

CQ de WA2LQO

The official voice of the Grumman Amateur Radio Club
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COMMUNICATIONS SYSTEMS (continued from October 2010)

By Bob Wexelbaum, W2ILP

Aside from the simple diode detector, an alternate method of recovering the baseband signal which has been imposed as an amplitude modulation on a carrier is to pass the AM signal through a non-linear device. For simplicity, an example of an ideal device has a square law relationship between input signal x (current or voltage) and output signal y (current or voltage). Thus $y = kx^2$, with k being a constant. Because of the non-linearity of the transfer characteristic of the device, the output response is different for negative and positive excursions of the carrier, away from what is called a quiescent operating point on the $y=kx^2$ curve. As a result the output, when averaged over a time of many carrier cycles but only a small part of the modulation cycle, has the wave shape of the envelope which is the initial voice audio signal. The demodulation does not depend on the non-linearity being square-law. Any type of non-linearity which does not have odd function symmetry with respect to the initial operating point will similarly accomplish demodulation. This serves as a reminder that even when demodulation is not intended, such demodulation may occur when the modulated signal is passed through an amplifier which exhibits some non-linearity. The spectrum of an AM signal is similar to a signal which results from multiplication, except that in the former case a carrier of frequency $f_{sub\ c}$ is present. The carrier $f_{sub\ c}$ is shown on the ideal spectrum diagram as a single vertical line of no width. There is a lower side band to the left of it stretching out to $f_{sub\ c} - f_{sub\ m}$, and a mirror image upper sideband stretching out to $f_{sub\ c} + f_{sub\ m}$. A “multiplier” is a device that yields an output signal which is the product of two input signals. No real device exists that can yield the product alone. Suppose that the baseband signal extends from zero frequency to 1000 Hz, while $f_{sub\ c} = 1$ MHz. In that case the sidebands extend from 999,000 to 1,001,000 Hz, and the baseband signal is easily removed by a filter. The overall result is that the device for multiplication yields an output carrier as well as the lower sideband and the upper sideband signals. This is true AM. We can however take steps to cancel out the carrier. Such suppression may be achieved by adding to the AM signal another signal at the carrier frequency, which is equal in amplitude but opposite in phase to the carrier frequency. Under such circumstances only the sidebands remain and we have a signal that is called *double sideband suppressed carrier* DSB-SC. In the days of pentode vacuum tubes, frugal hams used an inexpensive form of modulation that is not mentioned in any communications course. It was called “clamp tube modulation” but was actually screen modulation of the transmitter’s final RF power amplifier, rather than the more common plate modulation. Plate modulation produces true AM but screen modulation produces a signal that is

known as *double sideband controlled carrier* DSB-CC. The RF carrier amplitude varies as a function of the screen voltage in the case of screen modulation. Another method which can be used to make a DSB-SC signal is to use two AM modulators and reverse their input polarities. The output of both AM modulators is then added. The carrier gets cancelled but the modulation remains at the output of the adder. This method is seldom used, because the carrier can also be removed by a filter, for DSB-SC but it is important because it is the method used for what is called a *balanced modulator*, which is used when we want to produce a *single sideband-suppressed carrier* SSB-SC signal. Hams simply call such signals SSB, and they are now the most common phone signals that hams use on HF. Hams usually null out (suppress) the carrier as completely as they can. Some commercial and military systems do not entirely suppress the carrier. They allow some level of carrier to remain as a *pilot carrier*. A pilot carrier can be used for developing automatic frequency control (AFC) in channelized communications systems, but this is no advantage for hams whose frequency bands are not channelized with assigned specific operating RF frequencies. A baseband signal can be recovered from a DSB-SC signal by multiplying a second time with the same carrier. It can be shown that the baseband signal can be recovered in a similar manner if only one sideband is available. That is what we do for SSB reception. It cannot be done with a simple diode detector.

(To be continued)

PRESIDENT'S NOTE by ED GELLENDER, WB2EAV

November 2010

I just heard recently that Cablevision and Fox TV finally resolved their weeks-long dispute. I had been following it academically...not only do I not have Cablevision, but I hardly ever watch Fox. But something happened in there that was interesting...something the amateur radio community might be interested in too.

