The Prez Sez:
by Cory KE6WIU

QST, QST, QST,

Remember to keep your calendars open for ARRL Field Day in June. Field Day is always the fourth full weekend in June, which this year is the 22nd and 23rd. Since June first is a Saturday, this is one of those rare years where FD occurs the very next day after the OCARC meeting

The board, discussed F.D. at the last board meeting and thought it would be nice to get the club's score back up to where it once was, and should be. With upwards of 70 members we should be able to do this, so keep us (the club) in mind when we need OP's. For those of you who are new to Field Day, it's a real blast and challenge. We basically operate 24 hours straight in all kinds of modes in the name of fun and emergency preparedness. You can check out past F.D.'s in our picture gallery on the WEB site.

See you all at the meeting and 73's--Cory

The 2002 ARRL Southwestern Division Convention

The 2002 ARRL SW Division Convention will be coming this summer to the California Center for the Performing Arts in Escondido, California on August 16 - 18, 2002

Featured speakers will include **Jim Haynie, W5JBP,** who is President of ARRL and also **Riley Hollingsworth, K4ZDH,** head of the FCC Enforcement Bureau - Special Counsel for Amateur Radio.

See the special convention WEB SITE at

http://sd2002.hamcon.net/

for more details.

The OCARC WEB site also has a link.

March PROGRAM IS

The guest program speaker will be John De Boer - KD6ZKC. John will provide a presentation entitled:

"Solar Power Designs and Equipment"

He will be showing us from... "how to power our H.T.s", all the way to.... "how to use solar power for your home". Don't miss it. All members and visitors are welcome.

The next regular meeting will be:

Friday, March 15th 2002 @ 7:30 PM

We will be meeting in **Room 232** in the east **Red Cross** Bldg.

Monthly Events:

General Meeting:
Third Friday of the month
at 7:30 PM
American Red Cross
(near Tustin Ave & 4th St)
Santa Ana, 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):
Wednesday Evenings

28.375± MHz SSB
7:30 PM - 8:30 PM
Bob AF6C, Net Control

146.55 MHz Simplex FM
8:30 PM - 9:30 PM
Bob, WB6IXN, Net Control

VISIT OUR WEB SITE

http://www.w6ze.org

for up-to-the-minute club infor-
mation, 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.

(This is the second part of a Tech Talk series to explore Digital Communications)

In January, I started the exploration of the world of Digital Communications by outlining several topics of technology involved with digital communications and also by describing three approaches to Multiple Access Techniques including:
(a) **FDMA** (Freq Division - Multiple Access)
(b) **TDMA** (Time Division - Multiple Access),
(c) **CDMA** (Code Division - Multiple Access)

In January, I said that step number one in Digital communications is to convert your analog microphone output into a digital stream. So this month we will explore the principles involved with converting your analog voice into digital signals (a stream of 1's and 0's). This process is analog-to-digital conversion and sometimes called ADC or A/D Conversion. The modulation scheme we will use is called PCM or Pulse Code Modulation.

Pulse Code Modulation uses the concept of "sample and hold". If an analog signal is sampled several times per cycle, then you can obtain a digital conversion of the analog signal.

Let's look at some examples:

Figure 1 - An Analog Signal

Figure 1 shows a portion of an analog signal that could be coming from your microphone. It shows Voltage over a period of Time.
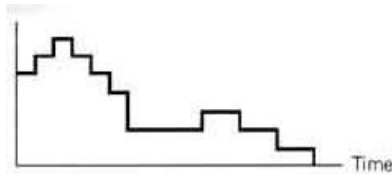

Fig 2 - Using "Sample and Hold"

Figure 2 shows what would happen if you sampled the signal (and "held" the voltage) 14 or 15 times during that period. This figure shows that each time that the signal is "sampled", the voltage is held at that "level" until the signal is "sampled again".

The next concept to be presented is that each voltage level that was sampled can be converted to a digital representation. Figures 3

and 4 help us visualize this concept of converting analog voltages into digital values.
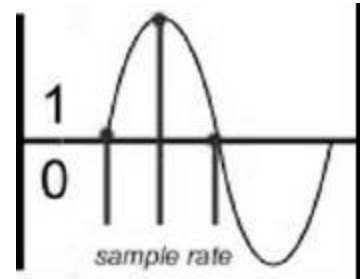
Fig 3 - Sample with only two thresholds.

