# County Hunter News

May 1, 2008
Volume 4, Issue 5

Welcome to the On-Line County Hunter News, a monthly publication for those interested in county hunting, with an orientation toward CW operation.

Contributions of articles, stories, letters, and pictures to the editor are welcomed, and may be included in future issues at the editor's discretion.

The County Hunter News will attempt to provide you with interesting, thought provoking articles, articles of county hunting history, or about county hunters or events, ham radio or electronics history, general ham radio interest, and provide news of upcoming operating events.

We hope you will enjoy the County Hunter News. Feel free to forward, or provide links. Permission is given for copying or quoting in part or all provided credit is given to the CHNews and to the author of article.

County Hunter Nets run on 14.0565, 10.122.5, and **7056.5**, with activity nights on 3556.5 on Tuesday evenings around 8-9pm Eastern Time. Also, with low sunspot activity, most of the SSB activity now is on 'friendly net' 7188/7185 KHz. The cw folks are now pioneering 17M operation on 18.0915. (21.0565, 24.915.5, and 28.0565 when sunspots better). Look around 18135 or 18.132.5 for occasional 17M SSB runs.

You can see live spots of county hunter activity at ch.w6rk.com

For information on county hunting, check out the following resources.

The USACA award is sponsored by CQ Magazine. Rules and information are here: http://countyhunter.com/cq.htm

For general information FAQ on County Hunting, check out: http://countyhunter.com/whatis.htm

MARAC sponsors an award program for many other county hunting awards. You can find information on these awards and the rules at: http://countyhunter.com/marac_information_package.htm

The CW net procedure is written up at: http://www.wd3p.net/ch/netproc/netproc.htm

There is a lot more information at www.countyhunter.com . Back issues of the County Hunter News are available at www.CHNewsonline.com

De N4CD (email: telegraphy@verizon.net )

# Notes from the Editor

**1) April 1st Issue** – Hopefully, too many didn't go running around looking for "Power Tunnel Diodes" or getting upset at 'channelization of HF'. No one yet has invented them or likely ever will. Tunnel diodes still operate at the microwatt level. Everything else in the article is accurate, though! The FCC is not proposing to channelize the HF bands. That rumor has been going on for 20 years.

**2) Mobile Activity in April** – a good month for chasing MP and band counties for all with W6TMD and AA9JJ/N9QPQ on major trips, and others giving out counties left and right despite the not-so-great propagation. Many mobiles were on the way to and from the mini in MI. KL1V is running in FL and AL, MS on a 3 week trip!

**Darrel, W6TMD**, took a long trip to NE, SD, ND, MN, IA running through lots of states giving out SSB and CW contacts. 40M was very good, 30M was 'OK" and 20M was poor for the trip, but he was logging contacts left and right. In Richland, SD, he ran into a winter snow storm with weather advisories to 'stay off the roads'. That day he had to QRT early as the conditions got too bad and he had to skip a few counties and hunker down in a motel overnight. Winter weather is not over in the north in April! He had snow again in NE – while SD had more blizzards after he left there.

Darrel wrote me by email:

“Thanks a lot for all of your help on my trip. Conditions weren't always the best but 40 meters was definitely the top producer of contacts. I ran out of a few counties without putting the county out on all bands but usually couldn't be helped. Some days the snow conditions kept me from stopping and other days the shoulder was so sloppy that I couldn't pull off. But all in all the trip went fairly well.

The picture is from the county line of Boyd and Keya Paha, NE. The mag mount on the top of the cab is for 30 and 40 CW and the antenna off the trailer hitch is for 20 SSB and CW and 40 SSB. Just to give any idea of band production, the break out of contacts on this county line were:

20 SSB - 20 Qs
40 SSB - 34 Qs
40 CW - 34 Qs
30 CW - 21 Qs
20 CW - 11 Qs

Total 120 Qs.

Darrel W6TMD”

W6TMD - Boyd/Keya Paha, NE

**Don, AE3Z,** reported on his trip

"Trip down thru PA, MD, DE, VA, NC and into VA.. Drove 2100 miles. Cheapest gasoline $3.09 per gallon in NC. Most expensive gasoline... RIGHT HERE IN CHEMUNG COUNTY $3.38 per gallon.. Should have stayed down south..!! At least I got five of the 30 counties I need for MG and gave out lots of counties on 40 SSB and CW.. Some even on 75 meters.. 20 meter net was useless..!! I made one contact on 20 SSB net and that station told me that no one was running the net. After three days, I quit tuning the screwdriver up there... We had a great time and as long as I gave out just one county that someone needed, it was a successful and fun trip... Don AE3Z" (from K3IMC forum)

**Ed, K8ZZ** reported: "Tnx to all the Net Controllers on SSB and CW.. 19 days.. 11 States.. 227 Counties.. 5803 miles.. The cost of the trip for all the fun I had: PRICELESS.. Hope I was able to fill a few holes in the coloring book.. 73 Ed K8ZZ" ( From K3IMC forum)

**Dan, KM9X**, reported on his trip to IN: "ALMOST 15 MIN OF RUNS FOR ORANGE COUNTY, IN. Sullivan was about the same. Finished up some people for Master Gold for Indiana ( KE3VV and N7ID for sure, maybe others). I also got my last two MG in Kansas- thanks to Scott KA3QLF and N5UZW for the updates on where Frank, AA9JJ, was! Had a rider/observer/sightseer along - Comm officer for EMA. Got into rain in western part of state but overall was a good day. Hope I got some cleaned up that were needing that area. Almost all contacts were on 40m, no more than 3 on 20m in one county and one or 2 in all other counties." (From the K3IMC forum).

**AA9JJ/N9QPQ, Frank and Kay**, took a long trip from AZ up to MN, then over to MI, and further east where they put out quite a few MP counties for the folks. That kept many people chasing them for the teams, YL, stars and MP. Still going as of press time, headed east!

**3) Most wanted list from Dan, KM9X**

"It's time for the SPRING edition of KM9X Most Wanted Counties from the K3IMC website. Us usual, this is a virtual cesspool of useless knowledge that might provide one second of entertainment value to someone! Here comes the TOP 5!

#5 Each of these counties have ELEVEN needs posted: ADAMS, ID; MADISON, MT; RAVALLI, MT; CAMERON, PA; GIBSON, TN; DOUGLAS, WA; FERRY, WA; AND STEVENS, WA

#4 Showing TWELVE needs are: LAWRENCE, OH AND WASHINGTON, ID

#3 With THIRTEEN needs per county shown: VALLEY, ID; TRINITY, CA; JOSEPHINE, OR; AND WALLOWA, OR

#2 The second most wanted counties, with FOURTEEN needs posted are: WAYNE, UT and ESTILL, KY

AND THE NUMBER ONE MOST NEEDED COUNTY WITH 16 NEEDS IS: JEFFERSON, WA

As usual, all disclaimers apply (they are never there when you get there, the band died; someone ran it the day before, etc etc).

This information is for planning purposes only, NO WAGERING!!! KM9X Dan"

PS: It was later noted that Boise, ID, with 25 needs, is really at the top of the list!

**4) IC7000 vs. IC706 Mark II**

Larry, W0QE did a nice comparison of the ability of each of these radios to operate into an SWR above 1:1. See his web site for details at:

www.bnk.com/W0QE/Mobile/IC7000_vs_IC706_mobile_pwr.html

**5) GA QSO Party**

Wow! These folks know how to hold a 'party'. There were hundreds and hundreds of spots (N9JF very busy), with many mobiles running all over the state. Propagation didn't favor me, but I caught a couple new ones plus a few band counties. Here, I had only a few hours I could work them on 40M, and 20M was useless for most of the time. The fixed stations were easier to work, but naturally not in the counties I needed! Dang sunspot minimum! I sure heard lots of folks working the mobiles, but getting through the wall of people calling was tough! Still lots of fun. W3DYA and KN4Y were two of the regulars out running around with a dozen other mobiles.