What caught my interest was when at the most contentious and vitriolic moment of the debate; the FCC asked both sides to resolve the issue. Keep in mind that the FCC asked in the most gently and polite way; As a matter of fact it was so polite that everyone figured that they were surely not going to do anything. After 48 years in ham radio, I have been exposed to the ways of the FAA enough that I didn't quite see it the way that conventional wisdom had it. What I have seen when the FAA gets involved in any proceedings is that they state their case very politely and in a non-threatening manner. Then, if they are not satisfied with what happens next, in short order they come down on the interloper like a ton of bricks, levying high fines and pulling licenses with reckless abandon.

I was waiting to see if the FCC that I knew was going to follow up in the usual manner or not. When they were ignored and didn't do anything, I realized to my disappointment that we are seeing a watershed moment – the final emasculation of the FCC. It is like seeing an aged lion that used to be the king of the jungle become a toothless shadow of its former self.

There is a fairly popular Latin phrase “Sic transit gloria mundi”...roughly translated it means “Oh, how the great have fallen.” What a shame.

73, Ed, WB2EAV

GRUMMAN AMATEUR RADIO CLUB
MINUTES OF GENERAL MEETING 10/20/2010
By Karen, W2ABK, Secretary

The meeting was called to order by Ed at 5:45 PM.

TREASURER'S REPORT – Ed, WB2EAV

Finances continue to be in good shape.

REPEATER REPORT – Gordon, KB2UB

The repeaters are working.

NET REPORT – Karen, W2ABK

Thursday night net at 8:30 PM on 145.330 MHz had a few check ins.

Sunday morning net at 7:30 AM on 7.289 MHz had 4 check ins.

VE REPORT – Bob, W2ILP

Due to a lack of applicants, there was no VE/CE session in October.

OLD BUSINESS

We need programs and new ideas for our meetings.

NEW BUSINESS

The annual Coast Guard field day at Fire Island will be on HF bands with the call sign K2G. Levittown Ham Fest will be October 31.

PROGRAM

Bob, W2ILP gave a presentation about Nikola Tesla's fantasies.

GARC NETS:

40 Meters: 7.289 MHz at 7:30 AM EST Sundays

Net Controller: Eugene, W4JMX

2 Meters (via repeaters): 146.745 MHz (-600 kHz) at 8:15 PM EST Thursdays

145.330 MHz (-600 kHz) at 8:30 PM EXT Thursdays

Tone for both repeaters: 136.5 Hz.

GARC Net Controller Karen, W2ABK

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 maps 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.

WEB SITE

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

Close to the date of Halloween, there were a number of spooky items coming up on the Internet. One presented a short clip from an old Charlie Chaplin movie, called "The Circus". The movie was made in 1929. There is a person walking in the background of a scene of that movie who appears to be using a cell phone. This had led many viewers to believe that the person (not sure if it is a man or a woman) was a "Time Traveler". I studied the video and my only guess is that the person has a tooth ache and he or she is carrying an ice pack, not a cell phone. You can see the video and judge for yourself by going to: <http://www.youtube.com/watch?v=Iv9f-sOKmOU&feature=topvideos> If that doesn't get you there Google up Charlie Chaplin Time Traveler.

PUZZLE

Last month I didn't give you a cryptogram to solve. Instead I gave you a physics problem. Now I will give you the solution. For those who may not have saved the October 2010 Newsletter, let me repeat the problem.

There is a truck that weighs just slightly more than the weight that would allow it to safely drive over a bridge. The cargo on the truck consists of a cage full of a large number of big heavy birds. If the birds are all forced to fly will the truck make it across the bridge?

No one has sent me their own solution, which is typical of most people, who don't want to commit themselves to solving any problem if they haven't been officially assigned to do so. Here is its "high schools" solution and the correct "college" solution. When the problem was given to me, I said that the total truck weight would be less when the birds fly. The man who gave me the problem said that I was wrong and I believed that he was right and I was wrong at that time...but on further consideration, I remembered that I had heard that problem before and the truck would weigh less was the correct solution. So I took a bath and while soaking in the tub, where I do some of my best thinking, I figured out the correct solution. Just to make sure, I posted the problem on QRZ and received both solutions from readers of my post. My conclusions were verified by a well qualified professional physics expert.