In Figure 3, there are only two values to represent the voltage. If the sampled voltage is positive then that voltage is given a "1". If the voltage is negative, then that voltage is given a "0". Using only one bit (with a value of a "0" or a "1") is not very accurate, but we have now converted a voltage to digital 0's and 1's.

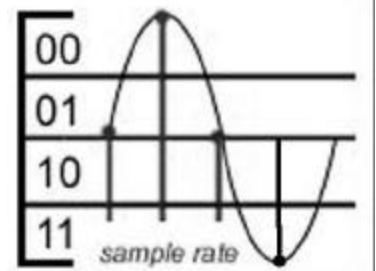**Fig 4 - Sample with four Thresholds**

In Fig 4 there are now four values (2 bits) to represent the sampled voltage; 00, 01, 10, and 11. In Fig 4, the first sampled voltage can be represented by the value **01**.

The voltage for the second sample in Fig 4 (at the plus peak) can be represented by **00**. The voltage for the third sample can be represented by **10**. The fourth sample (at the negative peak) can be represented by **11**, etc. Since the sampling occurs as a function of time, these four sampled values can be shown as a sequence of values:

01 00 10 11

Because computers can know where each two-bit number begins and ends, I don't need to put spaces between the values. So it really looks like:

01001011

We now have a "stream of 1's and 0's" that represent an analog voltage.

As it turns out, 2 bits still provides only a very crude representation of an analog voltage. Errors can be as high as ~24%. So in the real world of digital communications, 8 bits are used for voice A/D Conversion. An 8-bit conversion scheme allows the voltage sampling to have 256 voltage threshold values and greatly improves the accuracy problems.

But there is another source of inaccuracy. If the analog signal voltage is small (a weak signal) compared to the settings on the sampling thresholds, then the accuracy can be reduced. Figure 5 helps to visualize this accuracy problem.
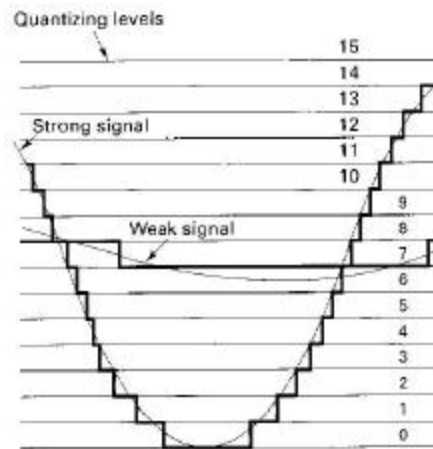

Figure 5 - Comparison of Weak signal and Strong signal accuracy.

Figure 5 uses an example of 4-bit quantization to provide 16 different sampling thresholds. For the STRONG signal the inaccuracy is around 6% (one part in 16). But the WEAK signal is only moving through about 4 threshold ranges, so its inaccuracy is poor at ~24%.

In order to correct for this poor accuracy of weak signals, two additional concepts are used with our A/D Conversion. First, a non-linear compression is used. This is very much like a **speech compressor** on a low band rig. Second, the sampling thresholds are made more "fine" at small voltages.

The combination of these two techniques greatly help to improve Weak signal PCM accuracy to be nearly as good as Strong signal accuracy.

The last concept to understand is the effect of the sampling rate. That is: "How fast do you have to sample an analog voltage in order to be accurate?" Figure 6 shows what happens if you sample only once per cycle.
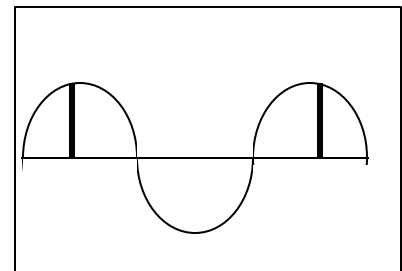
Fig 6 - Sampling only once per Cycle.

If you sample a small amount of times per cycle (in this example, only once per cycle), you can get a very distorted picture of the analog voltage. Every sample in this example is while the voltage is very high. It can appear that we have a DC signal that is not AC.

In Fig 7, the sampling rate has been increased to 4 samples per cycle. This fast sampling rate allows a more accurate interpretation of the analog signal

Tech Talk #15 Cont'd from Pg4
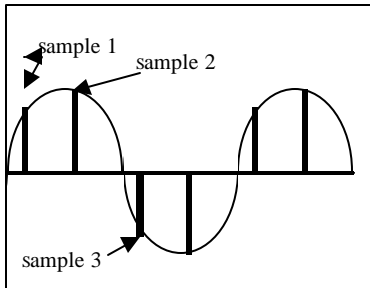
that is being sampled.

