

# The PROPAGATOR

November, 2003

The Monthly Newsletter of South Orange Amateur Radio Association

Auction Time	SOARA Monthly Raffle	Information Received!
<p>Haven't used that equipment in a while? How long has it been? Maybe you should bring it to the SOARA auction and let it clutter up someone else's shack. Malcolm, KO6SY, will be here to run the auction. If Malcolm can't sell it . . . well, he can give it away (maybe)!</p> <p>The auctions are always fun and are a chance to turn some of that old equipment into money. Don't overlook the possibility that an item you have been wanting will show up. You may well discover some new item of equipment that arouses your curiosity. And, you can have it for just a few dollars — if that other ham would just give up and stop bidding the price up!</p> <p>It is a fun evening, be sure to show up. If you are bringing equipment to sell, show up early in order to have time to fill out the tags and set up. You will want to have time to browse through the other offerings before the activities start. <input type="checkbox"/></p>	<p>Congratulations to Dave "Cruiser" Seroski (KG6QCI) for winning the raffle for the Kenwood TH-F6A tri-band radio at the October meeting! SOARA hosts two raffles</p>  <p>during our monthly meetings (no raffles are held during auctions which are held twice a year). One raffle is for smaller items such as ham radio accessories, antennas, books, coax jumpers, etc. The cost is \$1 per ticket or \$5 for six tickets. There is also a \$5/ticket raffle for larger items such as hand-held and mobile transceivers which are raffled off every two to three months, once we've sold enough tickets to pay for them. The raffles are held at the end of the monthly meeting about 9 o'clock so make sure you stick around! A special raffle is being held during the holiday party in December. Members in good standing will be given a raffle ticket at the door for a chance to win a Yaesu FT-90R 2m/440 mini (in size, not performance!) mobile transceiver! Mark your calendars and make sure you've paid your dues and we'll see you at the holiday party!</p> <p>Brian, NJ6N <input type="checkbox"/></p>	<p>John Hoot, N6NHP, was the guest speaker at the October general meeting. His illustrated talk covered the history of information theory and the relevance to modern digital communications. Claude Shannon, the father of information theory, developed many of the basic ideas upon which modern digital computers are based. He derived the theory upon which modern digital communications rests.</p> <p>After reviewing some of the history, John illustrated the concepts of channel capacity and illustrated the effect of noise on such a channel. While the subject can be highly technical and mathematical, John explained the concepts with familiar examples. <input type="checkbox"/></p>
<p><b>SOARA</b> does not hold a general meeting in the month of December. The first meeting in 2004 will be held on Monday 26. Our speaker at that meeting will be Gordon West. This should be a great start for the new year. Gordon is always an interesting and entertaining speaker. Be sure to invite any hams or prospective hams. It will be a good time to show off our club.</p> <p>The membership rolls have been growing and the attendance at meetings has been very good. We have implemented EchoLink on one of the repeaters. It has been a good year for SOARA. Attend the annual holiday party on December 7 to hear a report on our achievements. As you can see to the right, there will be a great door prize.</p> <p style="text-align: center;"><b>Dragon Buffet</b> 24416 Muirlands Blvd., Lake Forest Start Time: 6 PM cost is \$12.00 — pay at the door. <input type="checkbox"/></p>	<p>Most of our current members have paid their dues for next year. If you have forgotten please get them paid. Check your mailing label; it indicates whether your dues have been received. It is possible that you have paid and the information did not get into the mailing label database in time. It is important that SOARA gets support from all the members. As you know, there are expenses associated with running the club and maintaining several repeaters. The more members that are supporting those expenses, the lower the cost per member.</p> <p>Do plan on attending the party on Dec. 7, but be sure your dues are paid before that date in order to be eligible for the drawing. <input type="checkbox"/></p>	<p style="text-align: center;"><b>Recruitment</b></p> <p>Remember there is a membership drive in progress. We know that there are hams in southern Orange County who are not active in any clubs. Many of them would derive more fun from the hobby if they feel a part of an active club. Let's find them and make them welcome. There is also the incentive of the prize. For each new member you bring in you will receive one chance at the drawing.</p> <p style="text-align: center;"><b>Dues</b></p>



## The Way I See It: Understanding Radio Theory Without Math.

How would you like to become famous? This may be your chance. I am going to tell you how to make it easier to adjust your antenna tuner. The normal antenna tuner has one (or no) meters to aid in tuning. It also has three knobs to adjust. Where do you start? Well there are suggested procedures, but what we generally do is make note of what worked on a particular band and refer to our notes after that.

Automatic antenna tuners, on the other hand, find the correct settings in a flash — how do they do it? Why can't we be as efficient? They clearly don't tune around trying to find the proper setting — they go right to it. How do they do that?

