



RF



ORANGE COUNTY AMATEUR RADIO CLUB, INC.

VOL. XLIII NO. 7

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

July 2002

The Prez Sez:

by Cory - AE6GW

Wow! Yet another Holiday and another Field Day are behind us! I hope everyone had a great July 4th. Thanks to all of you that turned out for Field Day. Although the ionosphere didn't cooperate, Mother Nature did and everyone had a great time.

Next it's the OC Fair, Wednesday July 17 is our day in the sun. If you're not working the booth, come on out and say HI.

(NOTE: I just upgraded to EXTRA and now have a new set of call letters.)

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

The Orange County Wireless Net (OCWN) Does a Frequency Shift!

The OCWN CW net will be moving from 28.110 MHz to 7.115 MHz on 40 meters as of Sunday, July 14, at 9 AM local time.

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

For more details, see the special convention WEB SITE at

<http://sd2002.hamcon.net/>

OCARC SPECIAL ANNOUNCEMENT of \$250 Gift Certificate Prize

Special Raffle Time! OCARC is holding an ongoing special raffle for a gift certificate to Ham Radio Outlet. The certificate will be for \$250. Tickets cost \$1 each. The winner does not have to be present to win. See Phil-N7PA at the general meetings and breakfast meetings. The more tickets you buy, the more chances that you will have to win.

July PROGRAM:

The July 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, July 19th
@ 7:30 PM

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

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**THE ORANGE COUNTY
AMATEUR RADIO CLUB,
INC.**

P.O. Box 3454, Tustin, CA 92781



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New

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New

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2002 Club Appointments:

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Bob Buss, KD6BWH
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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 #19

Orthogonal Coding Channels for Digital Communications

by
Ken Konechy - W6HHC

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

In our May discussion of Digital Communications, we covered Signal-to-Noise ratios and Error-Rates. This month I will cover an area of digital communications theory that I find really fascinating...using "orthogonal coding" to eliminate inter-channel interference.

Let me start by defining "orthogonal coding". Orthogonal functions (or codes) are functions (codes) that DO NOT correlate...that is they do not interfere with each other. This theory will allow "channels" to be on the same frequency and not interfere with each other.

Two different codes are said to be orthogonal to each other if they pass the following test:

"Compare two codes, bit-by-bit. If the two codes have a 'number of agreeing bit locations' that is equal to the 'number of disagreeing bit locations', then the two codes are orthogonal to each other."

Let's see how this really works. Figure 1 shows two orthogonal codes:

CODE 1	0000
CODE 2	0101
Same	1010 (2 each)
Different	0101 (2 each)

Fig 1 - Example of Two Orthogonal Codes

CODE 3	1000
CODE 2	0101
Same	0010 (1 each)
Different	1101 (3 each)

Fig 2 - Example of 2 non-Orthogonal Codes

When looking at Figure 1, you can see that the number of equal bits is two (bits 1 and 3 are the same in both codes) and that the number of disagreeing bits is also two. Therefore, these two codes, CODE 1 and CODE 2, are said to be orthogonal to each other.

In Figure 2, the number of equal bits is one (only bit 3) and the number of disagreeing bits is three. Therefore, these two codes, CODE 2 and CODE3, are not orthogonal to each other.

There is an easy way to generate orthogonal codes. It is called the Walsh algorithm.

Look at Figure 3. Start with the number 0. To the right repeat the zero. Going down repeat the number. Going diagonally to the right and down, invert the 0 to a 1.

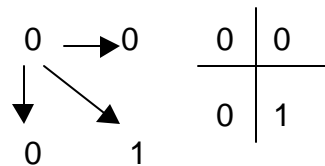


Fig 3 - Using Walsh algorithm to create two orthogonal numbers

If we start with the two resulting numbers from Figure 3. That is:

00
01

And use those two sets of numbers as the starting point for the Walsh algorithm in Figure 4, we can now create four resulting sets of codes.

0000
0101
0011
0110

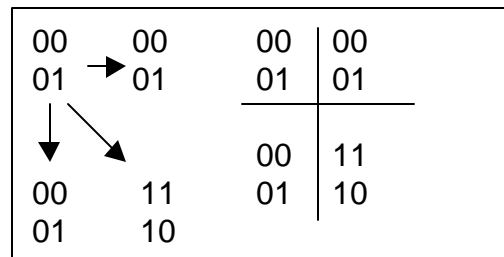


Fig 4 - Using Walsh algorithm to create four orthogonal codes

Look at the four numbers that came from Figure 4. They all pass the "orthogonal test" as shown in Figure 1 (any code to any of the three other codes).

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

Tech Talk #19 - Cont'd from Pg 3

Finally, I can continue to use the Walsh algorithm to produce longer and longer streams of orthogonal numbers. For example the next round using the algorithm on the numbers from Figure 4 will produce eight numbers that are each 8 bits long.

