CQ de WA2LQO

The official voice of the Grumman Amateur Radio Club

December 2011 VOLUME 84 NUMBER 12

Merry Christmas Happy New Year

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GARC December Meeting will be a Holiday Party

See President's message for details.

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COMMUNICATIONS SYSTEMS (Continued from November 2011)

By Bob Wexelbaum, W2ILP

I'll now return to the binary PCM coding scheme, which I described last month, in which 3 bits: 000 or 111 were transmitted as a code to represent bits 0 and 1, respectively. If the redundant message is to be transmitted at the same rate as the original signal, we would need to transmit 3 bits in the time *T* otherwise allocated to a single bit. It is generally understood that as the time allotted to a bit decreases, the error rate increases. It can then be seen that the triplet redundancy bit advantage will be undone to some extent by the increased bit rate. However the speed capabilities of modern digital systems may make triplet coding a very worthwhile net advantage.

The simplest error-detecting technique consists of adding a single bit at the end of each digital word. The extra bit is called a *parity–check bit*. It is chosen to make the number of 1s in each word an *even* number. Considering the case of a 4 bit HEX code, as in a previous example, where there are 16 possible messages because $2^4 = 16$, by adding an extra bit we have $2^5 = 32$ possibilities. We only needed 4 bits for HEX code, thus the extra bit introduces redundancy. The extra bit would be a 1 if the first 4 bits were an odd number of 1s. Thus 1011 would become 10111. If an even number of the first 4 bits were 1s we would add a 0. Thus 1010 would become 10100. The parity check bit method has been universally used in digital computers for error detection. The check-bit is effective if the probability of error is low enough so that we can ignore the probability of there being more than a single bit error in a word. If such a singlr error occurs, it will change a 0 to a 1 or a 1 to a 0 if a single bit error occurs and the received word would have an odd number of 1s. From this it would be known that an error has occurred. We shall not, however, be able to determine which bit has been in error. An error of two bits in a word could not be detectable, since such a double error would again yield an even number of 1s.

Coding has the advantage of allowing us to increase the rate at which information may be transmitted over a channel while maintaining a fixed error rate. The price we pay may only be the increased complexity of digital logic hardware at the transmitter where *encoding* is done and the receiver where *decoding* is performed. In theory by using unlimited complexity we would be able to reach the Shannon limit. That would mean that theoretically we could be able to transmit at the channel capacity without error.

Another measure of the merit of a code is to the extent to which it improves transmission without adding excessive complexity. There are many different codes that are recognized to be legal by the FCC for use in commercial systems, or for use by radio amateurs, and other codes that may be secretly used for military or security purposes. We can now analyze some commonly used codes; however it is beyond our capability to design a truly optimum code. Classes of often used codes are described as *algebraic codes.* Perhaps they might be better called arithmetic codes because they rely mainly on the use of arithmetic digital logic. If we transmit using binary PCM , where the signal is a variable which has the value 0 or 1 it is convenient to use an algebra for coding that is defined by the rules of Boolean algebra, with the single exception that 1 + 1 = 0 while

in Boolean algebra 1 + 1 = 1 , because in Boolean the + sign logically means “or”. We are using the + sign here to represent what is called Modulo-2 addition. We define the algebra operations of addition and multiplication in Modulo-2 by the following rules:

Addition	*Multiplication*
0 + 0 = 0	0 x 0 = 0
0 + 1 = 1	0 x 1 = 0
1 + 0 = 1	1 x 0 = 0
1 + 1 = 0	1 x 1 = 1

The method of algebraic coding is the following: Given that our message source can generate *M* equally like messages; we can initially encode each message of word length *k* where $M = 2^k$. Each of the message code words has no redundancy. Each bit in each message code word conveys an amount of information *I* = 1 bit. We now add to each message *r* redundant bits. The transmitted code word therefore has $k + r = n$ bits. The total number of words is 2^n, while the number of possible messages is $2^{k.}$. A typical transmitted code word will then have the form: $a_1a_2a_{3\ldots}a_kc_1c_{2\ldots}c_r$ where a_1 is the *i*th bit of the message code word and c_j is the *j*th redundant bit. The added bits, as before are called parity-check bits. Both a_1 and c_j may assume the values 0 or 1. The parity bits are selected to satisfy the linear equations;

$$0 = h_{11}a_1 + h_{12}a_2 + \ldots + h_{1k}a_k + 1_{c1} + 0_{c2} + \ldots + 0_{cr}$$
$$0 = h_{21}a_1 + h_{22}a_2 + \ldots + h_{2k}a_k + 0_{c1} + 0_{c2} + \ldots + 1_{cr}$$

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$$0 = h_{r1}a_1 + h_{r2}a_2 + \ldots + h_{rk}a_k + 0_{c1} + 0_{c2} + \ldots + 1_{cr}$$

The coefficients hij are either 1 or 0. These coefficients are not variables; their value is fixed. The rules of algebra, as shown above, apply. What distinguishes one algebraic code from another are the number of parity bits used and the selection of the coefficients h_{ij}.

