

The PROPAGATOR

March, 2003

The Monthly Newsletter of South Orange Amateur Radio Association

Remote Base Systems

Pete Juul, W6PJ, will be featured at this month's meeting, March 17. Pete will speak on operating remote base systems. This topic will be of special interest to local hams with antenna restrictions.

Many users limited by antenna restrictions have had a taste of operating on HF frequencies that they might not have had otherwise. The Internet Remote Base developers, Stan Schretter, W4MQ, Keith Lamonica, W7DXX, and Bob Arnold, N2JEU were awarded the ARRL Technical Innovation Award for 2002 for their work in this field. This presentation will describe the capabilities of the Remote Base stations, how to operate the stations, and how hams from all over the world are using these stations to increase their enjoyment of the ham radio hobby.

For a preview of the topic you may refer to the November, 2001 and November, 2002 issues of QST. The article starting on page 47 of the 2001 issue is a good introduction to remote operation via the Internet. The second article (page 39, Nov., 2002) gives more details on setting up a remote base station and its operation over the Internet.

Pete Juul, W6PJ was first licensed in 1956 as KN6UBH. He upgraded to Extra in 1977 as N6JE. His primary operating interests are chasing DX and contest operation on CW. Interest in the ham radio hobby led him to a career as an electronic design engineer. He currently designs receivers for test equipment applications. □

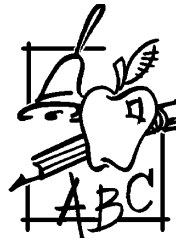
New Members

A hearty welcome to SOARA's newest member:

Steve Leander KG6OYK

Club Activities

SOARA's FCC Technician Class license course started on March 6 with 14 enthusiastic students. The classes will run for ten weeks, including the "final exam" — the FCC test. It will be administered at the final class meeting on May 8. Teaching assignments for some of the classes are still available. If you are interested in participating in the teaching team call or e-mail Chad, KQ6TL.



Summer may seem a long way off, but it will be here very shortly. Field Day preparations will be starting soon, and there will be more than enough opportunities for everyone to get involved. In 2001 SOARA won the OCCARO Field Day award. We didn't win it in 2002. With some effort we could win it back this year. Do keep the weekend of June 21/22 free for Field Day.

A few weeks later the Orange County Fair starts, and there will be opportunities to work in the Amateur Radio booth at the fair. The dates are from July 11 to August 3, but assignments for working the booth are made well ahead of those dates. You will be hearing more, and if you are available, it is a fun assignment.



SOARA will schedule a Spring Clean-up day at one or more repeater sites. Stay tuned for dates and times. There are many opportunities to get involved in SOARA activities, and SOARA needs your help.

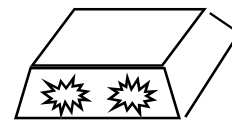
Finally, there is the Southwestern Division Amateur Radio Convention held between September 5 and 7. SOARA has had booths at the conventions in the past and there are plans in the works to have a booth this year. This is another opportunity for volunteering. □

Another Great Program

It was a rainy evening, and our speaker, Kevin Karamanos, WD6DIH, pointed out that the last few times he had made presentations at SOARA it had been raining. When Kevin got into his program everyone forgot about the weather. Kevin, who worked for Yaesu as Director of Sales and Marketing until a few years ago, has kept up with developments in radio equipment. He brought some of the latest rigs for people to see and touch. Of great interest were his insights into what technical developments were in view as well as what was happening with the pricing of radios.

One of his handouts listed some current prices of equipment at HRO. There are some great buys in HTs, mobiles, and base rigs. He explained that sales are down in most parts of the world, and that the companies are looking to the US a good market right now.

Kevin's interests, in addition to amateur radio, include safety equipment. He represents several manufacturers of such equipment to local agencies. Recognizing the need for some new safety products, he developed them himself. The item which generated the most interest at the club meeting was the LITE FLARE, a non polluting substitute for chemical flares. This device is based on some very bright LEDs and common replaceable batteries.



Kevin donated several of the LITE FLAREs for the raffle, and they proved quite popular. Brian

Roode, NJ6N, who is currently in charge of the raffle, states that Kevin donated enough that they will show up among the items at this month's raffle.

SOARA wishes to extend a heartfelt "thank you" to Kevin for a delightful and enlightening presentation. We certainly look forward to his return in the future. Maybe the next time it rains? □



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

In this column we have neglected just about everything digital. That is a bit hard to justify. All modern rigs — from HTs up — use digital microprocessors for their control functions. (How strange it would have seemed fifty years ago to imagine a rig with a removable front panel!)