Next, I want to define a "logic" function called EXCLUSIVE OR. This logic function is sometimes shown abbreviated as XOR. An XOR function will compare two bits.....

- 1) if the 2 bits are the same, then the output is 0.
- 2) if the 2 bits are different, then the output is 1.

OK, let's put these orthogonal numbers to work to create virtual channels and block out interference.

First: the data that I pick to be transmitted is....10011

Second : I pick a short walsh code to be used by Channel A as...0110 and by Channel B as...0011

Third: I "orthogonally spread" XOR each of the data bits with the four-bit walsh code for Channel A as shown below in Figure 5.

```

DATA to be transmitted:  1    0    0    1    1
Channel A walsh code:   0110 0110 0110 0110 0110
                        ↓ ↓ ↓ ↓ ↓
XOR the two streams    1001 0110 0110 1001 1001
Actual transmitted stream 1001 0110 0110 1001 1001
    
```

Fig 5 – Spreading DATA using Chan-A walsh code

Now, I will show how the received data stream is decoded by someone who is also using the same walsh code (Channel A). This is done by again XORing each group of four incoming bits with each of the of the bits in the chosen 4-bit walsh code, as shown in Figure 6.

```

Incoming received stream 1001 0110 0110 1001 1001
Channel A walsh code:   0110 0110 0110 0110 0110
                        ↓ ↓ ↓ ↓ ↓
XOR the two streams    1111 0000 0000 1111 1111
                        ↓ ↓ ↓ ↓ ↓
Extracted DATA        1    0    0    1    1
    
```

Fig 6 – Extracting DATA using Chan-A walsh code

bits all had the same values in Figure 6. So by "majority rules", I can determine the value of each extracted data bit from the group of "spread" bits.

Now, I want to look at the same incoming received stream using the walsh code I called Channel B. That is, I want to see what happens if I code the DATA to be transmitted with Channel A (as in Figure 5) and then attempt to extract the recieved stream using Channel B. The results are shown below in Figure 7.

```

Incoming receiv'd stream 1001 0110 0110 1001 1001
Channel B walsh code:   0011 0011 0011 0011 0011
XOR the two streams    1010 0101 0101 1010 1010
                        ↓ ↓ ↓ ↓ ↓
Extracted DATA        ?    ?    ?    ?    ?
    
```

Fig 7 – Trying to Extract DATA using Chan-B

Notice that the each XORed group of 4-bits contains an equal number of 0s and of 1s. There is no majority of either 0s or 1s in each group. In other words: you can not decode Channel A information using Channel B coding. I can not recover (extract) the data because there is no correlation in the decoded information.

What if there were multiple users trying to send their data at the same time? Would this orthogonal channel concept work for this situation? Yes....absolutely yes!!

I start by giving every different transmitting-user a different walsh code. Four example, if there were 8 pairs of sender/receivers, then I would issue 8-bit walsh codes....and if there were 32 pairs of senders/receivers, then I would issue 32-bit walsh codes.

The next two steps are complicated to show, but I will simply describe what occurs.....

Next, each sender prepares his own transmitting data stream and then all the data streams are added together into a single analog voltage form.

Finally, each receiver using the same "channel" as their intended sender will be able decode his channel of information and not "see" the other channels of data that are also being sent. Amazing!!!

In the next Tech Talk article, I will explore digital modulation technology.



**O.C.A.R.C.
Field Day
2002**



PORTOLA PARK



"RF"