These equations may be written in matrix notation. The matrix *H* is defined as a rectangular matrix with *r* rows and *n* columns. We may then define a column matrix *T* representing the transmitted code word (which in turn represents a possible message) in terms of the matrix *HT* = 0 The column matrix *T* is called a *vector*, with *components* $a_{1,}\ldots, a_k,\ldots, c_1,\ldots,c_{r.}$ Now let the received message be *R* which may or may not be the transmitted code word. Suppose at the receiver we have the hardware required to form the product *HR.* If *HR* is not 0, we know that *R* is not a possible message, and very likely, although not necessarily, *R* is the message that was transmitted. Still, if the possible messages are significantly different from one another, we may well be able to discount the possibility the received possible message was not the one transmitted.

(to be continued)

PRESIDENT’S NOTE by ED GALLENDER, WB2EAV
December 2011

The annual Holiday Party will, as usual, take place instead of our usual December meeting, On Wednesday, December 21st we will gather at Kwong Ming Chinese restaurant in Wantagh from 5;30 – 6:00 PM and will stuff ourselves while enjoying each other’s company.

To get there take the Seaford Oyster Bay Expressway (NY135) to exit 3 just south of the Southern State Parkway – for Jerusalem Avenue (N105). Go west on NY105 about a mile. The restaurant is on the left. There is plenty of parking space in the back. (You can also take Southern State exit 28-S and take Wantagh Avenue less than half a mile to Jerusalem Avenue. Turn right and the restaurant will be on the left side.)

December is also the time for a reminder that the Ham Radio University 2012 (HRU 2012) will be held at Briarcliffe College on Stewart Avenue in Bethpage on Sunday, January 8th from 9:00 AM until 3 or 4:00 PM. There are all kinds of forums, a chance to chat and catch up with the usual crew, a talk by Norm Fusaro, W3IZ of the ARRL at noon, and even a VE session at 1:30 PM. You can’t complain about the price of admission at $3.00. They have a website at www.hamradiouniversity.org . Since HRUs always happen early in January, this is the last chance I have to remind you about it, and a word to the wise is sufficient.

73, Ed WB2EA

GRUMMAN AMATEUR RADIO CLUB
MINUTES OF GENERAL MEETING 11/16/2011
By Karen, W2ABK, Secretary

TREASURER'S REPORT – Ed, WB2EA

Finances continue to be in good shape.

REPEATER REPORT – Gordon, KB2UB

Repeaters are working.

NET REPORT – Karen, W2ABK

Thursday night net at 8:15 PM on 146.745 MHz had one check in.
Thursday night net at 8:30 PM on 145.330 MHz had a nice turn out.
Sunday morning net at 7:30 AM on 7.289 MHz had 4 check-ins.

VE REPORT – Bob, W2ILP

Two applicants applied. Both passed Technician exams and one also passed the General Class exam.
5 VEs were Dave, AB2EF, Gheorghe, AB2ZW, Karen, W2ABK, George, WB2IKT, and Bob, W2ILP.

OLD BUSINESS

HRU 2012 will be at Briarcliffe College on January 8th. Each club has been invited to make a short presentation describing its activities.

NEW BUSINESS

The November Election for 2012 produced the following results:
President: Ed Gellender, WB2EAV
Vice President: Gordon Sammis, KB2UB
Secretary: Karen Cefalo, W2ABK
Treasurer: Ed Gellender, WB2EAV
Trustee WA2LQO: Ray Schubnel, W2DKM
1 Year Board Member: Jack Cottrell, WA2PYK
2 Year Board Member: Dave Ledo, AB2EF
2 Year Board Member: Jack Hayne, WB2BED
2 Year Board Member: George Sullivan, WB2IKT
The December general meeting will be our annual holiday party. See details in President's message.

PROGRAM

Jack Hayne, WB2BED brought in his German license and radio books.
We discussed TV and antennas and cable, and how to get TV reception without cable service.