Greg, NM2L, took a trip up to IL to visit with N9JF for the contest, so he could catch some of the many counties he needs in GA. He put out counties on the way up. His radio died, so he headed home 'sans radio".

Jim, N9JF wrote on the K3IMC Forum:

"The weekend was indeed a blast! The organizers did a great job drumming up activity, and one cannot say enough good about all the mobiles and rovers. My plan for the weekend was to simply clear a path to the shack and try to have everything in operational condition so Greg could get the last few counties he needed for USACA. Once the party started, I "got the fever" and

Greg would move aside to let me pick up the counties I needed for CW or Bingo. He primarily worked on 40 meters on one radio and I played around on the other one on 20, 80, 160 and 40 SSB (Greg didn't work any SSB at all). His total for the party was about 300 contacts in 153 of the 159 counties. I worked one other county while he was on the telephone: W4AN in Camden who moved into another county within a couple of minutes.

I mostly just worked stations which were new band-counties on the second radio (except for grabbing the ones needed for CW/Bingo on Radio 1 on 40 CW). I also spotted like crazy :) We missed Atkinson, Lee, Oconee, Oglethorpe and Terrell. I don't think any of them were spotted. He worked all the needed counties, and I wound up getting all GA for CW except for Atkinson.

N4PN was the only mobile worked on 160, and he noted that he had tossed a wire into a tree, which explains why he was nice and loud! W4AN in Echols was the only mobile to move the meter on 20 all weekend, though KN4Y repeatedly heard me call even though he was at ESP level here. The mobile signal strengths on 40 were fairly even on CW.

Mobiles worked were as follows: (counties/contacts): K4ZGB 5/5, KC4HW 11/11, KN4Y 28/30, N4FD 6/6, N4PN 30/30, NE4S 7/7, NF4GA 4/4, NG4Z 3/3, NY4N 32/32, W3DYA 29/30, W4AN 32/35 (!!), W4NZ 23/24, W5LE 16/16, WB4A 5/5. Greg made one contact on 160 (N4PN in JASP), 34 on 80, 253 on 40 and 7 on 20 (all CW

Cherokee was the easiest county to work (8 contacts). As noted in various places, some mobiles did not identify very often. I have been on both sides of that controversy; there has to be a middle ground that will satisfy everyone...or maybe not! Those who consistently came back to the same frequency on 40 after being on 20 sure helped make it easy to find them! The pileups were just amazing.. 73, Jim N9JF”

Greg, NM2L reported: “What a GREAT GA QP....I managed to finish up Georgia! With Jim and Melba's hospitality, Melba's cooking, Jim's spotting and his fairly substantial antenna farm.... we had a real blast. Thanks also to KN4Y who was the "last county set-up man". Ed came through with Schley, Taylor, Talbot and Marion on Sunday. .....then Norm finished the state off with Wilkinson in the last half hour of the contest! Georgia is done! All I have to do now is wrangle a couple of other cards out of some of the non-

county hunters and I will be looking back at Georgia with a smile on my face. Also, thanks to everyone who spotted all those counties over the weekend. The spots really helped! We worked 154 out of the 159 Georgia counties! 73 de Greg NM2L"

**6) Peak Oil News**

The news gets worse and worse. Nigeria is having major problems funding its share of 'joint' exploration and production, which could lead to a 30% drop in oil production in the next decade. The cornucopeans have planned on Nigeria doubling output. Half of what Nigeria produces is exported to the USA.

Saudi's King has said that oil projects will be shelved to provide for future oil production. Even worse, Saudi has said it will not increase production capability until 2020. (Matt Simmons was right – they are peaked out now!).

OPEC is likely to decide to reduce output quotas (it may not have a choice). Meanwhile, for the second year in a row, conventional oil production did not increase. The US dollar keeps declining in value, making the price of oil bought in dollars escalate even more. Would you believe $200/bbl oil by the end of the year? Details later in the newsletter.

It is also time for 'summer gas' which normally triggers a 10% rise in production costs, naturally passed on to purchasers. It's already just about at $3.50/gal and headed up. It's higher now in California, too.

**7) MICHIGAN QSO PARTY**

Another good one! These folks know how to 'throw a party'. Many, many county hunters were heard working the MI stations – and there were quite a few mobiles in MI putting out counties. In the day, 20M was good with lots of activity, and in the evenings activity shifted to 40M and down. Not much heard on SSB, but hundreds of spots on CW. I caught my next to last for all 40cw, and hunting for the last one.

**8) Mini in MI**

Ed, K8ZZ, wrote on the K3IMC Forum:

"Tnx to Steve, AK8A, and Paula for starting this event 18 years ago. This was our first one in Traverse City and it was a huge success with 62 registrations. Many tnx to all who attended to make our first Mini memorable forever. A special tnx to Gene, KD9ZP, for accepting the invitation to attend and put on a Logger forum. It was well received by all. A special tnx also to Tim, W8JJ, for his presentation on mobile operations while traveling. A special tnx to Jeffery, AF3X, for the web page and pictures. Next years event is already in the works for April 23,24,and 25th, 2009. Again, tnx. Ed, K8ZZ and Joe, W8TVT."

# On the Road with N4CD

At the end of March, it was time to do some county 'putting out'. The N4CD mobile had been resting up for a month after the trip to the well attended mini in South Texas, and several other activities had concluded locally. Ed, K8ZZ, had been running counties for 19 days, and headed back home. He ran through lots of good counties along the way. So it was my turn to put some out.

Charlie, W0RRY, is closing in slowly on MG and on 'All CW'. He now lives about 25 miles away, so it is easier to drop on by (compared to Tulsa). He needed 2 out in central TX and I needed a few to get toward Third Time CW. Conveniently, there was a hamfest scheduled for Weatherford, TX, so we decided to make a trip. We could get 2 of his last 3 in TX, and 4 that I needed, plus some listed needs for quite a few.

I picked him up early (7am) at the Corps of Engineering Campground where he parks the motor home, and we headed out to Parker County for the small but usually good hamfest. I picked up some goodies. After an hour, we had 'seen it all', so it was time to head out west.

This was the WPX SSB contest weekend, so 20M SSB was a real mess, with no net in operation. We came up there a few times, but usually massive

QRM, no net control, and no one around to answer. Not much seems to happen there now anyway at the bottom of the sunspot cycle anyway. 40M SSB and CW were quite good with several of the regulars holding things down as NC. The A index was above 10, so conditions were challenging. We got many counties that folks needed, but missed on a few – just couldn't be heard or hear them.

N4CD operated CW while W0RRY logged, and W0RRY did the primary work on 40M SSB with 'N4CD on the side'. Dan, KM9X, needed Stonewall, and we hit some of the less run central TX counties including Foard, Knox, King. Yes, once again we drove around Stephens – guess I"ll have to make a special trip as folks always need that one. Hi hi. We ran short on time, so we skipped the few in OKLA that were needed. Another weekend trip. We used the QRP 30M rig to work each other in needed counties for ourselves. No problems with propagation on those contacts – hi hi.

After 635 miles, and a long day with one detour of 30 miles caused by a bridge outage, we made it back home safely. Car averaged 28 mpg at average speed of 70. Can't complain too much, but gas $3.25 now.