The hot rigs today all have Digital Signal Processing (DSP) built in. Usually it is used at audio frequencies, but some rigs brag about IF DSP. It won't be long before we will see Software Defined Radios on the dealers shelves. Digital audio modes can't be far away. So lets look at some of the basics of converting analog signals to digital signals.

An analog voltage may change value smoothly in time, taking on an unlimited number of values in a short time. True it might be difficult for us to differentiate between consecutive values, but we certainly picture them as a continuous and smooth change. We could build a circuit (an analog to digital converter or ADC) which would convert continuously. First, it would be very expensive, and second, digital processors handle digital data (numbers) in steps and not continuously.

We can sample the analog signal using a "sample and hold" circuit to give the ADC time to make the conversion. However we do the conversion, we will sample at a uniform rate. That rate must be high enough to adequately represent the analog signal.

Consider a sine wave (pure tone or single frequency) as shown in figure 1. It is being sampled at a rate of twice its frequency, i.e. twice per cycle. This is called the Nyquist frequency for that wave. Everything looks good. We can surely tell what the signal was like from the digital data. If you connect the dots you get a triangle wave of the same frequency as the original wave. What if the sample times are shifted by 1/4 of a cycle? All

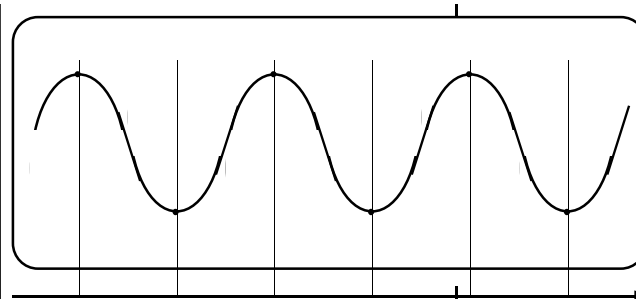


Fig. 1 Sampling a sine wave at the Nyquist

of the points would lie on a line — DC! We need to sample at higher than the Nyquist frequency, as in figure 2.

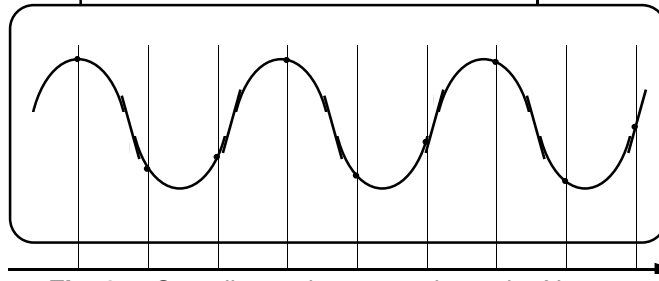


Fig. 2 Sampling a sine wave above the Nyquist

What if we sample at a slower rate. Figure 3 illustrates that case, and if you connect the dots it will appear that they represent a lower frequency than the original signal. This is called aliasing — the signal is pretending to be a signal of different frequency.

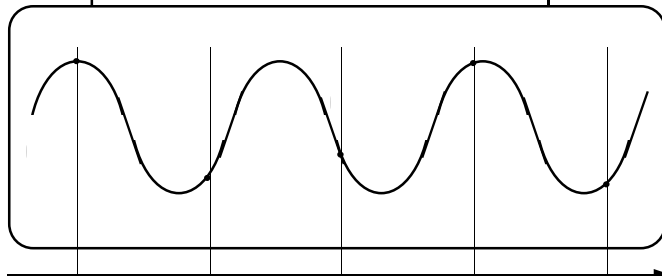


Fig. 3 Sampling a sine wave below the Nyquist

A real signal will be composed of a range of frequencies, and we must ensure that there are no frequency components greater than one half the sampling frequency (the Nyquist frequency). An analog filter to limit the input bandpass or a much higher sampling frequency must be used. It is not possible to distinguish an aliased signal from a real signal once it is digitized.

Lets look at another aspect of this digitizing process. If you have a multi-meter (VOM) it is most likely a digital one. You can read it

to a higher precision than an analog meter — but it still has some uncertainty. What would a meter with more digits read? Surely it would read a value slightly different.

Consider a voltage which is changing at a constant rate as indicated by the sloping line in figure 4. The fine vertical lines represent the sampling intervals. The fine horizontal lines represent the possible output (digital) levels of the ADC. At each sampling interval the value of the analog signal differs by some small amount from the nearest corresponding digital value.

The resulting random errors represent an added noise on the signal. This noise is called the quantization noise and is a function of the number of bits, or the resolution, of the ADC. We can not avoid quantization noise. Every signal has some noise associated with it. The real question is how much is the signal to noise ratio degraded by quantization noise.

