



# RF



## ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLIV NO. 10

P.O. BOX 3454, TUSTIN, CA 92861-3454

October 2003

### The Prez Sez:

This month I will be brief. I am sorry that I had to miss last months meeting, but family activities come first. I am thanking our VP Steve KB1GZ, for taking charge. I heard several favorable comments on 2M Net.

This month is the Annual Auction, so bring your boat anchors to auction off and your wallet/purse full of money to buy that item you need. I am sure Larry K6VDP and Larry K6LDC will keep the evening moving.

Remember, November is the club election and December is Christmas Dinner month. So this year is slowly coming to a close.

While at this months Board meeting we found out that Ida Yamachika gave another large contribution to the club. Secretary Dave Mofford sent her a thank you note, on behalf, of the club.

I will see everybody in October for the auction.

73's----Lowell-KQ6JD

### ARRL SW Convention FCC's Hollingsworth-K4ZDH Offers Advice to Ham Radio

"This Amateur Radio service is serious business. I think that Steve Mendelsohn of the League has made the best analogy of the Amateur Radio service, saying that the frequencies allocated to the Amateur Radio service are really the Central Park of the radio spectrum. And when you think about it, nobody in their right mind would advocate leveling Central Park and putting up office buildings, apartment buildings, condominiums, fast food restaurants or parking lots. But that's only to the extent that Central Park serves its purpose as a park. As long as Central Park can reasonably be used and reasonably be said to be a park, then it's safe."

"And there's an analogy similar to that for Amateur Radio. We're sitting on an incredible allocation of radio frequencies, and it used to be said that they had no other use, and it used to be said that we would never auction off Amateur Radio frequencies. I was at the Shoreham in Washington, DC, a few years ago when they had the first broadband auction. In the war room there, they had computers set up where they could speculate on the first bids and decide what the next incremental bid would be, how long to run the auction and so on. They had the foremost authorities on auctions in that room. They unanimously agreed that the first bid would come in at around two million dollars. The first bid for broadband PCS came in at twenty million dollars, and on that day, the radio world changed."

"We can't take anything we have for granted anymore. That's not to say it's in danger — we just have to be aware of the Central Park analogy."

--- excerpted from WorldRadio ---

### October Meeting

Turn your unused equipment into someone else's treasure and into your cash.

### "Annual OCARC Radio Auction"

Set-up begins at 6:00 PM

Full announcement of Auction is on page 7.

Auction Rules are on page 8.

Sample of equipment for auction is listed on page 6.

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

The next general meeting will be:

**Friday, Oct 17th  
@ 7:00 PM**

We will be meeting in Anaheim Room in the east Red Cross Building

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



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### 2003 Club Appointments:

**W6ZE Club License Trustee:**

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**ARRL Awards Appointee:**

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**OCCARO Delegate:**

Bob Buss, KD6BWH  
(714) 534-2995  
[kd6bwh@aol.com](mailto:kd6bwh@aol.com)

### Monthly Events:

#### General Meeting:

Third Friday of the month  
at 7:00 PM  
Orange Police HQ  
1107 N. Batavia  
(1 block south of Katella)  
Orange, CA

#### Club Breakfast:

First Saturday of the month  
at 8:00 AM  
CowGirl's Cafe, Too  
2610 S. Harbor Blvd  
(just south of Warner)  
Santa Ana, CA

#### Club Nets (Listen for W6ZE):

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

28.375 ± 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 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.

## Baluns

By Bob Eckweiler – AF6C

(This is part seven in a series to explore RF impedance, from the antenna...down the feed line...and eventually reach the antenna tuner and transmitter.)

### The Skin Effect:

Before we begin our discussion on baluns, let's review a basic law of RF energy, the *skin effect*. When RF energy flows along a conductor, it tends to flow only near the surface of the conductor. As the frequency increases, the depth in which the energy flows in a conductor becomes less and less. This is called the skin effect, and is the reason high power coils are silver plated and often made of hollow tubing instead of solid material. At RF frequencies the size and conductivity of the surface area, and not the cross-sectional area, is important for controlling losses.