Then, on April 9, a big storm hit the Plano, TX area. Winds 80-100 miles an hour tore up power lines for 135,000 people. In my neighborhood, hundreds of trees broken off, damage to wood chimneys, skylights, ventilators. Power out for 2 days. North of here a few miles, siding ripped off houses and aluminum flying through the air – through windows, wrapped around things. Roofs ripped off. Spring time in the middle of the country. Of course, not bad compared to Charlie, W0RRY, who lost power last fall for 9 days along with many in MO and IL with an ice storm, and temps down in the 20s and 30s!

W6TMD was headed through some desperately needed counties, so I went mobile in the local park here both days, helping out the mobiles as NC on cw and snagging needed MP counties from W6TMD and AA9JJ/N9QPQ. I kept calling the home phone number and when the answering machine finally answered on the second day, I knew power was back and headed home to operate. Fortunately, the weather cleared up right away and was mild, so no one froze here. That was 2 days of unplanned 'mobile time'. Hi hi. Now just imagine a scenario where power goes out over wide areas for

long periods of time in the future as resources begin to fail, and nothing else is in place to handle it – we are headed there right now.

In the Middle of April, after tax day, there was another hamfest in Belton, TX – one of the better swap meets around. Friday, 4/18, I headed down the interstate. Massive traffic backups with construction – and sitting and going 5 mph for a 30 mile stretch. My car doesn't get good gas mileage at 5 mph stop and go (and mostly stop for 2 hours). Two hours later than normal I arrived at the Motel 6 in Belton, then headed over to the Bell County fair grounds.

Three years ago, there used to be 20-30 motor homes out in the parking lot overnight, and a bigger flea market. Now, with higher gas prices, there were two motor homes. The flea market wasn't bad, and most of the inside space was sold out as well. I found some goodies I'd been looking for, so it was a good trip. The car got 25 mpg down with 2 hours of sitting in barely moving traffic, and 29 mpg on the way back (one 30 minute backup over just a mile of road!). Too many cars, even with gas at $3.40/gal average. Not many are cutting back yet. I wonder what it will really take? $6/gal gas? $8/gal gas? If oil hits $200/bbl, gas will be $7 to $8/gallon!

Conditions started out good, but Saturday afternoon the band went to pieces. I caught some who needed me, but with a few others, things just didn't work out. The good news is – the swap meet is twice a year in Oct and April, so I'll be headed that way again in six months! I might need to get a 'gas mileage multiplier' to add to my car to get there though at current increasing gas prices. (Is that something they send out new Boy Scouts to look for? Like snipe hunting and 9/12 tent stretchers? ). If you find one, let me know.

# On the Historical Trail

## Broadcasting, Vacuum Tubes, and Receiver Technology

I. Introduction

One of my favorite series on TV ever was the BBC 'Connections' program with James Burke. He took a thread, starting with some historical invention, and traced it through the decades and centuries, to show, for example, of

how the Roman chariot wheel progressed to the steam locomotive, automobile and beyond. It was always fascinating.

You can read about the history of broadcasting in many books. You can read about the development of receiver technology in dozens of excellent texts, and any ARRL Handbook. You can read about vacuum tube development from Lee De Forest on, but you will look hard and long to find a history of all three together and how they were inextricably interconnected. All three determined the development of the 'wireless industry' and two way radio as we know it today - especially ham radio.

Why did receivers start out as crystal sets? Then move to TRF (tuned radio frequency sets), and regens, and finally to superhets? Each new technology required more tubes and more parts and more complexity, and also more cost. What were the triggers that made change happen? What were the enabling technologies that allowed it to happen? Today, you have over 4000 AM radio stations, across the band from 540 to 1700 Khz. It wasn't always so!

II) Back to the 1910s

There were many wireless enthusiasts around 1910, listening into commercial wireless stations transmitting in Morse Code. That's all there were. You could build a simple coherer detector, or a simple crystal radio set, string up a good size outdoor antenna, connect up a ground, and hear high power Morse stations from 5 to 50 miles away, even further for exceptional high power stations. That was about it. You could use a Model T spark coil and talk a few hundred to few thousand feet with your spark coil to another friend. Dull by today's standards, but that was all there was. After 1912, hams were banned to the 'useless shortwaves' above 1.5 MHz (200 meters and shorter wavelength) but all the commercial stations used frequencies from 30 KHz to 500 KHz. "Everyone" knew those were the best frequencies for long range communications! Range suffered even more for hams banished above 1.5 MHz. There was no 'broadcast radio' before WW1.

The outbreak of WW1 saw the rapid development of radio technology. Before WW1, the audion had been invented, and was barely in use as a 'detector' in expensive top end commercial equipment. De Forest had

shown in 1913 that two audion triodes in series provided useful audio amplification. The first audions were gas filled with tungsten filaments.

AT&T had managed to make long distance repeater amplifiers out of audions, but they were not ready for consumer use. One of the key things AT&T did was use 'high vacuum technology' imported from Europe, and also design an oxide coating that gave much better performance. (thorium)

Audions were cantankerous, unreliable, short lived, and very expensive. They were basically light bulbs with tungsten filaments with an added plate element stuck in and a primitive grid system. They used a lot of power for not much performance. This was the era of 'soft' vacuum tubes (they had a lot of residual gas in them). No two tubes seemed to work alike. AT&T started the trend to 'high vacuum tubes' (no residual gas).

When WW1 broke out in Europe, there was intense desire for wireless communications. The French invented a hard vacuum tube and mass produced it. When the USA entered the war in 1917, it had to import tubes from France mass produced there for detectors in wireless sets. Western Electric, the manufacturing arm of AT&T, then rapidly developed the VT-1 and VT-2 tubes from its audio amplifier technology. They had 2.5v filaments that took at 1.1 amps and had a mu of 6. (amplification factor).

## III) The start of Broadcasting

Broadcasting started after WW1 in the early 1920s with a few experimental stations. The Department of Commerce regulated the radio frequencies. So-called 'entertainment' stations were allowed to operate on a wavelength of 360 meters (833 KHz). A second frequency of 485 meters (690 KHz) was set aside for broadcasting crop reports and weather services. Neither the transmitters or the receivers were capable of operating on 10 KHz wide channels. Primitive vacuum tubes in the transmitters struggled to make 10 or 20 watts output, and a 50 watt tube was as big as the manufacturers could make them! (remember crystal control didn't appear to the mid 20s)

Every entertainment station had to share the same frequency! When interference became excessive in a market, some stations slightly shifted

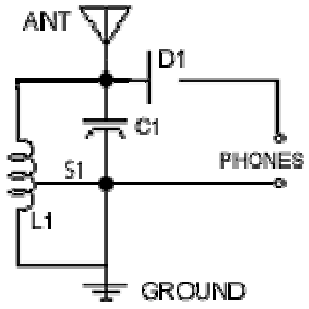
frequency to try to reduce it. Stations would normally take turns on the same frequency. That arrangement amazingly lasted up till the 1990s in certain markets (Chicago and Dallas, TX were two). Stations would sign on for a few hours, broadcast, and go off, then another would take the next few hours!

Initially, nearly all listeners used simple crystal radio sets simply for cost reasons. They weren't very sensitive, so the range at which most people could listen to the typical 10 to 250 watt broadcast stations was only a few miles. Thus, you could have a dozen different stations around a major city not interfering with each other! At night, there was no problem since the average receiver was so insensitive that this wasn't a problem – the strong ground wave necessary to be heard on a crystal set overrode any 'weak' skip.

Most transmitting antennas at broadcast stations were 'flat tops' – a 3 or 4 wire parallel set of wires supported between two towers, and fed near the center with a 'cage' of wire leading to an antenna tuner, then to the transmitter. This was 'commercial practice' started by Marconi 20 years earlier. It would stay that way through the 1920s.

