



# RF



## ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLIII NO. 9

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

Sept. 2002

### The Prez Sez:

by Cory - AE6GW

Hello out there in RF Land! Just a few things to touch on. First, next month is the Club Auction (instead of a normal General Meeting in October), so everyone clean out your shacks and closets and bring that useless stuff to the meeting so it can have another go-round at being useful stuff instead of a dust magnet!

Second, we have a camp-out scheduled for sometime in October, I'm sure there are details in the RF and at the next meeting.

Lastly, November is Election month, not only for the Country but for the Club as well. I encourage everyone to think about running for an Office, especially if you've never held one before. I've only been a HAM for 7 years, in the Club for 5 of the 7 and on the Board 4 of the 5. What I'm trying to say is it's not difficult, doesn't take up much time, and anyone can do it. So, please consider running for an Office, It's really a lot of fun.

See you all at the meeting and 73's--**Cory-AE6GW**

Where do you get odds that are roughly **ONE HUNDRED THOUSAND** times better than the **LOTTO**?

At the OCARC Special Raffle!! If the LOTTO is at \$29,000,000. Your odds are less than one in 29,000,000 to win. BUT...at OCARC with our special raffle your odds are 1 in 285!!!! Although the amount is lower, the odds are Soooooooo much higher.

Won't you consider supporting our Club? The sooner we get to \$288 the sooner you will get to see if you are the winner of the \$250 gift certificate at HRO. See Phil-N7PA at the general meetings and breakfast meetings.

### **New HAM Education and Test Training on WEB**

A new HAM company, HamTestOnline has a Computer-Based Training (CBT) Website that can help you study and learn the material on the U.S. Amateur Radio written license exams. They explain that HamTestOnline acts as your **personal tutor**. It keeps track in its database of which questions you have already learned, and which questions you have missed in the past. In addition, it knows which questions *other people* miss most often.

Cost is \$19.95 for two years, including access to all three license classes.

[www.hamtestonline.com](http://www.hamtestonline.com)

### **September PROGRAM:**

The September speaker will be Ken Konechy - W6HHC. Ken will provide a presentation entitled:

### **"...the Fundamentals of Digital Communications"**

Get an introduction to Voice Coding, achieving frequency sharing by using orthogonal coding, QPSK modulation, and more....

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

The next regular meeting will be:

**Friday, Sept 20th**  
**@ 7:30 PM**

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

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AMATEUR RADIO CLUB,  
INC.**

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**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 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.

## Tech Talk #21

### Receiver Detection for Digital Communications

by Ken Konechy - W6HHC

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

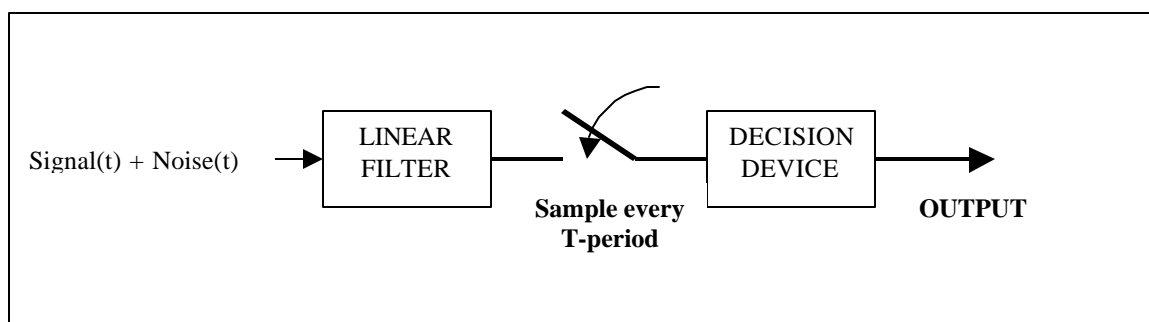
In our August discussion of Digital Communications, we covered many aspects of digital modulation; including: Amplitude modulation, Frequency Shift modulation, and Phase Shift modulation. This month I will provide an overview of the technologies involved with receiver detection to demodulate the RF signals back into a digital data stream. Finally, I will discuss converting output data stream of 1's and 0's back into sound.

#### RECEIVER DETECTION

One demodulation concept involves correlation receiver concepts. Correlation demodulation uses a set of matched filters to determine which bit value the sampled signal contains.

A second demodulation concept involves coherent and non-coherent communications. Coherent communications means that the phase and frequency reference is provided to the receiver. Non-coherent communications means that there is no phase reference provided by the transmitter and the receiver has to estimate it (probably using a Phase-Lock-Loop, PLL). For example of coherent communications: most modern digital cell phone technologies provide a "pilot" signal (on the air) to give a reference to the receivers.