GARC NETS: 40 Meters: 7.289 MHz at 7:30 AM EST Sundays Net Controller: Eugene, W4JMX
2 Meter (repeaters) Net Controller, Karen, W2ABK **Thursdays: 146.745 MHz at 8:15 PM**
145.330 MHz at 8:30 PM
Both repeaters (-600 kHz) and 136.5 Hz tone.
ARES/RACES NETS: Mondays.

MEETINGS: General Meetings of the GARC are held on the third Wednesday of each month, starting at 5:30 PM, at the Ellsworth Allen Park in Farmingdale. Driving directions and map can be obtained from http://www.mapquest.com. It is suggested that the GARC web site be checked to be certain of meeting location, which may change after this newsletter is distributed. Board meetings are held a week before the General Meeting at the Bethpage Skating Rink.

WEBSITE: The GARC web site can be found at http://www.qsl.net/wa2lqo. Webmaster is Pat Masterson, KE2LJ. Pictures of GARC activities, archives of newsletters, roster of members, and other information about the GARC may be found there

INTERNET LINK OF THE MONTH FOR INTERNERDS

And now to break the monotony let us see a fictional production of what Hitler thought about Ham Radio. I came across this YouTube presentation when I visited the HRU website and I steered to a video of HRU 2008. I was looking for myself in that video but I wasn't to be seen there. A related bunch of YouTube videos popped up and I selected the one that I am using for the Internet Link for Internerds of this month.

There are lots of videos about hams. Some are technical…Others are fictional comedies. The fictional ones are obviously the funniest…which proves what I always say: Fiction is stranger than truth. People are the strangest monkeys...and Ham Radio means different things to strange people. Hi Hi. (:o))

Play the video. The audio is in German, but there are English translated captions. This is not meant to bash any Germans. Some of my best QSLs came from DLs. The Third Reich had fallen, at least according to a non-fiction book by James Michener, and the WWII armistice signed by Harry Truman…So enuf sed.

The link is below. The GARC members who receive this newsletter by e-mail or on the Pat Masterson website can hold down their CTRL key and click on the link. Those who receive this newsletter by postal mail will have to copy the link into their computer home page Internet URL Box. Take care and copy it exactly as shown below. If you miss a character… who knows what advertisements or even stranger YouTube video you might get? Capitalization counts in any case. I mean that you can't use any lower case when upper case capitalization counts more than socialism….I think…

http://www.youtube.com/watch?v=TiVlvciPZx4

PUZZLE

This month I will give you another cryptogram to solve.

YB YUM VP FYJJMT "TYSQ," BKC IMFYAPM CZM JVUZC RYVJP CK PZVBM IAC

IMFYAPM HMKHJM SMRAPM CK PMM VC.

--DYGMP GVFZMBMS--

The solution for the November 2011 cryptogram is:

THE AMERICANS ARE CERTAINLY HERO-WORSHIPERS, AND ALWAYS TAKE THEIR HEROS FROM THE CRIMINAL CLASS. –OSCAR WILDE--

CQ de WA2LQO December 2011 Volume 84, Number 12

GARC Officers ***These are the 2011 officers. The newly elected 2012 officers are listed on Page 3***

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Secretary: Karen Cafalo, W2ABK 631-754-0974
Treasurer: Ed Gellender, WB2EAV (see above)
WA2LQO Trustee: Ray Schubnel, W2DKM Retiree
2 Yr. Board Member: Jack Cottrell, WA2PYK Retiree 516-249-0979
1 Yr. Board Member: Dave Ledo, AB2EF
1 Yr. Board Member: Bob Christen, W2FPF

Newsletter

CQ de WA2LQO is published monthly by the Grumman Amateur Radio Club for its members and friends. Editor: W2ILP 631-499-2214 W2ILP.RADIO@gmail.com This is new E-mail address.
Contributing writers: All GARC members (we hope). To submit articles or ham equipment advertisements contact the editor. Articles will only be edited when permission is granted by the author.

GARC Webmaster

Pat Masterson, KE2LJ Retiree 813-938-4614 Pat-Masterson@tampabay.rr.com

GARC VE Exams

We normally proctor exams for all classes of ham licenses on the second Tuesday of each month, starting at 5:00 PM. The exams are given at Briarcliffe College, 1055 Stewart Avenue, Bethpage, NY in room: Long Beach #5. Ham Exams are: Element 2 – Technician, Element 3 - General, Element 4 – Amateur Extra Class. All applicants must pre-register by contacting W2ILP. Time and location of exams are subject to change. If there are no applicants VE sessions will be cancelled. The fee for 2011 is $14 for all exams taken at one sitting. New first time applicants should be aware that their Social Security Number will be required on the application form unless they register with the FCC for an FRN. Applicants for an upgrade should bring their present license and a photocopy of it. All applicants should bring picture ID such as a driver's license. Study material may be bought from the ARRL-VEC or W5YI-VEC http://www.arrl.org or http://www.w5yi.org All VECs use the same Q & A pools.