You may recall that in the July '03 issue we discussed how you can tune an antenna with two reactive elements (inductors & capacitors are "reactive" elements). That automatic tuner may well have only two elements to vary. Last month we discussed how an SWR meter works. The automatic tuner doesn't have any meters, but it does have corresponding signals to tell it what to do. The secret is it doesn't have just one, it has two. One for each element it has to tune. If your tuner had only two knobs and a meter over each knob to tell you which direction to turn it you would be a whiz also!

Any time my tuner is 'off tune' the SWR meter reading is high, but I have no idea which knob to turn or which way. Why have an SWR meter if there are more useful indications available? Well, a major reason is that we are accustomed to SWR meters. (Don't most rigs have SWR meters? Yes they also use the SWR signal to cut back the output power if the SWR gets too high — not caring about the nature of the mismatch causing the high reflected power.)

### Tuning Meters

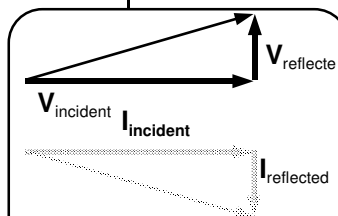
Let me warn you, in this brief article we are

not going to consider every possible case, only enough to illustrate the principles. If you want to design a real tuner, you will have to be much more thorough. We saw in the July issue that one reactance could transform the effective resistance (real part of the reactance) to the value we need ( $50\Omega$ ), and the second reactance could neutralize or cancel the reactive component remaining. With that in mind, lets consider our two knob tuner. One knob removes the reactance and the other knob adjusts the resistance value. (OK, they interact! Maybe you can devise a system where they are independent — then you would become really famous.)

We want a meter that tells us how close we are on the resistance value and another that tells us how much

reactance we have. The fancier antenna analyzer will have this capability. The MFJ 259B will give you exactly that readout. Of course it has a microprocessor inside to help it get the values. We would settle for a meter (zero center) that tells us in which direction we are off (above or below  $50\Omega$ , — is the reactance is inductive or capacitive). We also want an indication of how far off it is. Do I have to turn the knob a little or a lot.

Lets examine those meters. First is the resistance indicating meter. From last month, recall that the incident wave (from our transmitter) will have the voltage and current in phase. The reflected wave, because the power is traveling in the opposite direction, will have the voltage and current  $180^\circ$  out of phase. We obtained the SWR indication



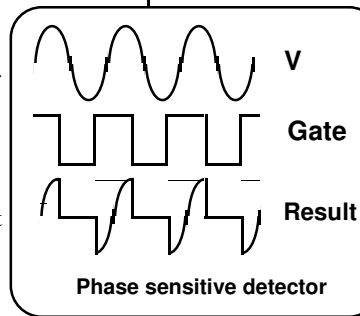
By rectifying the voltage and current signals before taking the difference we throw away the effects of the phase.

based on samples of both the voltage (incident + reflected) and current (incident + reflected). We change the current sample to a voltage by passing it through a  $50\Omega$  resistor.

Our SWR indication is obtained by subtracting the voltage sample from the current (now a voltage) sample and then rectifying them (remember they are at RF frequencies) to obtain the DC for the meter. For our "resistance" meter we will rectify the two

signals before taking their difference. We will get a null for two cases. If there is no reflected power (i.e. the ratio of voltage to current is  $50$  [volts / ampere = ohms], or if at the measuring point, the reflected voltage (and thus the current) are  $90^\circ$  out of phase with the incident signal. In other words we read  $50\Omega$  if that is the resistance value, whether or not there is a reactive component.

The second meter must give us an indication of the phase shift between the total voltage and the total current. (The totals are what are presented at the measuring point.) What we need is called a phase sensitive detector. They can be simple or complex. We won't go into details, but the general idea is seen in a simple example. Remember we have two



voltages (one derived from the current) and we want an indication of the phase difference. We start by shifting the phase of one voltage by  $90$  degrees. Next we arrange to gate one — we only let the one

through when the second is positive. This chops the first voltage into pieces with zero voltage between the pieces. If the original voltages were in phase then the pieces average out to zero — the positive excursions just cancel the negative excursions. Any change in their relative phases will result in a positive or a negative average value. This is read on the meter. Now we have a meter which reads zero when the waves are in phase (no reactance) and shifts to one side or the other depending on the direction of the phase shift (and thus, of the polarity of the reactance).