Figure 1 below shows the basic block diagram of a demodulator for a digital communications receiver. Basically the signal (along with noise) usually goes into a filter and a sampling switch is thrown every period, (T), to look for the value of that bit in the data stream. Then the Decision circuitry determines if the information is a ONE bit or a ZERO bit. It then waits (T period) for the next bit in the signal stream and repeats the decision making to provide an output stream of 1s and 0s.



**Figure 1 - Basic Block Diagram for Receiver's Digital Demodulator**

#### CORRELATION DEMODULATION

Correlation detection (or demodulation) uses a set of matched filters to determine which bit value is received during each bit-period. We have previously learned that one method to modulate for digital communications is to change frequency (Frequency Shift Keying or FSK). If you use two different frequencies, it is called BINARY. Make it higher for a data bit value of ONE and lower for a ZERO. The receiver just needs to determine which of

--see **TechTalk** cont'd on page 4--

the two frequencies is present....and pass on either a decoded ONE or a decoded ZERO. In Figure 2, there are two matched filters for detecting BFSK signals: the top one is set to look for the presence of Freq 1, and the bottom filter set to look for Freq 2. Every sample period, T, (same as the bit-period) it decides if a ONE was sent or a ZERO was sent.

This same approach can be used for detecting Phase-Shift-Keying communications. The filters need to be designed to detect a specific phase or phase shift. Then a decision is made as to which phase was present during a particular bit-period. A QPSK (Quad Phase Shift Keying) detector would require a set of four filters to be used.

### COHERENT AND NON-COHERENT DETECTION

Coherent communications means that the phase and frequency reference is somehow provided to the receiver by the sending station (over the air), as in a "pilot signal" used in cell phones. The other variety is called non-coherent communications, where the sending station does not provide the reference frequencies or phases, but the receiver generates them locally...as with a Phase-Lock-Loop circuit .

The two supplied frequencies ( Freq. 1 and Freq. 2 ) shown in Figure 2 could be either supplied by the sending station or could be self generated by the receiving station.

The problem with non-coherent detection for PSK communications is that the phase of the received signal can change if there is motion by either the sending antenna or the receiving antenna. If the distance between the two antennas shifts by  $\frac{1}{4}$ -wavelength then there is a 90 degree phase shift. This change in phase could cause a mistake in phase detection at the receiving detector. At 144 MHz,  $\frac{1}{4}$ -wavelength is only 19-inches....a mobile unit could easily create lots of phase shifting while driving. At 1.2 GHz,  $\frac{1}{4}$ -wavelength is only 2.5 inches...wind could easily sway a tower 2.5 inches and create a phase change of 90 degrees. The advantage of using co-

herent communications in this situation is that a pilot reference signal from the sending station will shift the same amount as the "real" data signal....so the reference signal will always track the "real" signal and thereby eliminate phase shifts caused by motion.

### DIGITAL-TO-ANALOG CONVERTERS AND VODEC

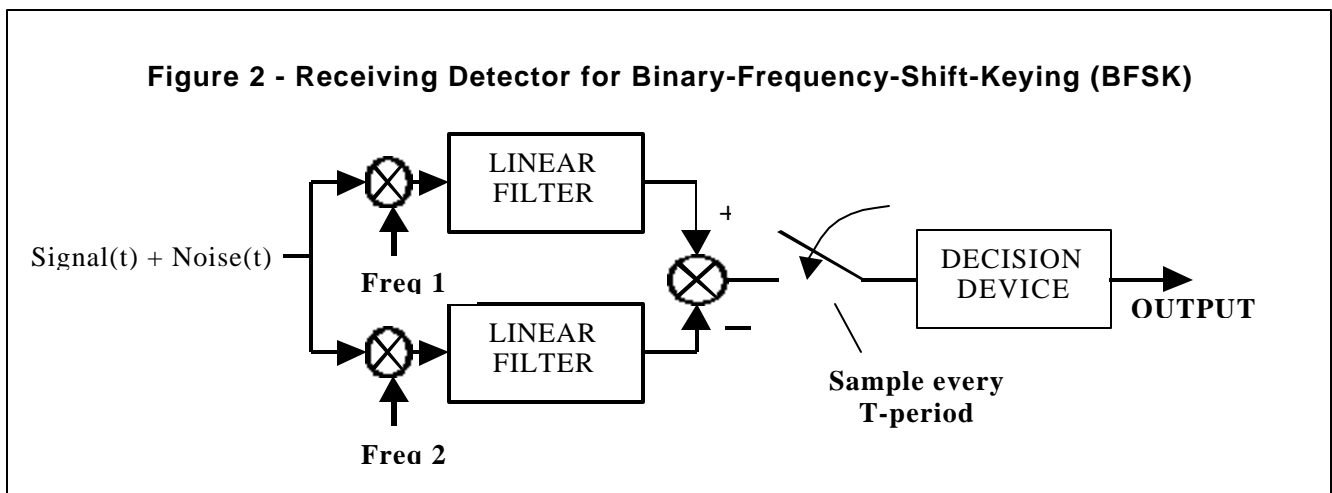
The final step for voice digital communications is to convert the receiver's stream of 1's and 0's back into analog sound. A circuit called a Digital-to-Analog Converter (DAC) is used to take a group of ones and zeros (let say an 8-bit DAC) and turn this into a analog voltage with a specific amplitude. DAC with 8-bit resolution can define 256 different voltage levels....so you obtain a lot of accuracy....enough for voice....but not a lot for music. Alternatively, if the sending transmitter used VoCoder coding to compress the voice information, then the receiver has to use a corresponding voice decoder circuit (VODEC) to take the coded voice info and reconstruct it into tones and amplitudes.