What started out as a handful of stations in 1920-1921 very quickly became a crowd. A second frequency was added in 1922 allowing stations to use 400 meters (750 KHz), and was dubbed Class B (for better stations). These could run 1000w input power. Class A stations on 833 typically ran from 5 to 250 watts input!

Naturally, to separate out the two stations on a band did not take a super selective receiver. They were far enough apart that a simple high Q tuned circuit of a crystal receiver was usually adequate, if you even were lucky enough to have had two to listen to! Most listeners had a choice of one! There were millions of crystal sets built from parts by young boys and adults alike. It didn't take much to tune in 'the one station' in town if you were close enough. Millions of commercial sets were made , too!




Simple Xtal Set

This set above could be made from a cardboard coil form, a fixed capacitor made from alternating tinfoil and waxed paper homemade plates, a galena crystal and high impedance headphones. The tap on the coil was a slider, that shorted out the bottom turns. It controlled how much L you had in your tuned circuit. Good for reception at a few miles with a good antenna and ground! You had to buy the galena crystal and holder (cats whisker) and the headphones, and scrounge the wire. The coil was wound on an empty oatmeal container or similar.
Most consisted of variations of 'sliders' (adjustable shorted out inductors for tuning) sometimes as the only tuning element (using the capacity of the short antenna to form the resonant circuit). More complicated ones had a fixed capacitor to make a resonant circuit like above. There were also multiple tap 'loose couplers' where you could both vary the taps for matching to the antenna, the coupling to the antenna, and perhaps tuning in the secondary. In many early variations, 'variable capacitors' were too expensive for hobbyists to use, so folks used variometers – a rotating inductor within another fixed inductor – to vary the inductance of the series connected coils – sometimes with a fixed capacitor of several hundred mmf made from tin foil and waxed paper! No one manufactured 'capacitors' back then – there was no need for them until radio came along!

Maybe you made a crystal set as a Boy Scout? Half a dozen parts including a head phone, galena crystal and cat whisker, slider on a coil, and one r.f. bypass cap, and 4 Fahnestock clips to connect the antenna, ground, and headphones.

Here's a Department of Commerce document dated 1922 telling you how to build your own crystal set in detail!

http://www.crystalradio.net/crystalplans/xximages/nbs121.pdf

One of the problems of crystal sets is keeping the Q high. You want the least coupling to the antenna to keep the Q as high as possible, and the coupling from the primary (where high Q is important) to the secondary circuits, if present. Some sets had an amazing number of taps and adjustments!

For those with 'disposable' incomes, better performing tube sets started to appear in 1922. This of course took more reliable vacuum tubes that just started to appear. Would you believe, that in order to get around patents, many of the first radios were supplied in kits? That got around the patents about 'manufacturing radios'. Now, if you are very lucky, you might find an Atwater Kent breadboard radio from the early 20s. All the parts were supplied, and you had to 'construct it' yourself from the detailed plans. A radio in 1922 might cost $40. The tubes were an additional $5 each. That was a lot of money back then. (I think Model T Fords sold for about $395). So think of an AM radio with tubes costing about 1/6$^{th}$ of what a new car would cost you – maybe the equivalent of $2000+ today!). Youch!

**IV) Now a short interlude of vacuum tube technology development**. You can't have tube radios without tubes.

There were only a handful of tube types available after WW1. RCA decided to manufacture tubes. The UV-200 and UV-201 were two of the first. The UV-200 had a 'gas vacuum' – argon gas was added. It made a decent but unstable detector. The UV-201 was a hard vacuum tube. Both had tungsten filaments that had to be heated to high temperatures to get electrons to be emitted – they were called bright filaments as they glowed like a light bulb in operation, and they consumed lots of power from batteries. (5v at 1.1 amps or 5.5 watts). Now think of running 4 of them off a battery! Early tubes also had high capacity between elements. They were likely to start oscillating when you tried to use them above a megahertz, and this proved to be a constant problem until the tetrode appeared with a screening grid years later.

In 1922, manufacturers figured out how to include a small amount (1.4%) of thorium in the tungsten filaments. This allowed the emitter to run at much lower temperatures (dull filaments) requiring only one fourth the power.

The UV-201A was a thoriated version of the 201 tube that fit the same socket.

UV-201 Tube

In 1922, Westinghouse brought out the smaller WD-11. It was designed for battery powered and portable sets – a 1.1 V filament that would need .25 amps. GE would come out with the UV-199 in 1923 which used 3.3v at 0.06 ma. Both were used extensively in early radio sets.

A few years later came the type 30 tube, which only took 2v at 60 milliamps – filament power had gone from 5 watts down to 120 milliwatts. The early tubes could put out maybe 100 milliwatts of audio power. Most users of battery powered radios used headphones, or users bought ultra efficient 'horn speakers' and sometimes spent money on 'power amplifiers' to drive them to louder levels.

Early tubes were used for three purposes: RF amplifiers, detectors, and low frequency audio amplification. Often, in 1922, manufacturers selected tubes on the production line for how well they worked in each application. Then they color coded them, so a red paint splotch might be 'good for a detector' and yellow might mean 'good for an RF amp'. The same tube number, but different color codes!

Now, if you have a 'new' WD-11, you can get quite a few bucks for it. A working tube is worth $$. The filaments were notoriously fragile, and when they failed, tended to short the HV line to the filament, taking other good tubes with it. If anyone has an old radio using them, they are afraid to turn it on! Other early tubes can cost more than the radios themselves, and a 1922

Atwater Kent breadboard radio in good condition can sell for $800 or $1000 with a complete set of working tubes. The early tubes quickly became obsolete, and people retrofitted better tubes into the sockets with adaptors.

However, you can still buy "New Old Stock" or tested good tubes (201A, WD-199s, etc) on Ebay! And the original radios – many in amazingly good condition – as well as lots of real junque.

**V) Back to broadcasting history**

By 1923, the number of stations on 360 meters reached 524. Broadcasters clamored for 'more frequencies'. The Department of Commerce decided to expand the broadcast band from 530 to 1350 KHz, and channels were spaced 10 KHz apart. Stations were given the option to move. There would be Class A stations at up to 500w, and Class B stations at up to 1000w. Now, instead of having only one, sometimes two, frequencies to separate, you might have five or ten in a market. Or 15. Simple one tuned circuit selectivity was not going to work well any more. You'd hear multiple stations often heard together no matter where you tuned your set! If you had one loud nearby station, that might be all you ever hear as it would swamp out the weaker ones. A single tuned circuit, or two of them, weren't going to be enough.

This expansion helped to relieve the congestion of too many stations on 'the same frequency'– but produced another problem – the need for more selectivity in receivers! While hobbyists were using crystal sets and millions of kits and hundreds of thousands of manufactured crystal sets had been sold, it was time for a major shift. Before, everyone had been on one or two frequencies. Now you needed the ability to separate out a dozen stations, maybe 50 KHz apart across the band. Some were loud nearby, others were distant. You not only needed selectivity, but some dynamic range.

Those with money could afford sets with better performance. Those on a budget were having big problems and forced to 'upgrade'. However, it was not unlike the beginning days (and even today) of computers, where anything you bought/built would be obsolete in 5 years. Your $1500 or $2000 computer in 1985 was so out of date 5 years later you bought a new one to replace it at $1500 or $2000, then did it again 5 or 6 years later! Back then, it was broadcast radios!