Fig 7 - Sampling Four Times per Cycle.

The Nyquist Theory states that in order to obtain good sampling, "the sampling rate per second should be 2x the bandwidth of the signal". So with the normally acceptable voice audio bandwidth being about 3.5 KHz, the common sampling rate in cell phones is 8K samples/sec.

Well, this leads to the next problem.

Analog Voice Bandwidth = 4 KHz
Sampling Rate = 8000 samples/sec
Number of bits/sample = 8

Digital Data Rate = 64,000 bits/sec

Whoa! We took a 3.5 KHz voice audio stream and turned it into a 64,000 bit/sec digital stream. Since the rule-of-thumb is that one bit-per-sec is approximately equal to 1 Hz, this digital stream is about 64 KHz of bandwidth. **That is a 16x hit in bandwidth!!!! This is NOT good!!!!**

How can we get out of being a digital bandwidth hog?

Well, a lot of very clever engineers were able to invent a way to compress the digital bandwidth needed for human voice. This compression technique is called "VOCODER".

The next **Tech talk** Digital Communications series article will explore this new vocoder technology.

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Next **RF** Deadline: Apr 6th

The meeting was called to order at 7:30 pm. All officers were present except Phil N7PA and Larry K6LDC. Attendance was 26 members and visitors.

Speaker: The guest speaker was John Spencer - K7KF (see picture below). John, who has been a ham for 45 years, described the design, construction, and operation of a dream antenna farm (AB0I) he owned in Kansas. Here is a "flavor" of the ingredients needed for a world class antenna farm:

- Many towers, ranging from 180 ft to 80 ft.
- A 4-ele 40M beam on 100 ft boom

Guest speaker John -K7KF presenting slide show on
"Contesting with a Large Antenna Farm"

FEB MTG MINUTES
- Continued from pg 5 -

- 7-ele 10M beam - 45 foot boom
- 7-ele 15M beam - 68 foot boom
- 7-ele 20M beam - 90 foot boom

The minutes of the February board meeting were accepted as published, motion made by Frank WA6VKZ and seconded by Bob AF6C.

VP: Speaker for March will be John De Bore on Solar Power, Engineer and Ham

Secretary: A few communications, including one returned printed RF newsletter due to failed forwarding, and a new WorldRadio.

Treasurer: Our club gets rebates for new ARRL memberships, but not renewals, if anyone in the club has not joined, please do so through OCARC.

Membership: 71 members on roster, including Fred KF6JJ, a new member.

Activities: Bud WA6VPP is standing in for activities officer who is absent.

Cory made announcement about changed raffle procedure, no special drawing for grand prize anymore, it is simply "first drawn, first choice".
This was voted on at the February board meeting, and this vote is in the minutes of that meeting, available in the RF newsletter.

Publicity and **Technical:** no report

Members-At-Large:
OCCARO meeting- HamCon 2003 discussed, Buena Park is a possible site. ARRL affiliated clubs website updated: OCARC is an ARRL Special Service club, and our affiliation has been renewed for 2002. Also, the Field Day Awards should be back in gear this year for OCCARO clubs.

Old Business:
-Baker-to-Vegas- race discussion limited to 5-10 minutes during general meetings, for more info contact Bob KD6BWH.

-Kamp-Anza- Frank WA6VKZ has gotten 3 responses so far. Photos of the RV park were passed around.

-Club polo shirts- info is on our website, under Items Of Interest.

New Business:
No new business

Good of the Club:
-2002 ARRL HamCon in Escondido in August, info on our website

-Night cap at El Ranchito after the meeting

The meeting was adjourned at 9:34 PM.

Respectfully submitted
                            - Matt K6LNX

BAKER-to-VEGAS Communications Exercise

After a couple of years off, the City of Orange Police Department is going to be in the **B-2-V Relay Race** again this year.

The race will have about 250 different police department entries this year. Each entry will have a team of 20 runners plus four or five backups. Each team needs a follow vehicle to follow their runner and shuttle vans to transport the runners to and from the twenty exchange points along the 120 mile coarse. The support people for the event is about equal to the number of runners. Each entry needs communication to keep track of their runners, support vehicles, and drivers.

This is where you come in.

The Orange and Garden Grove teams need hams to provide the communication for their teams.