### Balanced vs. Unbalanced Feedlines:

In previous articles we discussed two types of feedline, balanced and unbalanced. Balanced feedline normally has two parallel conductors separated by insulating material (sometimes air.) TV twin-lead is a balanced feedline; ladder-line and open-wire line (held apart with insulators every few feet) are other types of balanced feedline. Ideally, the energy flowing in each conductor is equal but is traveling in opposite directions. The electromagnetic field generated by the currents in the conductors tend to cancel due to the balanced nature of the current flow. This canceling occurs at a distance from the feedline. Close objects will influence the field and care must be taken running balanced feedline to keep it away from nearby objects, especially conductive ones. Neither conductor of a balanced feedline is connected to ground. Common balanced feedline normally has an impedance in the range of 200  $\Omega$  to 600  $\Omega$ . I've also seen 75 $\Omega$  balanced feedline referenced.

Unbalanced feedline normally has one side connected to ground. Coaxial cable is an unbalanced feedline. Energy flows in coaxial cable

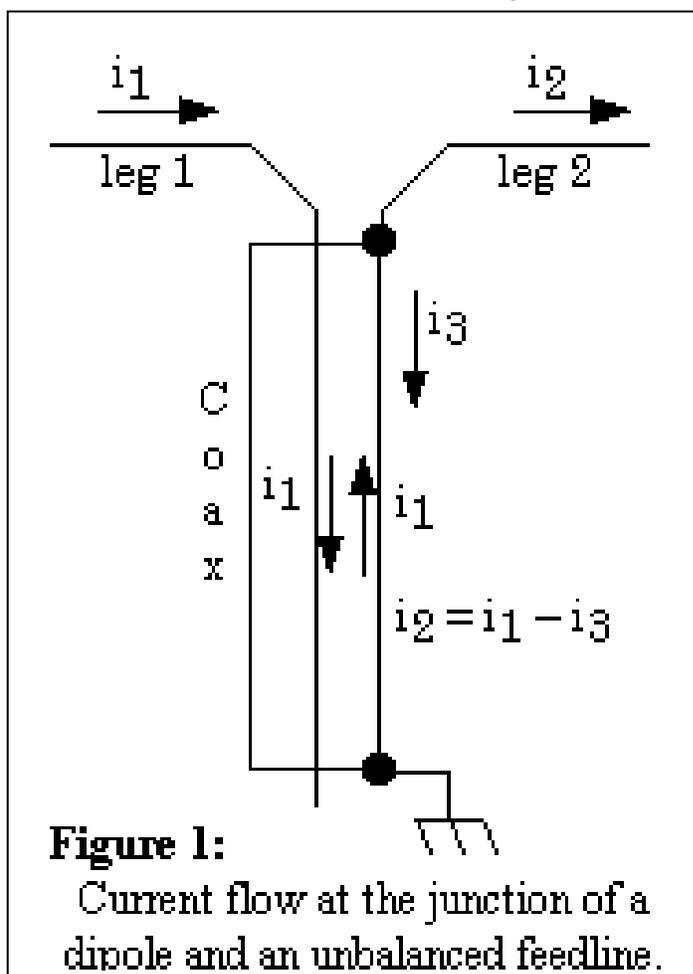
along the outer surface of the inner conductor and the inner surface of the shield. An electromagnetic field is developed in the dielectric material between the two conductors. Energy flows equally in the two conductors but in opposite directions. Normally, no energy travels along the outside of the outer conductor; that's why it is called a shield! Coaxial cable is popular because it isn't influenced by its surroundings. Common coaxial feedline has an impedance in the range of 50  $\Omega$  to 90  $\Omega$ .

Antennas can also be balanced or unbalanced. A dipole antenna and a quad or yagi driven element are examples of balanced antennas (unless they use a matching device designed for unbalanced feed.) A quarter wave vertical is an example of an unbalanced antenna.

### The Problem:

What happens when an unbalanced feedline is used with a balanced antenna? A common example is a simple dipole fed with 75  $\Omega$  RG-59U coax. Figure 1 shows the junction of a dipole antenna fed with coaxial cable.