## VI) Selectivity, Please!

There were two ways to increase selectivity in the early 1920s. Both methods would also increase sensitivity, another highly desired feature that customers and broadcasters both desperately wanted. The first was using multiple tuned circuits and amplifiers in a radio – the TRF or tuned radio frequency set. The second was the regenerative receiver. Both had pluses and minuses

One unintended consequence of better receivers came nighttime interference from skip stations. Now receivers were both more sensitive and more selective, but that doesn't help when stations are all piled up on the same frequencies at night! It meant those distant stations would be heard wiping out the local stations frequently.

More complicated crystal sets appeared – some with external wave traps to suck out a strong signal so you could listen to a weaker one. But the era of simple receivers was quickly coming to an end. People tried directive small loop antennas for directionality to null out interfering stations.

One of the technical problems of crystal sets is that hooking the rest of the radio (the diode) reduced the "Q" of the tuned circuit. The impedance looking into the diode/headphones was less than 10K ohms, and that effectively reduced the selectivity. You could tap down on the inductor, but then you had even less signal for the detector. Crystal sets fed microwatts to the headsets on weak stations.

Fortunately, vacuum tube technology was advancing quickly enough to solve the problem. The least expensive alternative was a simple set with a single tube – the one tube regenerative receiver – for kits. For manufactured radios, you had to pay a very healthy royalty.

### The Regenerative Receiver

If you take an audion and feed back some of the amplified signal in the correct phase, you overcome losses in the tuned circuit AT the resonant frequency. This is critical. You do not have to make it oscillate, just overcome losses in the tuned circuit. Not only that, the impedance looking

into the grid of a vacuum tube is likely more than 100K ohms or higher – thus the Q of the circuit is less effected by loading.

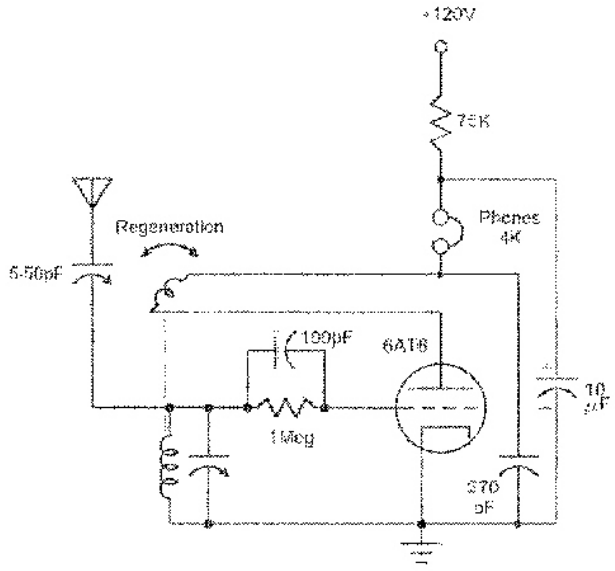



Figure 1-6: A Regenerative Radio
Similar to Armstrong's Original

changes the frequency of oscillation of the r

The feedback and negative resistance characteristic at, and only at the resonant frequency, provides a "Q multiplication" of the selectivity of the tuned circuit. Selectivity is dozens of times better than a crystal set and sensitivity is a thousand times better.

Many of the first broadcast receivers for home entertainment at 'the top of the line' quality wise were regens. (Armstrong held the patent and extracted lots of dollars from each licensed unit). Many commercial receivers quickly went to regen design if they could get a patent license. If you built your own radio, you didn't have to worry about patents – so there were lots of 'kits' to get around the patent. If manufacturers didn't want to pay royalties, they had to go to the second technology - TRF. Sets were still expensive. Kits allowed manufacturers to get around patents, and naturally experimenters everywhere built up their own regens from supplied parts or by buying components from the least expensive source.

With tube radios came the problem of power. Even in metro areas like Chicago, well under half of houses had electricity! It was only during the

1920s decade that electricity reached the majority of Americans, and appliances proliferated – electric irons and hot plates, lighting, washing machines, electric drills. That meant that the majority of radios had to run off batteries in the early 1920s! Later, they would slowly transition to a/c powered units.

Tubes were power hungry. Manufacturers usually designed for a wet cell battery (typically 6V or 2V) to run the filaments, and a dry cell B battery. You could often 'rent' the A battery, or get your own recharged for 50c at the local radio shop. Maybe once a year or two, you had to spring big bucks for the B battery. It would be more than 5 years before sets were designed to run on A/C home power. More tubes meant more power consumption.

Back 70 years ago, you had to likely pay a dollar or more a month for the electricity to run your radio if you listened a lot! That was a fair chunk of change back then. Ouch! Radios actually had rheostats on the filament to let you run them at the lowest possible voltage, saving the batteries. That was the 'gain control' and the 'volume control'!

Another advantage of the regen set was that if you set the regen control at the point where the regen detector went into oscillation, you would get 'heterodyne' reception of CW signals. You had to tune the receiver off by a bit, so that the regen oscillated at a slightly different frequency (say 500 Hz to 1000 Hz away). This was usually called the Autodyne receiver at the time. You not only had a fairly selective receiver, but you could copy CW to boot. (like the direct conversion receiver, a signal appears in two places either side of the zero tuning). The new control was the 'regeneration control' that set the amount of feedback. There was interaction between tuning and the regen control. Most simple regens had one tube and perhaps a single audio stage afterwards. They would easily run on batteries. These sets had gain, higher selectivity, and sold by the hundreds of thousands.

One disadvantage of the regen was poor overload performance. A strong signal in one part of the band would make it difficult to separate nearby stations. A strong station tended to 'pull' the radio to it. It had fairly poor dynamic range. After a few years, the cost of vacuum tubes came down, and another type of radio came into popularity which solved some of these concerns – the TRF (tuned radio frequency) set. That also got around the 'regen patent' that Armstrong and RCA had locked up.

**The Tuned Radio Frequency Technology**.

But the regen did not 'die' for ham use. While the TRF receiver would work well at the broadcast band, it fell apart at 'high frequencies' above 15. Mhz! Not only that, it had its own problems. Hams used regens for at least 6 decades, and even today experimenters play with them. One of the first commercial receivers for ham use, the National SW-3, was a regen!

Back in the 1950s and 60s, Heathkit, Knightkit. Lafayette, and a host of other companies sold regen kits. Maybe you remember the Knight Ocean Hopper, Space Spanner, and Span Master?


Knight Kit Space Spanner circa 1960

Lafayette Expore-Air Receiver

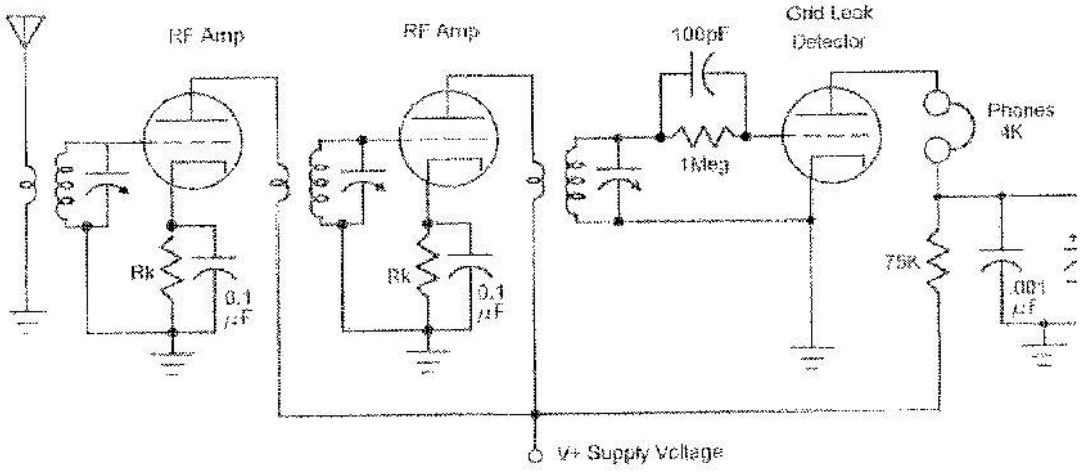



Figure 1-7: A Tuned Radio Frequency (TRF) Receiver

Above is a typical TRF receiver. It has several stages of RF amplification and three tuned circuits. In the first sets, you actually had three separate knobs for tuning in a station. In addition, you would have a volume control which consisted of a rheostat in the filament circuit and allowed you to

operate with the minimum filament power necessary. You controlled the gain by controlling the emission from the filament!