If you can help or if you have any questions, please contact:

Elmer Thomas, WA6PFA
wa6pfa@aol.com
(714) 771-2917

The March board meeting was called to order at 8:30am, with all officers present except Phil N7PA and Frank WA6VKZ, and a total of 18 people in attendance.

VP: March speaker is set for John De Boer, KD6ZKC speaking on Solar Power. April's speaker will be Bill Phinizy - K6WHP on QRP and May's speaker will be Dennis-WA6NIA and Fred- KQ6Q talking about PSK31. Also for March Art Goddard, W6XD will give a short presentation about the upcoming Escondido Ham Convention. Art will also do a full presentation in November, most likely on his DX trip to Paulu in the Pacific.

Secretary: A renewal notice was received for WorldRadio listing and our (8 each) 1-year subscription cards to be raffled by the club.

Treasurer: Full balance sheet to be given at the next General Mtg.

Membership: 71 members on roster, with 7 renewals.

Old Business:
Kamp Anza is set for next weekend, and a few members are going to enjoy a nice relaxing campout "Not-so-Dxpedition".

Baker to Vegas: City of Orange needs operators. They will be having a meeting Wednesday evening at 7pm at the Orange PD facility, Bob KD6BWH will look into this as he is our Baker to Vegas committee chairman.

New Business:
Field Day: committee chairman will be Larry K6VDP. Assisting Frank WA6VKZ with publicity for Field Day will be Cindy KC6OPI and Secretary Matt K6LNX. Cindy will use her Red Cross connections to get us some good publicity, and she said that the Red Cross may want to donate a few operators for Field Day.

Ken has sent a letter to the city of Santa Ana to request Portola Park, which we used last year. We will be making general info flyers to hand out during Field, and we will also be making some sign(s) to put out near the street to attract attention.

Members at Large: No report.

Respectfully submitted:
- Matt K6LNX

WHOis - the Club Secretary?
by
Ken W6HHC

(This is the third in a series of articles to inform you about the background of the officers and leaders of the OCARC.)

The new Secretary for OCARC this year is Matt McKenzie - K6LNX. Matt received his first HAM ticket in June 2000 as KG6BZQ. He has been a member of the OCARC since 2000.

Matt's QTH is Costa Mesa. Matt currently only has a "portable" station at his home QTH. He has two Hand-Held rigs: a RadioShack HTX202 for 2M and an Alinco DJ-280 for 220 MHz.

His favorite "shack" is mobile in his Thunderbird where he usually operates his ADI Model AR147+ on 2M using an MFJ 5/8 magnetic mounted antenna. (See the picture of Matt mobile on this page.)

Matt's favorite HAM activities include OCARC Field Day and ragchewing with friends and acquaintances. He also has his own little HAM related website, hosted by QSL.net:

http://www.qsl.net/k6lnx

Matt is a third-generation Californian. He is currently taking classes in computers and electronics at Orange Coast College. He is also looking for a position in the computer industry.

His favorite non-HAM activities include:
LINUX - he loves playing with computers and belongs to the local Orange County LINUX Users Group - www.oclug.org
.
MUSIC - He plays the french horn and trumpet and belongs to three bands -
1. Santa Ana Winds Youth Band
2. Orange Coast Wind Ensemble
3. Band X

Matt's current HAM goals by June are to upgrade to a General class license and to obtain a used 10M rig in order to get on the low bands.

Matt McKenzie K6LNX in his "Mobile Shack". 2M in the right hand and 220 in the left hand

Orange County Wireless Net (OCWN) is Forming

Just passed your 5-wpm Morse test and would like to put your hard-won skills to use? Have a Morse key or paddle that is accumulating dust and could use some exercise?

Then maybe the Orange County Wireless Net is for you. Its purpose is to let people improve their CW operating skills in a relaxed setting. We will emphasize courtesy and tolerance to encourage potential CW users to join in this enjoyable and historic aspect of Ham radio. We will use frequencies that are accessible to Tech+ license holders, and slow CW speeds (5-12wpm, 18wpm Farnsworth). The net is conversational only; no traffic will be handled.

Proposed OCWN:

Schedule:
Weekly, Thursday evenings at 7:30pm (03:30z).
Primary frequency:
28.110MHz (10 meters).

We are currently working out what are the best frequencies and times for this activity. Your feedback would be very welcome.

To contact OCWN:

Rick Clifford, KF6UEB,
rick.clifford@eds.com
Jill Wilson, K3JIL,
ilovechocolate@earthlink.net

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