### SUMMARY

Well this article ends the information to describe the technologies used in digital communications. Over these seven articles on digital communications...we have explored the basic fundamentals:

- 1's and 0's & Analog-to-Digital Conversion (ADC)
- Voice Compression (VoCoder)
- Multiple Access Techniques (FDMA, TDMA, and CDMA)
- Signal-to-Noise Improvements (Shannon's Law)
- Orthogonal Signals (Walsh Codes)
- Modulation Technologies (OOK, FSK, PSK, even 64-QAM)
- Receiver Detection/Demodulation

I hope this TechTalk series on Digital Communications has given you an insight on how cellular phones work, how HDTV can pack more information into the same 6 MHz bandwidth as old analog TV, and the direction HAM radio communications is sure to go.





# NOTICE

**Hey You, You'll be Mighty ?!#(?!#!@ Sorry If You Don't Make It To This *Special***

## **Not So Dx-Pedition**

The Date is **Oct. 25 through 27 (Friday the 25th for those who want to come early. We'll be there).**

The location is near Aguanga, CA (not far from Temecula). **Maps will be available at the October meeting.** This is a dry camp, so bring water.

The location is on private property and the site is located up on a level clearing, elevation about 4,000 feet msl. Easy to get to, with the only unpaved section being the driveway leading in (about 1,000 ft). Plenty of room for antennas, trailers, motorhomes and you name it.

**A DX opportunity!!!**

### **What to bring:**

Tent, trailer, motorhome, truck or car to sleep in.

**Food** (no community cookout) and the utensils. (note: There is a cafe not too far away.)

Warm **clothing** in case of a chilly night. (motel close-by)

A Porta-Potty if you have or can get one. (LDC has a loaner if someone wants to borrow it and share with others)...**{Call}**

### **By Owner's request:**

Maps are not to be put on the web.

Everyone coming must be listed in advance.

Do not drive-up at night.

**These Poor OPs Missed the Last Not So Dx-Pedition**

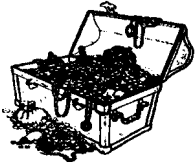


### **Bring Firewood If You Can !!!!**

Bring your **rigs, antennas or just yourself**, and have a great time trying field day stuff you wouldn't try at home. There will be lots of rigs (hopefully) to play with, regardless of license class.

**For more info call Larry, K6LDC, 714.636.4345 or call Art, KE6WOX, at 714.997.2078 E-mail [k6ldc@earthlink.net](mailto:k6ldc@earthlink.net)**

**Treasures for Pennies**  
**The Orange County Amateur Radio Club**  
**Annual Auction is coming.**



**Don't kick yourself  
for missing this one!**

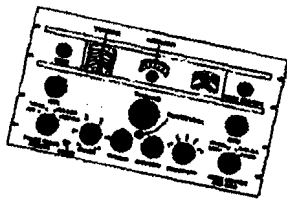


**Buy, Sell, or Both**

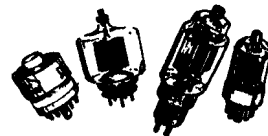
**The Date is Friday October 18th, 2002**

**Check-in for sellers begins at 6:30 PM**  
**Auction begins at 7:30 PM**

**Rules, guidelines & map are on back of this page**  
**See details on the OCARC Web-site at [www.w6ze.org](http://www.w6ze.org)**



**Open to all !!!**  
**Members and**  
**non-members.**



**Don't Miss This**

**Ham Radio Auction**



## General Meeting Minutes

16 - Aug - 2002

The featured program started at 7:30 PM at the Red Cross building. The business meeting was called to order at 8:48pm. All of the club officers were present except for Chris W6KFW (on vacation).

**Meeting Program** The speaker was Bob Heil - K9EID, who provided (via video tape) a thoroughly informative and entertaining talk on "The Science of Audio"

**Vice President:** ARRL Convention tomorrow (8/17). Ken W6HHC speaking Sept on Digital comm. In lieu of a speaker, October will feature the yearly club auction.

