of the tower. He will check with the city to see how much work can be done before getting the new permit.
- July, August, September meetings - noontime picnics at the park.
- W6TRW Web Page - getting about 100 hits per month. Norm has done a great job on the Swapmeet section. Pat received the password to activate our registered copy of HotDog Pro, the HTML editor.
- Swapmeet report - Rich Sauer reported that the May swapmeet was quiet.
- Rich has been approached by SEA regarding having the club provide traffic control and communications for an upcoming SEA Swapmeet. Rich will refer them to Pat Anderson who will get more details.
- Technical Chairman's Report - Chris Wachs reported the following:
  - Computer Dreams will update the mother board on the shack computer at no additional cost.
  - An http server has been set up on the shack computer. Currently in test phase.
  - Continual problems with two meter TNC. Goes down about once a week.

- Problems with repeater battery switch. John Cheatham is helping to trouble shoot.
- Proposed Wachsomatic ID system for Swapmeet vendors.
- ECT Chairman's Report - Rich Sauer reported:
  - Nothing was done to the van while it was over at Ted's. Eric volunteered that he had a JN to do the work so the van was moved to Space Park. Eric's JN did not materialize so Ray Enriquez approached his supervisor (Facilities). He was favorably impressed with the whole idea and agreed to take care of the work at no cost to the club if we would agree to support Facilities communications in an emergency.
  - The cell phone in the van has been shut off again for non-payment. Despite repeated requests to Eric, it has not been reactivated. Rich will look into getting our own cell phone to alleviate this problem.
  - A 5K race will be held in Manhattan Beach this weekend. A number of ECT members are participating.
- Rich reported that he received a letter from Charlie Brown's notifying him that they will be closing and will not be available for the club banquet in November. Chris and Nina agreed to look around for other facilities.
- Elizabeth Twyford volunteered to be the club's SEA representative. The board formally approved.
- Chris Wachs received approval to purchase a new 2 meter TNC for the Internet Gateway - not to exceed \$200.
- Elizabeth Twyford received approval to purchase a headset for Field Day - not to exceed \$200.

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**Wanted: CROSSTALK Editor, no experience necessary. Call Bob Briggs at (310) 813-2622 to volunteer**

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**For Sale:** Yaesu FT-1000D, IRC slow tuning board, 600 Hz filter in sub-Rcvr, SP-5 matching speaker. \$2500. Bill, KJ6GR (310) 542-9899 after 6 p.m.

**For Sale:** RF Concepts 70 cm. 10/100 watt power amplifier with preamp. \$250. Bill, KJ6GR (310) 542-9899 after 6 p.m.

## 6 Meter Update

One of the most under used bands is 6 meters. It got a bad reputation due to interference problems in the early days of TV. Modern TV technology and the popularity of Cable TV in fringe areas have greatly reduced this problem. Sporadic E and Tropo propagation provide plenty of excitement for low power enthusiasts.

Getting on 6 meters doesn't have to be expensive. The June 1996 issue of QST contained a review of the Ten Tec T-kit 1208 6 meter transverter. It can be driven by an inexpensive 20 meter QRP transceiver. The transverter puts out 8 watts which is plenty during a good sporadic E opening.

The June 1996 issue of CQ VHF magazine contained a description of an inexpensive 6 meter Yagi (Reference 1). Cubex makes a nice quad for this band and can often be found at our swap meet. So far this new magazine has been excellent. There's plenty of interesting material for VHF/UHF enthusiasts of all levels in each issue.

Just about the time you receive this issue of Crosstalk, the sporadic E season will be at its yearly peak. During the recent VHF contest, there was an excellent opening to the Northeast and North with some double hops into the Southeast. A second, lower peak will occur in December. Tropo conditions exist often during the summer months. You can listen for beacons on the low end of the band to find openings. Beacons are listed in the ARRL repeater directory. Why not give 6 meters a try?

73 de KJ6GR

- 1) "Build a Featherweight 6-Meter Yagi" by Rick Littlefield, K1BQT. CQ VHF, June 1996. pp24-30.



## 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 F2 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.



# W6TRW Calendar

## July 1996:

|                   |            |  |
|-------------------|------------|--|
| Tuesday, July 2   | 5:30 pm    | <b>Executive Board Meeting</b><br>O1/1210 (All Club Members are invited)       |
| Tuesday, July 9   | 12:00 noon | <b>Emergency Communications Team Meeting</b><br>R3 Emergency Operations Center |
| Tuesday, July 9   | 12:00 noon | <b>Club Meeting</b><br><b>PICNIC at Polliwog Park</b>                          |
| Friday, July 19   | 12:00 noon | <b>Technical Chairman's Meeting</b><br>Building S Hamshack                     |
| Tuesday, July 23  | 12:00 noon | <b>Emergency Communications Team Meeting</b><br>R3 Emergency Operations Center |
| Saturday, July 27 | 7:00 am    | <b>TRW/ARC Swap Meet</b><br>Marine and Aviation (Northeast Corner)             |
| Saturday, July 27 | 12:00 noon | <b>T-Hunt</b><br>Swap Meet Parking Lot - 144.72 MHz                            |

## August 1996:

|                     |            |  |
|---------------------|------------|--|
| Tuesday, August 6   | 5:30 pm    | <b>Executive Board Meeting</b><br>O1/1210 (All Club Members are invited)       |
| Tuesday, August 13  | 12:00 noon | <b>Emergency Communications Team Meeting</b><br>R3 Emergency Operations Center |
| Tuesday, August 13  | 12:00 noon | <b>Club Meeting</b><br><b>PICNIC at Polliwog Park</b>                          |
| Friday, August 16   | 12:00 noon | <b>Technical Chairman's Meeting</b><br>Building S Hamshack                     |
| Tuesday, August 27  | 12:00 noon | <b>Emergency Communications Team Meeting</b><br>R3 Emergency Operations Center |
| Saturday, August 31 | 7:00 am    | <b>TRW/ARC Swap Meet</b><br>Marine and Aviation (Northeast Corner)             |
| Saturday, August 31 | 12:00 noon | <b>T-Hunt</b><br>Swap Meet Parking Lot - 144.72 MHz                            |

## Reoccurring Events:

|   |         |  |
|---|---------|--|
| Every Monday Night<br>(Except the 1st & Holidays) | 7:30 pm | <b>Disaster Communication Systems (DCS) Net</b><br>DCS Members: Check in on 2 Meter Repeater                 |
| Every Thursday Night                              | 6:30 pm | <b>TRW Amateur Radio Club Net</b><br>The Bob and ? Show - Check In on 2 Meter Repeater                       |
| Every Friday Morning                              | 7:30 am | <b>TRW Amateur Radio Club Breakfast</b><br>Building S Cafeteria - Everyone is invited<br>Talk-in on 2 Meters |