In the early days, an RF amplifier might have a gain of 5. Two RF states would give you a gain of 25 over a crystal set. Add another RF stage, and you would have 125 times gain. Now, these are not dB. The sets almost always used a grid leak detector that also provided for audio amplification. Some sets would have an additional audio amplifier.

These sets had advantages and disadvantages. With three tuned circuits, and little loading on the "Q" of the tuned circuits, they were much more selective that sets with less tuned circuits (other than regens). They did not have the overload problems of regens. Millions of sets like this were sold. The most popular had 4 and 5 tubes in them and were able to drive a horn speaker at up to 100 milliwatts, and later higher powers.

One of the problems was that if a set was designed to have 10 KHz selectivity (well, maybe 2-3 times that but enough to separate stations)at the low end of the band (500 KHz), by the time you got to 1500 KHz, you were at 3 times the frequency, and the same tuned circuits were now 30 Khz wide. You had less selectivity as you went up in frequency.

With the band first going to 1350, then to 1500, more and more stations appeared at the upper end of the band. During the day, without skip, that was no problem since stations were usually assigned 40 to 50 KHz apart in any given market. However, come night time with stations on every 10 KHz coming in, as the band filled up with more and more broadcasters, the sets did not work as well at the top end of the band as they did at the lower end. All the 'high power' stations favored the bottom end of the band.

Yet, millions were sold and you can still buy them on Ebay by the hundreds, and collectors still collect them. Within a few years, various suppliers brought out "A battery eliminators". Often they cost nearly as much as the radio, and you had to have A/C power at home. By the 1926 era, you could buy both an A, B, and C battery eliminator and run your entire radio off A/C. (the C battery was used to bias the audio amp grid negative). The first totally a/c powered integral sets appeared around 1928.

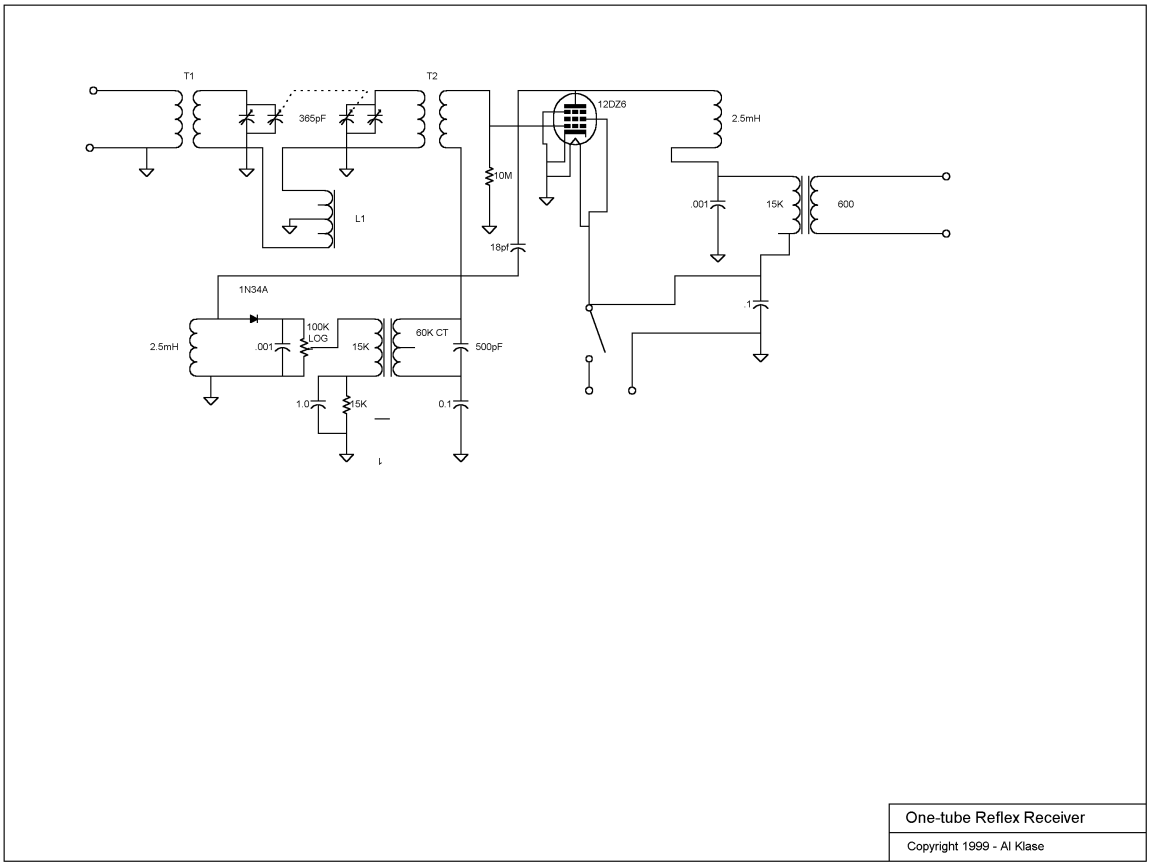
So while the TRF had better traits than the regen, and could easily separate out stations at 10 KHz spacing at the bottom half of the band, it lacked

selectivity at the top end. It also took more power from batteries than a regen.

The TRF also had one other problem. As tubes got better, the tendency of RF amplifier stages to oscillate increased. Having multiple circuits all on the same frequency required good engineering even with low gain tubes. You'd get coupling via proximity of coils of different states, and power supply coupling, but the inter electrode capacity was the worst offender.

Hazeltime came up with a solution – neutralization of each RF stage using RF feedback to cancel out the inter electrode capacitance. This allowed the set to be stable with high gain. (It would take another few years for screen grid tubes to arrive – an even better solution). The 'Neutrodyne' was, of course, patented, and manufacturers had to pay for the rights to build them. If you bought a kit, no problem with patents! TRFs provided good performance, but crowding of more and more stations in the band led to the abandonment of that technology by the time the 1920s ended. For most, they could now run sets off the commercial power lines, but throughout the 30s, there were many TRF radios made as 'farm sets' by the millions for those without power. Most ran off car batteries, so folks could charge them up in their car, and some ran off 24 or 36v from windmills! (about 20% of windmills sold in the 1920s/30s for were DC power – with radios as one of the chief uses of that power!).

One other trick early receivers used was the 'reflex design'. Since tubes were expensive and gobbled power, why not use the same tube as an RF amplifier, detect the signal, then act as an audio amplifier? That was the principle of the 'reflex' receiver. A bit more complicated, and a compromise in performance, but you could use one expensive tube for multiple purposes. Note this is not multiple tubes in one glass envelope, but the same triode or pentode used for both RF and AF!




**Reflex Receiver**

In the above diagram, the tube first is an RF amp. The RF is detected with a diode detector, and coupled back into the grid of the tube so it acts like an audio amp. One tube – two functions.