Nov. will be Art Goddard on DXpedition to Honolulu. December will be Christmas dinner, on Sunday the 15<sup>th</sup> at 6:30pm at Mimi's Café in Fountain Valley.

**(Editor's note: Plans finalized for the Christmas Dinner to be held on Sunday, Dec-08)**

**Secretary:** Intermod newsletter from WCARC recvd.

**Treasurer:** Balance sheet passed out, no change in balance since last report.

**Membership:** Dick Young filling in for Chris: 61 members on roster.

**Activities:** \$3 discrepancy in special raffle sales, recommend changing the World Radio ticket expense to a raffle expense. Discussions about where gift certificate for special raffle will be purchased from, tabled for next board meeting, check or gift certificate possible.

-- see **General Minutes** cont'd on page 8 --

## WHOis the Member-at-Large? by Ken W6HHC

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

One of the two Members-at-Large on the OCARC Board of Directors is Larry Hoffman – K6LDC. Larry first got bit by the HAM bug while in High School in the San Fernando Valley. Larry explains that "...I got THAT close to getting my ticket!!!!" in H.S. Finally, he later got his General ticket as K6LDC in 1955 (no novice class was available back then). From 1955 until 1984, Larry was fairly active San Fernando ARC, the Wheeling Whips Motor Radio Club, and was Trustee for the following club stations: the Wheeling Whips, San Fernando H.S., and University H.S. Larry got the bug to be active in HAM radio again in 1994 and was issued the Technician call of KF6CXI. A little later he upgraded to General class and received the call KF6BCS. Finally, he upgraded to Extra Class and received the call AC6WN before he was able to reclaim his original call of K6LDC. Larry joined the OCARC in 1997 and served as OCARC President in 2000.

At Larry's shack in Garden Grove, the low band station consists of a Yaesu FT-920 and a Yaesu FL-2100B amplifier. The antenna's are a Cushcraft 4-ele beam for 40M-thru-10M., a brand new Ringo Ranger 10M, and an 80M loop. For mobile activities out of Larry's beautiful motorhome, he uses a Kenwood TS-50 transceiver, AT-50 tuner and an OutBack antenna on 80M-thru-10M. For VHF/UHF mobile, he has a Yaesu FT-90 rig for 2M and 440 MHz along with a MFJ 2/440 mag-mount antenna.

Larry's favorite HAM activities are Field Day, FD-like campouts...such as Not-So-DXpedition, hamming out of his motorhome while on vacations, Club breakfasts, chasing DX, and plain rag-chewing.

Larry was born in Chicago, raised in Arizona, then California. He was in Navy avionics and was a CW operator on long-range patrol flights out of Greenland. Larry is a Professor of Real Estate and Marketing at Long Beach City College. He and wife, Pauline, enjoy fishing, dirt bikes, camping in the motorhome, and travel.

If you get chance, ask Larry about the fishing when he vacationed this year on Lake Hebgen near West Yellowstone!



**Larry Hoffman - K6LDC with his FT-920  
at his HAM shack in Garden Grove**

**General Meeting Minutes** -- cont'd from page 7

**Members at Large:** On the last weekend of October there will be another Not-so-DXpedition, map will be available in September, details on the website.

**Technical:** Nothing to report.

**Publicity:** Nothing to report.

**Old Business:** OCC Ham class will be starting last week of August.  
(Update- class did not have enough people to run. At least 15 students are needed and only 5 showed up including Secretary Matt K6LNX.)

**New Business:**

OCCARO meeting last Tuesday discussing next convention in 2003 on September 5-7, in Long Beach, and discussion about Wouff Hong. Should OCARC supply cast members, if OCCARO can supply coordinator? There were discussions about the percentage to give OCCARO.

Motion by Frank WA6VKZ to propose to OCCARO to participate in Wouff Hong at Long Beach 2003 ARRL Convention, if OCCARO accepts the offer we reim-

burse them 75% of the seed money, then we would give them 25% profit and OCARC gets 75% profit. Motion was seconded by Lowell KQ6JD and passed unanimously.

**Good of the Club:** Steve KB1GZ wants to put a link to "The Human Race" website on the OCARC website.

ARRL Convention in Escondido, talk in frequency is 146.880 (107.2 PL) also monitoring 146.550 simplex.

Al Watts W6IBR, SK, was a past president of OCARC. Suggestion that flowers be sent to Jane Breller-KC6TAM (daughter of W6IBR and also a past president).

Steve KB1GZ purchased an ARRL Flag for the club, and it will be flown at Field Day and other club events. OCARC will also purchase our own full size US Flag.

Jim Winn (ex-KE6UCH) has a new callsign: AE6UC, he recently passed the Extra class exam.

Meeting adjourned at 9:33pm.

Respectfully submitted, Matt K6LNX

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

***First Class Mail***

***Time Dated Material.***  
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