-- See TechTalk cont'd on page 4 --



**Figure 1:**  
Current flow at the junction of a dipole and an unbalanced feedline.

Let's assume for the sake of simplicity that there is no reflection due to a mismatch of impedance. The center conductor of the coax connects to one leg of the antenna and the RF current ( $i_1$ ) on the inside coaxial conductor travels into that leg; it has nowhere else to go. Thus the current entering the leg is also  $i_1$ . The story is different for the antenna leg attached to the shield. RF current ( $i_1$ ) traveling on the inside of the shield can travel along two different paths, either onto antenna leg ( $i_2$ ) or back along the outside of the coaxial cable shield ( $i_3$ ) to ground through the radio. Because of the skin effect the outside and inside of the shield look like separate conductors to RF. Energy that travels back along the outside of the coaxial cable radiates. It can affect the antenna radiation pattern and cause TVI, RF feedback in the radio, a hot microphone, and many other evil effects. In a normal antenna setup, the length of the feedline doesn't affect the SWR (other than caused by losses.) However, with RF flowing on the outside of the shield, that path becomes a part of the antenna that changes with the feedline length, and that *will* affect the SWR.

If the path along the outside of the shield to ground happens to be an odd number of quarter wavelengths, then the point where the outside of the shield connects with the antenna will have a high impedance and very little RF will flow along the outside of the shield. On the other hand, if it is an even multiple, then that point is very low impedance and problems may arise!

RF can also be introduced to the outside of the feedline shield by radiation from the antenna itself. That is why the feedline should be brought out perpendicular to the center of a balanced antenna for a distance of at least a quarter wavelength whenever possible. This way RF is picked up equally from each antenna leg and cancels on the feedline.

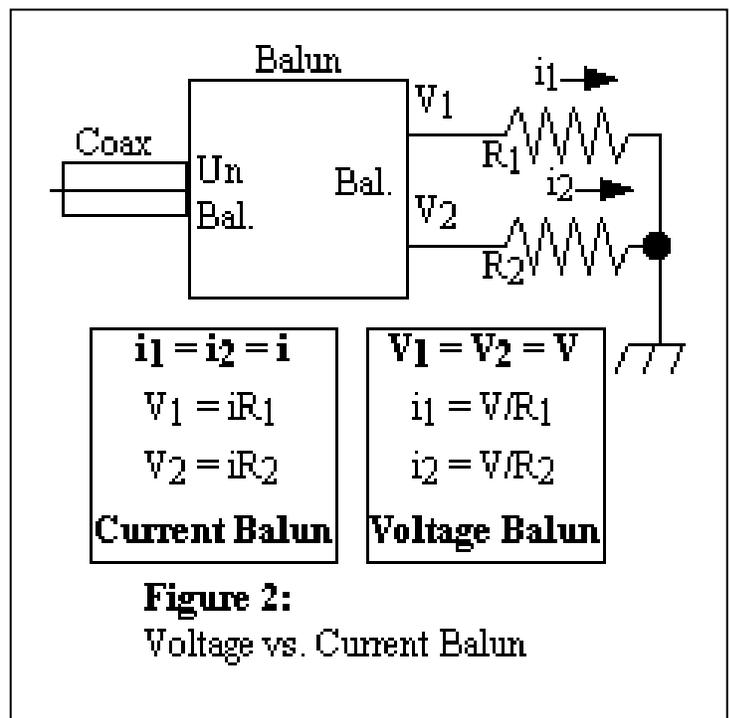
How serious of a problem is created using unbalanced line with a balance antenna varies significantly. I've used numerous dipoles fed directly with coaxial cable very successfully. A simple adjustment of the length of feedline will often reduce any problems that are encountered. However, it is a tradeoff, and while OK for temporary antennas,

a permanent installation should be designed to keep RF off the outside shield.