## The Superhet arrives

As the band filled up, manufacturers looked for a better 'solution' to the problem of interference and performance in the top half of the broadcast band. The solution had been invented more than 10 years before by Armstrong (and patented). It was the "superhet" (supersonic heterodyne). The mixing products of a local oscillator at RF frequencies with the incoming signal produced mixing products (the IF) in the 'supersonic range' so they would not be heard. Gain could be higher at the lower frequencies (the first sets used 175 KHz and 262 KHz IFs) with good selectivity from the Q at lower frequencies, and the receiver bandwidth would not vary with frequency across the band! With the need for more tubes, and the desire for higher power for speakers, these sets were nearly all designed for A/C power, and the first superhets hit the market in 1928. We still use that

design today, 80 years later. There were low power versions made for portable radio use, but you had to haul along many pounds of batteries to run them!

**Back to Radio Broadcasting History**

The DOC became the Federal Radio Commission – the traffic cop of the airways – and it expanded the AM band to 1500 KHz, hoping to reduce the problem. Recall at this time hams had the frequencies above 1500 KHz. The FRC had to sort out the mess. In some cities like Chicago, five stations shared the same frequency. The FCC started making some stations only daytime stations to avoid skip at night to others well established.

In the 1930s, the FRC set up three classes of stations – clear channel, Regional and Local – with different power levels and operating schedules. Locals were often only 250w, many daytime only. Power levels were increased to a maximum of 50KW for Clear Channel and Regional. Only one superstation station in US history exceeded that, and that was WLW which for ten years ran at 500 KW on 700 KHz – having to stop in 1939. (BTW, WLW was heard for 300 miles around during the day and worldwide at night while at 500 KW! – It was known as the Nation's Station). Needless to say, it made trying to listen to a weak distant station on another frequency challenging!

The vertical radiator tower so commonly associated with broadcast transmitters came into use in the early 1930s, and quickly lead to directional broadcast stations which could run at higher power and not interfere with others on the same frequency. Another big shift happened in 1941 when the US coordinated frequencies with Mexico and Canada, and stations once again had to move channels. Now the broadcast band went up to 1600 KHz. About 8 years ago, the FCC again expanded the band up to 1700 KHz.

## Receivers – Postscript

Hams, naturally, needed receivers to cover the frequencies above 1.5 MHz. The regen receiver was inexpensive to build and did provide excellent performance at the 'high frequencies' that they were banished to. The

initial TRF sets had tubes that would not work well over 1 MHz! Most hams used the regen.

Hams made good use of this principle of Q multiplication in receivers for decades to follow. They made good AM receivers as well as CW. Note it was not 'single signal' reception for cw, but you received the signal in two places at once on cw, just like a normal direct conversion receiver today.

Some receivers used regenerative IFs to provide additional selectivity, and in the 50s and 60s, many rigs featured in inboard or optional Q multiplier circuit that operated on the same principle! (this only disappeared with the introduction of good crystal filters in higher priced rigs, which allowed superhet receivers to really provide narrow CW reception).

By the mid 1930s, hams were building their own superhets and commercial ham radios quickly moved to simple superhets. The regens surfaced again in the 1950s with the need for simple, low cost receivers for 'shortwave listening'. Knight, Lafayette, and Heathkit and others provided entry level kits (Span Master, Ocean Hopper, Explore-Air, Space Spanner, etc) with a tube or two or three. The next step up was a superhet receiver.

**Conclusion**

The receiver technology of the 20s was driven by several inter-related processes. One was the assignment of more and more stations requiring ever increasing levels of selectivity. Another was the development of vacuum tube technology, which controlled the rate at which new technology could be economically deployed. A third was the arrival of A/C power in homes which made more complex set design possible (and affordability greater). All are deeply inter-related.

Hams benefited from the large number of tubes and products coming out of WW1 and the broadcast market. Without the broadcast market to sell millions of radios, there would have been little tube development and the associated components (variable capacitors, fixed capacitors, resistors, power supplies, electrolytic capacitors, batteries, transformers, speakers, etc). The ham market was small. The broadcast radio business was measured in the tens of millions of sets and hundreds of millions of vacuum tubes needed!

Another benefit was the development of transmitting tubes. All those thousands of broadcast stations needed transmitting tubes and wanted tubes of ever increasing power levels! Manufacturers had to develop better and better transmitting tubes. Without that market, maybe we'd only be at the 100 milliwatt level for tube power? It sure makes you happy that 'broadcasting arrived' and provided the incentive to spur radio technology to tremendous new heights.

# MARAC Contest

Don't forget – The MARAC contest is coming up real quick on May 3rd and 4th! .

Go to AA8R.net to find the complete set of rules.

USACW Award

One of the most popular awards these days is the "ALL CW AWARD" offered by MARAC. Likely over 100 active county hunters are working at it, and Elwood, KA3MMM, tracks people's status at the end of each year, so folks can track their yearly progress! That's the only award where progress is tracked!

George, AA4GT, wrote me:

"Hi Bob

I did buy a Vibroplex iambic deluxe key and I was surprised how easy it is to do CW with it. I am up to 1585 counties now on CW. My speed has picked up some, but I still need practice. I hear you a lot now on 40. Mary is doing ok but she has to use a cane. I did get my Geratol number this winter and also my Directors number. I use my Force 12 Flag Pole antenna for 80 meters. I made a Auto Transformer for the flag pole and

it works good on 80. I have been on the Omiss net also. My number is 1795 so I get a lot of calls. I hope everything is going fine with you.

73

George AA4GT”

Since conditions have been fairly bad on 20M, George is quite active on 40M SSB and CW these days.

# Peak Oil News

## 1) Missing Saudi Natural Gas

Saudi Arabia's boast that its southern desert region contains vast reserves of natural gas is facing growing skepticism, amid a string of exploration setbacks by international oil companies operating there. The kingdom had hoped that gas in the Rub al Khali, a vast desert that translates into English as the Empty Quarter, would be a key source of fuel for its booming economy. If the region turns out to be as empty as its name implies, Saudi Arabia runs the risk of a gas-supply crunch within the next decade at today's rate of demand.

If that happens, and the kingdom has less gas than expected, it will be forced to divert more of the oil it produces for its own use, leaving less to fuel the rest of the world's cars, airliners and factories.

Pessimism about the Empty Quarter was fueled by French oil company Total SA's decision in January to quit a consortium exploring for gas in the region after it drilled its third dry well.

The Saudi reserves are only about 20 percent larger than those of the United States, ranked No. 6, and most of the kingdom's gas is caught up in producing oil fields and not available for use. New discoveries have fallen far short of expectations.

Meanwhile, Saudi Arabia is seeing a huge increase in domestic demand for the fuel as a feedstock for everything from desalination plants to heavy industry and power generation.

Saudi Arabian Oil Co., the state-controlled oil giant known as Saudi Aramco, forecasts domestic gas demand will nearly triple by 2030 and is on a drive to boost the kingdom's reserves of nonassociated gas - that is, gas from wells that don't contain any crude oil - by 100 trillion cubic feet over the next 10 years.

One of the world's largest deserts, the Rub al Khali is one of the most-inhospitable environments on earth: temperatures can reach 131 Fahrenheit. Former U. S. Secretary of Defense Caspar Weinberger once wrote that Rub al Khali "makes Death Valley look like a summer resort." But it has long been seen as the key to Saudi Arabia's gas-supply problems. The hope is that the region will add a significant fresh stream of natural gas by 2011.