Commercial FCC Radio Operator Exams

We are certified by the National Radio Examiners to administer exams for all classes of FCC commercial radio operator and maintainer exams. All Commercial Operator License Examiner Managers (COLEMS) use the same commercial license pools. Administrating fees vary. For information or to register contact W2ILP.

Editorial

First I want to wish everyone happy holidays and a happy healthy new year. Let us all enjoy 2012 better than 2011. Let us hope for better economic conditions, less global heat, and peace on Earth and good will to all men, women and children wherever they are.

I have been having trouble with my e-mail box. At the present time I can't send or receive e- mail using the w2ilp.radio@gmail address. I don't know why this has happened but it started when they would not accept my password. I think that someone changed my password who wasn't me. Maybe it was me and I forgot, because I have two faces on Facebook. I tried to merge them but I can't. I haven't even been able to get the two faces to be friends or relatives of each other. Google (which runs gmail) is now supposed to be investigating my problem, so I hope that I can get my usual gmail address back soon. Meanwhile if you or anyone who wants to register for an exam needs to contact me, try my new e-mail address w2ilp.radio@yahoo.com As I age I find that I get tired easily and don't care to go out much. I get tired of looking at TV or computer screens. I now spend more time reading than ever. I read real books, not the electronic i-devices that they are now trying to sell. I shave with double edged blades and real shaving soap.

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FIRST CLASS MAIL

Do Not Delay

SPREAD SPECTRUM and HEDY LAMARR
By W2ILP

There is a myth that says that spread spectrum methods were invented by the famous movie actress, Hedy Lamarr. This myth had been perpetuated by an article in the IEEE's monthly magazine (ironically called "Spectrum"). The article explained that Hedy had suggested using a frequency hopping method, where the frequency hopping sequence would be controlled by holes in a player piano musical roll. Hedy did make such a suggestion during WWII, in the hope that it would aid the US's classified torpedo guidance program. Not only did the US government initially ignore Hedy's suggestion because they were already secretly using spread spectrum and Hedy was not trusted well enough to be told about it, but frequency hopping spread spectrum methods had been used before WWII. Frequency hopping spread spectrum is basically a form of MFSK. RTTY is a two tone frequency shift keying system, while MFSK is a Multiple Frequency Shift Keying system. In its simplest form MFSK may hop from one RF frequency to another driven by a known "pseudo-random" code…or even a known musical piano keying sequence as Hedy suggested. The presence of a tone at its expected time can equal a 1 bit, while the absence of an expected tone can be a 0 bit. The MFSK-16 mode is weighted so that each tone represents four binary bits. It is not as popular with hams as PSK-31 or RTTY. That is mainly because it is difficult to synchronize. There is no certainty that many words will have a most or least significant frequency to sync on. Thus amateur MFSK must be tuned until the decoded characters appear to make sense. This is like tuning SSB by ear until it sounds proper. Frequency hopping techniques were used for secure HF commercial communication between Europe and Africa, as early as 1935. The MFSK that is now used by hams generates characters by its tone enabling sequence but technically it is the same type of emission as the spread spectrum concept with programmed hopping. Spread spectrum techniques are also used for many modern wireless and telephone applications, as well as to assign channels and to multiplex cell phone signals.

Renewed interest in Hedy Lamarr springs from a new book: "Hedy's Folly: - The Life and Breakthrough Inventions of Hedy Lamarr, The Most Beautiful Woman in the World." by Richard Rhodes. I read a review of this book in "Harper's" magazine, December 2011. Hedy Lamarr (Hedwig Eva Maria Kiesler) was born in Vienna, Austria, the only child of a wealthy banker. One of her seven husbands was munitions merchant Fritz Mandel. Her spread spectrum work was accomplished with the aid of George Antheil, who had composed an unsuccessful ballet for 16 player pianos. I plan to read Rhode's book to learn more details about Hedy's inventions, if possible. I am now reading another recent book, "Beautiful – The Life of Hedy Lamarr" by Stephen Michael Shearer. After further research, I'll try to tell the rest of her story. Stay tuned. –73—w2ilp