**Enter the Balun:**

A balun (short for *balanced/unbalanced*) is a device that allows connecting a balanced device and an unbalanced device. Since balanced and unbalanced feedlines tend to have different impedance ranges, baluns also allow matching different impedance ratios. 1:1, 4:1, 6:1, 9:1 ratios are common ratios. There are many different designs for baluns, but there are just two types: *current* baluns and *voltage* baluns. Figure two shows a balun fed with coax with the balanced side connected to two resistors each going to ground (these represent the legs of a balanced antenna.) If the two resistors are of different values, a current balun will send the same RF current ( $i$ ) through each resistor, and this current then determines the voltage across the resistor by Ohm's law. The voltage balun places the same RF voltage ( $V$ ) across each resistor and the voltage then determines the current flowing through the resistor by Ohm's law. If the resistors are the same value, then both baluns operate similarly. Since antennas are current devices, the current balun is generally considered superior.

-- See TechTalk cont'd on page 7 --



## OCARC General Meeting Notes

September 19, 2003

The regular Monthly Meeting of the Orange County Amateur Radio Club was held at the EOC in the City of Orange Police Dept. The meeting was called to order at 7PM by V.P. Steve KB1GZ

Steve introduced Sergeant Dan Cahill, Director of the City of Orange Homeland Security and Emergency Operations Program. Sgt. Cahill gave a brief discussion of the city's overall emergency response and operations in general and the (CERT) Community Emergency Response Program in particular.

Following Sgt. Cahill's presentation we were treated to a video of the City of Orange's new \$500,000.00 Mobile Command Center.

We then toured the facility: talking to the Watch Commander; visiting the Radio Dispatch Room and touring the Mobile Command Center.

This tour was organized with cooperation of the Orange Police Dept. and (COAR) City of Orange Amateur Radio organization. COAR holds a net each Monday Evening on 446.140(94.8 pl) Thank you to Steve KB1GZ and to those OCARC members who assisted in making this a very enjoyable meeting.

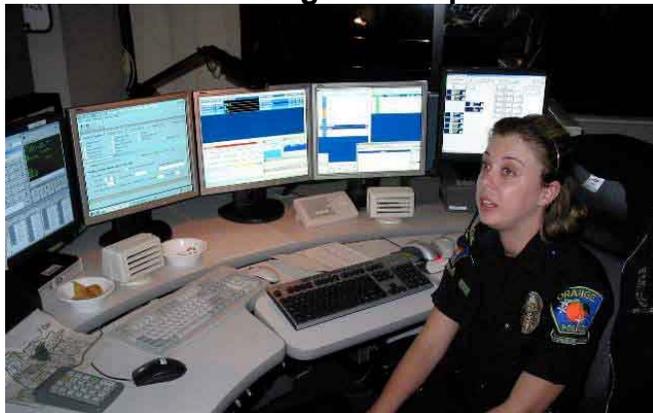
Because a quorum was not present, no formal business meeting was held.

It was announced that next months meeting is the Annual OCARC Auction being held Oct 17 at our regular meeting location-Red Cross Chapter.

Finally, Ken Konechy W6HHC presented to the OCARC a check for \$400.00 from the W6NGO Kei Yamachika Trust Fund. The check was presented to VP Steve Brody KB1GZ. Thank you for this donation.

Respectfully Submitted - David Mofford W7KTS - Sec.

### A Console in Orange PD Dispatch Center



## OCARC Board Meeting Minutes

October 4, 2003

The October Board Meeting of the OCARC was held on the 4th at the Cow-girls Cafe Too and was called to order at 8:30AM by Pres. Lowell KQ6JD. Roll call and not-present were Larry K6LDC, Cory AE6GW and Frank WA6VKZ. A quorum of board members was present. There were a total of 12 members and visitors at the breakfast.

### Reports:

VP: Nothing to report.

Sect: A thank you letter was sent to Mrs. Yamachika for her donation to the club.

Treas: \$1623 in savings and \$788.52 in checking;

Activities: Nothing to report.

Technical: Wants input for club projects.

### Old Business:

A Bylaws-Discussion was held. Motion by W7KTS to proceed with the vote on the 4 items amending the current bylaws as presented at the August meeting. This vote will be held at the November general meeting. Seconded by Bob KD6BWH. Passed 7-0 by a show of hand vote.