### The Knobs on the Tuner

You can buy antenna tuners with only two knobs, but you will find that they have a switch to rearrange the two reactors. Three knobs gives your manual tuner more flexibility. That third variable reactance must vary something! It does. Although you can obtain a match for a variety of settings there is a difference. The Q (how sharp the response is as the frequency is changed) will differ. But, you don't know which setting has a high Q! Off hand I can't think of a technique for putting a meter in the tuner that will tell you that. Maybe you can figure out how to do it. □

Year 2003	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.				
General Meeting 7:00 PM	27	24	17	<b>Party Time is Near</b>  The annual SOARA Holiday party for 2003 will be held at the Dragon Buffet in Lake Forest. We have reserved the banquet room for December 7th at 6 PM. The cost will be \$12 payable at the door. The Dragon Buffet provides a huge variety of food options including beef, fish, chicken, Chinese dishes, side dishes, and salads. Deserts and beverages are also included. Bring your family and friends - everyone is welcome. We plan on having some special entertainment this year and a fun time is guaranteed for all.  Place: <b>Dragon Buffet</b> Location: 24416 Muirlands Blvd., Lake Forest Start Time: 6 PM End Time: ? Phone #: 949-581-6648  Call in Frequencies: 147.645 and 145.240				18	15	20	17 Auction	No meeting				
Program	W6XD														Fall Auction	
VEC Testing 5:30 PM															17	—
Propagator Deadline	21													13	10	
Board Meeting															24	
ARRL Field Day																
SOARA picnic																
Fall Auction															17	
SOARA Holiday Party																7

**ON THE AIR**

**Operating Tips by John Walker, AC7GK**

I have been asked to follow up on last month's description of doing radios for the MS 150 Bike Tour with some words on ham radio emergency operations. You shouldn't get me started on this because it is where I have done most of my radio work over the years. I find it very rewarding and fulfilling, and it is a good way to serve the community behind the scenes, where the real satisfaction is.

Let me tell you a true story about this. When I lived in Utah, there was a large scout jamboree in East Canyon, a deep chasm in the Wasatch Mountains that rises suddenly and impressively on the east side of the cities that run along its fault line, including

Salt Lake City. In the evening, a scout climbed up on the closed bungee jump tower on a lark, and fell 40 feet, injuring himself seriously. The adults there quickly grabbed for their cell phones to call for help, but discovered that the canyon is a no-service area. There were hams there, however, who had just concluded a radio demonstration for the scouts, and they quickly called back down to their contacts on the valley floor. A helicopter was dispatched within minutes and the boy was saved. Cell phones are nice, but in a real emergency, only a radio can get through.

I'll discuss why this is so next month. □

➡ If you are not associated with an emergency radio group — RACES or ARES — consider getting active in this important aspect of Amateur Radio. For information

talk to Ray, AE6H, about the local cities groups, or call Gordon West, WB6NOA, who is the ARES District Emergency Coordinator for Orange County.



On Monday, Jan 26 (the first SOARA meeting of the new year) **Gordon West** will be the featured speaker. West will present a program on High Frequency (HF) mobile and portable operation during emergencies.

**LOTS OF LIVE EQUIPMENT AND HF ANTENNAS!** West will offer tips on how hams may better serve emergency agencies such as those in the recent wildfires. Gordo will bring selected door prizes also. You bring your best questions! □

**Classes**



The General Class License preparation course is in full swing. The sessions are being held at the Norman P. Murray center in Mission Viejo. They run from 7:00 PM to 9:00 PM on Thursday evenings. There is a charge which covers the cost of books and the upgrade testing fee. Anyone who wishes to audit the course is welcome at no charge. Classes started on Oct. 2 and end Dec. 11. No class on Nov.27. □

**SHERMAN'S LAGOON** By JIM TOOMEY



# The PROPAGATOR

South Orange Amateur Radio Association  
P.O. Box 2545  
Mission Viejo, CA 92690



## Meeting: November 17, 2003 at 7:00 PM Auction

☛ **SOARA** meets at the Mission Viejo Community Center, 26932 Veterans Way, Mission Viejo, the third Monday of every month at 7:00 PM. Changes to the meeting time or place are announced in this newsletter and on the two-meter repeater.

☛ **License Exams:** Amateur License Exams are given prior to SOARA meetings. Exams are from 5:00 to 7:00 PM. Walk-in applicants are welcome. For information call Paul Levey, NZ1M, at 949-249-0121.

☛ **Contacting SOARA:** Questions about SOARA? Send e-mail to: [info@soara.org](mailto:info@soara.org), or leave a message at 949-249-1373.

☛ **Web Site:** SOARA maintains a web site with current club information. The URL is: <http://www.soara.org>.

☛ **Repeaters:** The SOARA 2-meter, 70 cm and 224.100 MHz repeaters are open to all licensed hams.

SOARA 2m — 147.645 – (110.9) Laguna Beach

SOARA 2m — 146.025 + (110.9) San Clemente

SOARA 2m — 145.240 – (110.9) Trabuco

SOARA 220 — 224.100 – (110.9) Laguna Beach

SOARA 440 — 445.660 – (110.9) Laguna Beach

The SOARA 220 and HROC 440 repeaters are shared by members of both clubs. Each machine is subject to the operating rules of its respective club. Call KG6GI for details.

SOARA 220 — 224.640 – (123.0) Santiago Pk. (C)

HROC 440 — 447.180 – (131.8) Santiago Pk. (C)

☛ **Nets:** SOARA 2 m repeater open net is held Tuesday 8:00 PM  
40 meter HF net (7.268 MHz +/- for QRM), Sunday 7:30 AM.

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