ORANGE COUNTY AMATEUR RADIO CLUB

JULY 2002

FIELD DAY SUMMARY
FOR
THE ORANGE COUNTY AMATEUR RADIO CLUB - W6ZE

by: Ken / W6HHC & Bob / AF6C

YEAR	160M SSB	80M CW	75M SSB	40M CW	40M SSB	20M CW	20M SSB	17M SSB	15M CW	15M SSB	12M SSB	10M CW	10M SSB	6M PHN	2M CW	2M PHN	2M PKT	220 PHN	440 PHN	ATV	SAT- ELLITE	GOTA	---- TOTAL ---- QSO's / (POINTS)
2002	0	26	69	192	279	76	229	0	0	485	0	0	18	62	0	68	2	6	10	3	0	3	1,528 / 3,648
2001	0	0	25	101	251	0	432	0	0	675	0	0	109	48	0	28	0	1	0	0	3	-	1,673 / 3,548
2000	0	19	20	88	91	0	625	0	0	794	0	0	121	36	0	72	0	7	15	0	1	-	1,889 / 3,992
1999	0	13	20	15	237	0	996	0	0	724	0	0	22	5	0	2	0	0	0	0	0	-	2,034 / 4,124
1998	0	24	75	65	136	100	250	0	0	624	0	0	82	0	0	46	7	17	12	0	1	-	1,439 / 3,270
1997	5	81	131	83	306	150	853	0	14	275	0	0	106	32	0	79	32	4	0	0	1	-	2,152 / 5,024
1996	-	146	228	104	125	283	673	0	40	605	0	0	217	121	0	32	13	0	40	0	1	-	2,628 / 6,428
1995	-	145	272	203	94	443	572	0	51	451	0	0	131	66	0	93	33	29	8	0	6	-	2,597 / 6,944
1994	-	114	114	208	45	486	748	0	85	761	0	13	312	58	0	94	31	33	0	0	0	-	3,102 / 8,078
1993	-	150	100	159	81	530	700	30	131	812	0	0	179	40	0	86	35	12	16	0	0	-	3,061 / 8,132
1992	-	0	294	200	110	541	555	0	0	840	0	0	232	13	0	74	41	0	1	2	80	-	2,983 / 7,530
1991	-	105	308	182	182	400	623	23	9	463	0	0	104	4	0	141	48	23	11	0	0	-	2,626 / 6,740
1990	-	0	0	70	144	0	370	-	0	747	0	0	131	39	0	114	2	14	26	0	-	-	1,657 / 3,454
1989	-	30	0	98	5	0	906	-	21	172	0	0	238	3	0	121	18	24	9	1	-	-	1,646 / 3,590
1988	-	127	0	93	75	2	359	-	0	570	0	144	81	0	0	32	14	0	-	-	-	-	1,497 / 3,726
1987	-	22	0	0	39	0	708	-	0	18	1	117	0	1	0	51	5	0	-	-	-	-	962 / 2,202
1986	-	0	46	219	78	0	488	-	0	45	10	0	0	0	0	82	0	0	-	-	-	-	968 / 2,374
1985	-	85	0	315	91	35	662	-	78	0	-	0	0	0	0	22	-	0	-	-	-	-	1,288 / 3,602
1984	-	18	0	313	0	32	196	-	32	350	-	0	0	0	0	0	-	0	-	-	-	-	941 / 2,672
1983	-	3	93	200	0	0	776	-	0	995	-	0	43	18	0	16	-	1	-	-	-	-	2,145 / 4,696
1982	-	0	105	59	238	40	352	-	19	515	-	0	72	0	0	155	-	27	-	-	-	-	1,582 / 3,400
1981	-	0	167	200	265	60	699	-	77	717	-	0	105	0	0	197	-	0	-	-	-	-	2,487 / 5,648
1980	-	20	149	205	235	471	318	-	52	1,025	-	0	226	12	0	100	-	36	-	-	-	-	2,849 / 7,194
1979	-	0	195	198	92	42	773	-	0	737	-	0	95	0	2	124	-	8	-	-	-	-	2,266 / 5,016
1978	-	16	196	246	170	30	981	-	57	558	-	13	145	0	1	164	-	23	-	-	-	-	2,600 / 5,926
1977	-	25	243	182	199	0	843	-	81	486	-	4	309	0	4	234	-	0	-	-	-	-	2,610 / 5,812
1976	-	99	254	152	487	21	600	-	64	210	-	2	54	0	0	2	-	0	-	-	-	-	1,945 / 4,566
1975	-	80	120	154	274	40	863	-	140	259	-	0	123	0	0	0	-	0	-	-	-	-	2,053 / 4,934
1974	-	6	161	6	333	0	630	-	12	342	-	0	110	0	0	0	-	0	-	-	-	-	1,600 / 3,248
1973	-	90	226	0	452	0	932	-	0	273	-	0	0	0	0	46	-	0	-	-	-	-	2,019 / 4,218
1972	-	0	50	0	350	0	521	-	0	530	-	0	0	0	0	94	-	0	-	-	-	-	1,545 / 3,090
1971	-	0	274	0	106	0	530	-	0	136	-	0	0	0	0	0	-	0	-	-	-	-	1,046 / 2,092
1970	-	0	272	0	0	0	531	-	0	426	-	0	0	0	0	0	-	0	-	-	-	-	1,229 / 2,458
1969	-	0	98	0	50	0	375	-	0	301	-	0	0	0	0	169	-	0	-	-	-	-	993 / 1,986
1968	-	10	224	62	396	93	328	-	24	430	-	0	68	0	0	145	-	0	-	-	-	-	1,780 / 3,938

Note: These are raw contacts taken directly from the log sheets. Adjustments have not been made for duplicate contacts, and bonus points have not been added yet. Final scores appear in QST in the fall.

General Meeting Minutes

14-June-2002

The presentation was a brief slide-show of past OCARC Field Day operations by Ken-W6HHC followed by Field Day Chairman Larry-K6VDP reviewing plans for this years Field Day at Portola Park.

The business meeting was called to order at 9:04pm, all officers present except Larry K6LDC and Bob KD6BWH.