Motion by W7KTS and seconded by Steve KB1GZ to postpone the update of the bylaws until the 1st quarter of 2004 and allow the board to research the bylaws during the 4th quarter of 2003. Passed unanimously.

-- See **Board Minutes** cont'd on page 9 --

# OCARC AUCTION

## Sample of Equipment Committed for Auction

See OCARC Web Site for many more items @ [www.W6ZE.ORG](http://www.W6ZE.ORG)

**Seller 1:**

| Manufact'r    | Model     | Description  |
|---------------|-----------|--|
| Yaesu         | FT-960R   | All Mode 6 meter transceiver in Good Condition. Needs new mike connector.  |
| TE Sys        | 508G      | 50-54 mhz. Power Amp. Good Condition   |
| Astron        | RS-7A     | 13.8 VDC Power supply, 5A/7A Good Condition  |
| Shure         | 515SB-G18 | Low Z Microphone with chrome gooseneck. NEW in box.  |
| Radio Shack   | HTA-20    | 2 meter power amp. 1/2 - 1 W in 30 W out. Good condition.  |
| Heathkit      | MP-10     | DC to AC inverter kit. Complete. NEW (unbuilt) in the box.   |
| PrimeStar     |           | Satellite TV Receiver w/hand remote control.   |
| Amphenol      |           | Numerous "N" connectors, all new, all top grade.   |
| Unknown       |           | Mag mount with 1/4 wave 2 meter antenna.   |
| Hamstick type |           | Antenna, Mobile, 75 meters, in decent condition.<br>Antenna, Mobile, 40 meters, in decent condition.<br>Antenna, Mobile, 20 meters, in decent condition.<br>Antenna, Mobile, 15 meters, in decent condition.<br>Antenna, Mobile, 10 meters, in decent condition. |

**Seller 2:**

| Manufact'r | Model       | Description                    |
|------------|-------------|--------------------------------|
| Astron     | RS-12A      | 13.8 VDC Power Supply, 9A/12A  |
| Astron     | RS-35A      | 13.8 VDC Power Supply, 25A/35A |
| CDE        | Ham II/CD44 | Rotator Control Box            |
| Drake      | CS-7        | Coax Switch                    |
| Drake      | Theta-7000e | Communications Terminal        |
| Heathkit   | O-12        | Laboratory Oscilloscope        |
| Heathkit   | SB-620      | Scanalyzer                     |
| Heathkit   | SB-200      | HF RF Amplifier, 1 KW          |
| Heathkit   | SB-104      | HF Transceiver                 |
| Heathkit   | HP-1144     | Power Supply                   |
| Heathkit   | IP-2728     | Power Supply                   |
| Kenwood    | S-599       | Speaker                        |
| Kenwood    | R-599       | Receiver, HF                   |
| Kenwood    | T-599D      | Transmitter, HF                |
| Upper      | 1 3M10 70D  | Amplifier                      |



# the Annual W6ZE Ham Radio Auction

Presented by the Orange County Amateur Radio Club, W6ZE

Friday Eve. October 17, 2003

Auction begins at 7:00 PM

The auction will be held at the American Red Cross Building, 601 N. Golden Circle Drive in Santa Ana.

Sharp

**For complete details & some of what will be auctioned, or to list what you will bring to sell, see our website at [W6ZE.org](http://W6ZE.org) or phone Lowell 714-997-0999 or Larry 714-557-7217**



**You need not be a member to buy or sell.**

**Let's make it a good one. Turn your junk into someone else's treasure and into your cash.**

**Let your cash turn someone's junk into your treasure.**

## TechTalk -- cont'd from page 4

Numerous balun designs exist. The transformer type uses either air-core coils or, more popularly, ferrite-core coils. Air-core baluns are generally bulky, ferrite-core baluns are more compact, but are easily damaged if the ferrite core becomes saturated. Since they are transformers they can easily be designed for different impedance ratios. Another type of common balun is the choke balun. They work by creating an high impedance on the outside of the coax shield, thus preventing (or 'choking off') current flowing along the outside of the shield. The simplest choke balun is made by coiling eight to ten turns of the coaxial cable feedline near the antenna. This works well on the 20 - 10 meters bands and can be made to work across the HF band. The effect on the energy flowing within the coax is insignificant. Another type of choke balun is the 'bead balun' or W2DU balun. By placing ferrite beads over a length of coax, an effective 3.5 - 30 MHz choke can be constructed. Using another ferrite bead material, baluns that work in the VHF range are also possible. Since the

beads only see the energy along the outside shield of the cable, the chance of them saturating and being damaged is very slim.