If we change the puzzle by using fish in a fish tank, we can easily understand that the total truck weight would be the same if the fish were all swimming or if they were resting, like cat fish, on the bottom of the tank. This is because any increased water pressure caused by the swimming fish would only continue to add their weights to the bottom of the fish tank. For every action there is a reaction, and the simple high school solution treats the bird case the same as the fish case, concluding that there is no difference in the total truck weight when the birds are forced to fly...BUT a college student could apply partial differential equations to the bird problem. Why is the bird case different than the fish case? It is because the birds are in a cage and the fish are in a tank. The fish tank must be water tight but a bird cage is not air tight because birds must breathe air. Any increase of air pressure, which is required to help lift the fluttering birds is not simply transferred to the bottom of the bird cage. Some of it escapes to the ambient atmosphere through holes or openings in the cage. Pressure difference is transferred in all directions and the increased air pressure does not all transfer weight to the bottom of the bird cage. Thus **THE WEIGHT OF THE TRUCK AND CARGO IS DECREASED** when the birds are forced to fly and the truck may cross the bridge.

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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.

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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 preregister by contacting W2ILP (see above). Time and location of exams are subject to change. If there are no applicants VE sessions will be cancelled. The fee for 2010 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. Adminstrating fees vary. For information or to register contact W2ILP.

Editorial I recently updated my MS Word 2002 software, after updating my MS Vista OS software, my Java software, my Sun iTunes software, and my Trend Micro security software. As a result of this entire update loading, I have been unable to insert not only pictures, but our traditional "CQ.." heading. I was advised to get help from Microsoft but they seem to be stumped, possibly because they have not attempted to test the compatibility of my particular software configuration themselves. I am not a software person, and if Microsoft can not help...I may have to buy versions that are more deluxe or advanced to solve my problems, if not an entirely new Windows 7 PC. Please read the continuation of this editorial on page 6.

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FIRST CLASS MAIL
Do Not Delay

EDITORIAL (continued from page 5)

Plans are underway for HRU 2011, but I have not attended any of the planning meetings. I sent an e-mail to the HRU 2011 group telling them that I have decided not to participate in HRU 2011. I have received an e-mail from the committee saying that they will “miss my unique point of view”. I didn’t ask exactly what they meant by that.

After the test waivers for BPL (broadband over power lines) were supposed to have expired, what I and a local ham continued to hear seemed to be a type of BPL packet from the power lines that started at the corner of Commack Road and New Highway. I reported this to a ham who was working for LIPA. He began to investigate. He admitted that the interference was there and he had traced its source to the Commack Library (Huntington branch). He said that, as a LIPA worker, he had no authority to investigate the library. I can’t say for sure if it was BPL, but at any rate it interfered with the AM broadcast reception in any vehicle that drove near it. It was clearly illegal, if the rules of FCC Part 15 were to be observed and punishable by a daily fine if they were to be enforced. This pulse-like interference continued for almost two years...but then a strange thing happened which I admit may have been a coincidence. The nasty radio interference stopped on the day that President Barack Obama was inaugurated. It has not returned since that day.

At the time that President Ronald Reagan was president, the union that represented the air traffic controllers was asking for higher pay and better working conditions for their members. Reagan did not want any federal employees to hold up the nation, so he decided to lay off all the union air traffic controllers and replace them with new non-union controllers. The FAA said that this would break FAA rules, which required a certain amount of training and experience for taking on the responsibility of controlling and spacing air traffic. There was not enough time to train new controllers. Reagan’s policy won in spite of the FAA rules, proving that a President can trump (or enforce) the authority of any appointed government agency.

The standoff between Fox News and Cablevision was not solved by FCC mediation. Was it solved by a political party that spends millions of dollars on media publicity? Fox news has stars that promote a “unique point of view”. Was it a coincidence that the standoff was solved just before Election Day? I dunno. Let this be your puzzle for this month. -73 w2ilp--