VP: waiting from John De Boer on a Solar Power program, if no answer by the 1st of June Lowell may do the program, possible showing of EOC room at the RedCross facility, possible tape on science of sound.

Treasurer: Al-N6TEZ distributed the club balance sheet, everything accounted for except for dues received today, cookies & RF printing, roughly \$3001.44 checking, \$25 savings.

Secretary: Bylaws amendment issue discussed, and amendment read to the club members, board email vote passed with 8 ayes, 2 absent, to accept the Amendment C as voted on in the general meeting in November 2000, but not recorded in the minutes for that meeting; the newly revised bylaws will be available online.

Membership: 55 members

on roster, with new members and renewals.

Activities: +/- \$1 for raffle balance normally, this meeting there is a negative balance of approx. \$20, need more advertising for the gift certificate raffle, currently ~ \$100 in the pot.

Publicity, Technical: Nothing to report

Old Business: Field Day- motion to issue \$150 to Don, food chairman for Field Day, balance to be returned to club, motion made by Ken W6HHC, 2nd by Bob AF6C, passed with 1 nay by Frank WA6VKZ; also a donation can will be put out.

New Business: Treasurer Al N6TEZ is resigning. Vote held for new treasurer, nomination for Steve KB1GZ by Ken W6HHZ, 2nd by Bob AF6C; vote passed unanimously. Ken W6HHC and Al N6TEZ will instruct Steve on the use of Quicken for keeping the financial records.

ARRL convention on August 17th in Escondido.

Good of the Club: Bob AF6C looking for contact info for Martin WB6PEX, who is a former president of OCARC.

Motion to adjourn by Lowell KQ6JD, 2nd by Bob AF6C, meeting adjourned at 9:22pm

Respectfully submitted:
Matt K6LNX

Board Mtg - Cont'd from Pg 8

the year. At each January meeting he will make these CD's available for a small price.

Orange Coast College will have a Ham Radio Class this coming fall semester. Matt K6LNX is helping the professor at OCC who once taught this class many years ago. The class is listed in the OCC class schedule as *Computers & High Technology 108: Survey of Technology*. More information is available on OCC website: www.occ.cccd.edu. Matt asked if OCARC has any Volunteer Examiners, and he received several responses. Class students will be encouraged to join OCARC.

People who volunteered to help with the Amateur Radio booth at the Orange County Fair on Wednesday July 17th will receive their admission tickets in the mail.

New Business: A motion was made by Lowell KQ6JD, to purchase a 4x6 ARRL flag. The flag will cost \$55 including shipping, and will be flown at FD, gen'l meetings, and other suitable events. This was deemed appropriate because OCARC is an ARRL Special Services Club. The vote passed unanimously.

Another motion was made by Frank WA6VKZ to purchase a similar sized US Flag for the club. At Field Day we did have a small US flag on display, but all board members were in agreement that we should have a large US flag that belongs to OCARC, and that it should be flown above any other flag. Bob AF6C made an amendment that the flag actually be made in the US. This vote also passed unanimously.

A motion was made by Lowell KQ6JD to donate \$100 to the Amateur Radio Newline, the club donates to the AR Newline annually. Motion was passed unanimously.

Respectfully submitted,
Matt K6LNX

July Board Meeting

The meeting was called to order at 8:42am on 7/6/2002 at the CowGirl Too Café. Officers absent were: Phil N7PA, Chris W6KFW, Larry K6LDC, and Bob KD6BWH. All other officers present.

President Cory has upgraded to Extra class license, her new call is AE6GW.

Vice President: John De Boer will speak on Solar Power at the July meeting, and a tape presentation will be given on the science of audio at the August meeting.

Treasurer: Our new treasurer,

Steve-KB1GZ, distributed the club balance sheet to officers, and the club has a total balance of \$2911.89.

Secretary, Publicity, Technical, Members At Large:

Nothing to report.

Old Business: We need more advertising for the ongoing gift certificate raffle. A banner on website, and announcements in the RF newsletter were suggested, as well as announcements at Gen'l meetings. The total amount collected for the raffle so far will be announced at the July General meeting.

We will be restarting the Mr. RF program again. A person will be chosen in secret to be Mr.

RF before each General meeting. The purpose of a secret "Mr RF" is to encourage each member to greet and talk each other members and to visitors. Whoever makes a certain contact with Mr. RF at the meeting (such as 5th handshake, or perhaps the 10th "Hello!", etc) will be awarded \$1 worth of raffle tickets for the regular prize raffle.

Bob AF6C has mentioned this before but wanted to bring it up again, that he plans on creating an annual CD compilation of OCARC pictures, as well as all the RF newsletters published during

- see **Board Mtg** cont'd on page 7 -

ORANGE COUNTY AMATEUR RADIO CLUB, INC
P.O. BOX 3454
TUSTIN, CA 92781-3454

First Class Mail

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