While many baluns are broadband, a simple frequency dependent balun may be made using a piece of coaxial cable that is electrically one-half wavelength long at the frequency desired. Just bend the piece of coax into a "U" shape or loop and bring the ends together and against the ends of the feedline. Tie all the shields together and connect the inner conductor of the feedline to the inner conductor of one end of the piece of coax. Also tie this point to one leg of the antenna. Tie the other antenna leg to the inner conductor of the remaining end of the piece of coax. See Figure 3 on page 8. This type balun also steps up the impedance at a ratio of 1:4, making it ideal for feeding folded dipoles and other antennas that have 200Ω to 300Ω feed points.

-- See TechTalk cont'd on page 8 --

# ORANGE COUNTY AMATEUR RADIO CLUB

## ANNUAL ACTION Friday, OCT 17, 2003

### Auction rules

The OCARC Annual Auction will take place on Friday evening, October 17th, 2003, at 7:00 PM at the American Red Cross facility located at 601 N. Golden Circle Drive, Santa Ana (see map below). The room will open at 6:00 PM to allow registration, set-up and viewing. All buyers and sellers are welcome. The following rules for the auction will be in effect:

- 1) Only Ham Radio or electronic equipment/items will be auctioned (that is: no fishing equipment, etc)
- 2) Buyers and Sellers must register at the door with the OCARC treasurer. There is NO registration fee.
- 3) Only 3 items from a Sellers lot will be auctioned during each turn. After auction 3 items, the auctioneer will move on to the next lot. After the first 3 items from every lot have been offered for bidding, the auctioneer will start the second round of auctioning with the next 3 items in Lot #1.
- 4) Sellers should number each item in their lot. A tag should indicate the minimum bid they expect.
- 5) Auction bidding will take place as follows:
  - (a) \$0.00-to-\$5.00 bidding will take place in \$0.50 increments.
  - (b) Over-\$5.00-to-\$50.00 bidding will take place in \$1.00 increments.
  - (c) Over-\$50.00-to-\$100.00 bidding will take place in \$5.00 increments.
  - (d) Over-\$100.00 bidding will be in \$10.00 increments.
- 6) Payments for purchased items are due at the end of the auction and shall be by cash or check with the appropriate ID. No two-party checks or credit cards are allowed. Disbursements to the Sellers will be by OCARC check, only. Sellers will be charged 10% of the selling price for items sold by OCARC.
- 7) A special table will be set up for donated items. The proceeds of donated items will go to the OCARC.