The number of bits used for digital audio will vary depending on the application. A system designed for high quality music must have a wide dynamic range and low noise. It will have considerably more bits than a system for voice. The number of discrete levels doubles for each additional bit.

Digital may be the wave of the future (was that a pun?) but it brings its own set of problems and constraints. We will be looking at additional considerations in future columns. Stay tuned. □

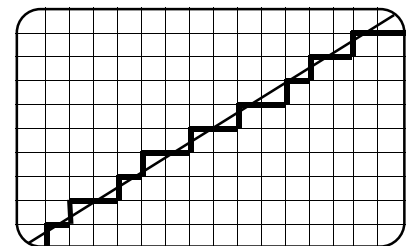


Fig. 4 Quantization error

Year 2003	Jan.	Feb.	Mar.	Apr.	May	Jun.	Jul.	Aug.	Sept.	Oct.	Nov.	Dec.
General Meeting 7:00 PM	27	24	17	21	19	16	21	18	15	20	17 Auction	No meeting
Program	W6XD	WD6DI H	W6PJ									
VEC Testing 5:30 PM	27	24	17	21	19	16	21	18	15	20	17	—
Propagator Deadline	21	17	10	14	12	9	14	11	8	13	10	
Board Meeting	2/3	3/3	24	28	26	23	28	25	22	27	24	
ARRL Field Day						21/22						
SOARA picnic								2				
Fall Auction											17	
SOARA Holiday Party												7

ON THE AIR

Operating Tips by John Walker,

Some time ago, I heard a disheartening QSO. A ham came on a frequency and announced himself as monitoring, a common way of inviting a conversation. Two others answered him and he said: "Well, I hear two stations" and then he called one of them and the two went into a lengthy back-and-forth conversation, leaving the other station high and dry and embarrassed by being totally ignored. It probably was not done intentionally, but once such a station leaves the frequency in a state of rejection, it is hard to repair the damage.

In such a case, or whenever there are multiple stations in a conversation, the best thing to do is to form a round-robin. Each station takes his or her turn, and then passes it to the next in line until all have been heard from and it starts again. When a new person breaks in, the next person to talk promptly turns it over to the new station for input, telling the newcomer that they will follow so-and-so in the order and to turn it back to the relinquishing station when their opening comments have been made, and thus the newcomer has an instant place in the circle and everything stays in order, with no one left out. This is not only a courteous way to hold radio conversations, but allows all of us to get to know and appreciate people outside our own close circle of radio friends.

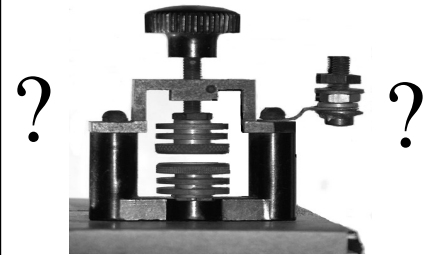
Next time, I'll give some tips on how we can carry on a personal conversation within such a group framework. Have fun conversing on the airwaves; that is what radio is all about. □

Welcome to John, AC7GK, who will share tips on good operating practice. Look for future "tips" from John's experience.

John was licensed as a ham in 1995 after being state head of a good quality upper-sideband CB club. He has long been involved in emergency communications, and was a pager-carrying leader in the Utah ARES, which was a powerful group headquartered in the state capital and spreading throughout the state.

After moving to California he Joined SOARA and the Hospital Disaster Support Communications System, the unique group serving hospitals throughout Orange County in the event of a power outage or mass casualty incident. He also enjoys doing field communications for public service events for SOARA.

What is it?



Thanks to Sten Gould, WA2MRO, for the photo of this genuine SPARK GAP — yes, it is the spark gap used with the early spark gap transmitters.

The gap distance is adjusted by the knob at the top. The electrical connection to the upper electrode is seen in the upper right of the picture. Note the cooling fins on the two electrodes. □



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



Meeting: March 17, 2003 at 7:00 PM Pete Juul, W6PJ: Remote Base Systems

- ☛ **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 5:30 to 7:30 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, 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 and 70 cm repeaters are open to all licensed hams.
 - SOARA 2m — 147.645 - (110.9)
 - SOARA 2m — 146.025 + (110.9) (BCWS)
 - SOARA 2m — 145.240 - (110.9)
 - SOARA 440 — 445.660 - (110.9)
- 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 — 224.100 - (110.9)
 - SOARA 220 — 224.640 - (123.0)
 - HROC 440 — 447.180 - (131.8)
- ☛ **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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