#### TechTalk -- cont'd from page 7

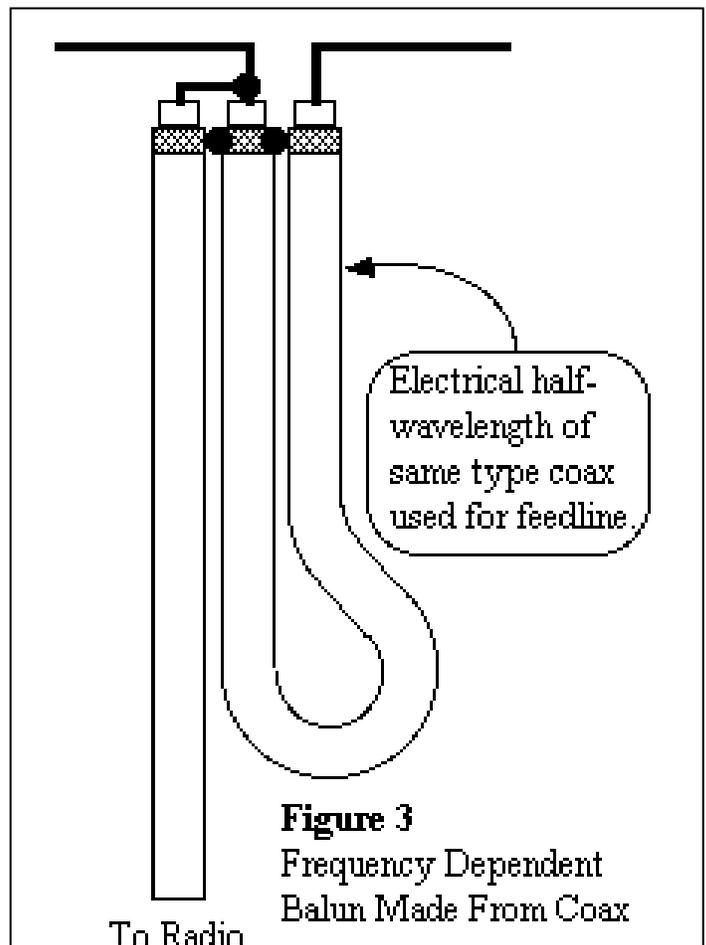
Since an electrical half-wave of coax can be quite long on the lower bands, this type of balun is more often used on higher frequencies. Choosing the coaxial cable with the lowest velocity factor will help keep the balun length short.

Next month we'll look talk more about the W2DU balun and also introduce the Noise Bridge; an interesting device for making antenna and feedline measurements.

de Bob, AF6C

I'd like to make a correction to last month's article. A typo appeared in Table 1. Reflection 5 shows a value of 0.977. That value should have been **0.0977**.

de Bob, AF6C



**Figure 3**  
Frequency Dependent  
Balun Made From Coax



Some of the operators of the weekly Orange County Wireless Net (OCWN on 40M CW) gathered at the ARRL Convention in Long Beach. Standing (L-R) are: John - WA6RND, Ian - K3IMW, Ann - KE6OIO, Jim - KA6G, Larry - K6VDP, Kathy - KS6CW, and Roy -K6GFG. Kneeling in front are: Rick - KF6UEB and Chris - W6KFW.

**Board Minutes** -- cont'd from page 5

**New Business:**

**Broadband Over PowerLines (BPL):**

A motion by Steve KB1GZ and seconded by Bob AF6C to send \$100.00 to ARRL for BPL account and ask each club member and visitor to give a donation at the next meeting to help increase the size of this donation. Motion passed.

Cindy Hughes KC6OPI asked the club for permission to use the club generator for a Savannah High School Band Event on Nov. 15, 2003 at Glover Stadium. This event is sponsored by the high school boosters. The board approved

her request for the use of the club generator.

**Good of the Club:**

A reminder that the annual OCARC Auction will be held Oct 17, 2003 at 7pm at the OC Red Cross (normal location). Set-up and inspection of auction items will begin at 6:00 PM, before the auction

The Meeting adjourned at 9:35 am

Respectfully Submitted

David Mofford W7KTS-Secretary

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**Missing!!!  
OSKER POWER/SWR  
Meter**

Please help find a missing Power/SWR meter. It is the OSKER Model SWR-200 shown in the picture, below. This Power / SWR meter was lent out to various club members over the past year and is now missing. It was reportedly last seen earlier this year in the Raffle Prize Container that the activities chairman normally brings to the meeting. It may have been lent to another club member at that meeting?

The meter was a gift from Kei, W6NGO, and has a lot of sentimental value. It is not sold in the United States. The metric (thread) UHF connectors on the meter have been replaced with US standard connectors.

If you are in possession of this SWR meter please email or call the Technical Chairman, Bob Eckweiler, AF6C [ [af6c@arrl.net](mailto:af6c@arrl.net) - (714) 639-5074 ] or bring it to the meeting.

Thanks in anticipation! - Bob, AF6C



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ORANGE COUNTY AMATEUR RADIO CLUB, INC  
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TUSTIN, CA 92781-3454

***First Class Mail***

***Time Dated Material.  
Please Expedite!!***