Husseini is among a growing contingent within Saudi Arabia that believes that the kingdom's whole gas strategy is misguided. With signs mounting that the kingdom overestimated its available gas supplies, Husseini said, "the consequence is that we need to go back to the strategy we had before, which is to make better use of oil, to be more efficient, and to be more gradual in our industrialization."

Source: http://www.nwanews.com/adg/Business/221340/print/

**2) Heavy Crude Oil – the yukky stuff**

PORT ARTHUR, Texas — Oil companies are traveling farther and drilling deeper to find that next barrel of crude. But the oil they're unearthing is increasingly gooey, acidic or laced with sulfur.

That's why two of the world's largest oil companies — state-controlled Saudi Arabian Oil Co., known as Saudi Aramco, and Royal Dutch Shell PLC — have begun plowing an expected $7 billion into the most ambitious U.S. refinery project in more than 30 years.

“Doubling the size of the storied Motiva refinery, whose roots go back to the days of the famous Spindletop gusher of 1901, will turn the sprawling plant here on the Gulf Coast into the largest crude refiner in the U.S. But the bigger plan is to make the Port Arthur facility the best equipped in the country to digest the world’s most challenging oil — the stickier, high-sulfur stuff that sells at a discount to the light, sweet crude that first put Texas on the map.

The refinery, now capable of handling around 275,000 barrels of oil a day, will grow to a capacity of 600,000 barrels a day by 2010.

From Asia to the U.S., refiners are bracing for increasing flows of heavier or more acidic crudes from the Middle East, Sudan, Brazil, Canada and Venezuela. Some of the logic is simple economics. The most easily refined light crudes, such as West Texas Intermediate, now sell for more than $105 a barrel. They yield the most high-value products, like gasoline. But the heavier, more troublesome grades go for sharp discounts. In recent months, Canada’s heavy crudes have sold for as much as $20 a barrel less than West Texas intermediate.

The Port Arthur project also reflects a longer-term reality as oil producers, many of them boxed out of the richest oil regions, such as Iraq, move to tap some of the least desirable pockets of crude. Heavier grades of oil now account for around a quarter of daily world-wide supplies, but some forecasters say that figure could jump to more than half by 2030. Refiners must be ready to turn that crude into usable gallons of gasoline, diesel and jet fuel.

Shell, which owns half of Motiva alongside Aramco, is now investing in heavy-oil projects in regions ranging from South America to Canada, where the company claims 20 billion barrels in heavy-oil reserves.

But the expansion is more important strategically for Aramco. In three years, Aramco plans to open the spigots on what could be Saudi Arabia’s last giant reservoir of crude: the Manifa field that stretches from the kingdom’s east coast into the Persian Gulf. The field, first discovered in 1957 but later mothballed, is slated to pump 900,000 barrels a day of heavy Arabian oil."

Source:  Shell press release

The ‘good stuff’ is getting scarcer. What is left is ‘the bottom of the barrel’ and refiners must adapt to it. Obviously, with the high cost of the refinery expansion, the price of your gas isn’t likely to go down.

**3) Russian Oil**

"Russia failed to grow its oil output for a third month in a row in March and closed the first quarter with a one percent production decline year-on-year. Energy Ministry data showed on March oil production edged down to 9.76 million barrels per day from 9.79 million bpd in February, and well below the post Soviet high of 9.93 million bpd reached in October last year."

**4) Saudi Oil**

"Saudi Arabia's King Abdullah said he had ordered some new oil discoveries left untapped to preserve oil wealth in the world's top exporter for future generations, local media reported.

"I keep no secret from you that when there were some new finds, I told them, 'no, leave it in the ground, with grace from god, our children need it'," King Abdullah said in remarks made late on Saturday, the official Saudi Press Agency (SPA) reported. "

Not only that, Saudi has just said it has no plans to expand beyond 12.5 million barrels a day of ‘capacity’ until 2020. That is what it can produce for 90 days max, and then it must cut back to current levels. Current levels are about 9 million bbl/day. You might see a teeny bit more, but not much.

The handwriting is on the wall. The world acknowledged that when Saudi peaked, the world has ‘peaked’. That moment is here. Even worse, the Cornucopeans are counting on Saudi producing 15 million bbl or more by 2020 to meet the increasing demand in China and India. . It isn’t going to happen.

**5) Nigeria**

Shell's future in Nigeria in doubt
Nick Mathiason The Observer, Sunday April 13 2008

Royal Dutch Shell is facing pressure from the Nigerian government and increasingly violent opposition in the Niger Delta oil-producing region, raising questions over its long-term future in the country.

Sources in the Delta say the Nigerian government has withheld up to $1bn as part of a production-sharing agreement while the two sides are locked in talks over how to pay for new investments in the oil industry. The decision to withhold funds is preventing contractors from getting paid, say sources.

The difficulties for Shell and other western oil producers, including Chevron and Agip, could push oil prices to new heights. Last week, US light crude reached an all-time record of $112.21.

Shell says that 95 per cent of profits from its joint venture go to the Nigerian federal government. But Nigeria believes that it has been shortchanged by the oil majors.

'The whole Shell position is looking vulnerable,' said a source in the Niger Delta. 'I don't want to make predictions, but we are not too optimistic. There's a change in the environment. I am expecting this year to be very rough.'

Production levels in the Delta, a lawless and poverty-stricken zone where armed gangs connected to local politicians control communities, have been severely affected by violence and the theft of oil from pipelines. "

**6) The "Bakken Find"**

No doubt you have heard some of the hype of the 'biggest find' of hundreds of billions of barrels of oil under NDak and MT. Well, it is exactly that – 'hype'.

Last week the U.S. Geological Survey (USGS) released its long-awaited reassessment of the undiscovered recoverable oil potential in the Bakken Formation of North Dakota and Montana. The USGS estimated "mean undiscovered volumes of 3.65 billion barrels of oil," which sounds like a lot. A lot of the news media had been reporting 'hundreds of billions of barrels of oil' there. Pure BS.

Often called the Bakken "shale," the productive sandstone lies in highly pressurized productive (pay) layers have a net thickness of 6-15 feet, low porosity (8-12%), low permeability (0.05-0.5 millidarcies) and a water saturation of 15-25%. Some doubt that even 400 million barrels of oil is producible.

What makes the Bakken play possible? Technology has finally caught up to the Bakken Formation. The ability to fracture stimulate these horizontal wells is what makes this play work." Operators must drill down vertically about 10,000 feet and then "kick out" almost as far (± 9500 feet) horizontally through the productive sandstone layers. These long-length laterals maximize wellbore contact with the reservoir. Accordingly, wells must be widely spaced (e.g in 320 acre parcels).

It takes great human and technological skill to steer the drill bit horizontally through the pay layer. It is high risk work, with no guarantees of success or good oil flows. Oil must be well over $50 to justify the exploration and production.

The cumulative oil production 6 years after discovery is 32 million barrels. Production from about 350 wells had reached 1.6 million barrels in March, 2006. This works out to 53,000 barrels per day with an average well producing about 152 barrels per day.

Well productivity drops off rapidly after the first year or so of production. If other parts of the Middle Bakken are as productive as the drilled parts of Elm Coulee, and constant large investment in drilling activity in the western Williston Basin continues, we might see peak production somewhere in excess of 100,000 barrels per day.

OK…so the US needs 21 million barrels of oil a day. This is literally a 'drop in the bucket'. Maybe it might get up to 200,000 or 25,000 bbls per day from Bakken, but that isn't going to solve a lot of problems. However, in the oil world, 100 million barrels of oil at $100/bbl is 100 billion dollars worth of business to go after.

Wonder why your dollar keeps reaching new lows? We use 21 million bbl/day. At $100/bbl, that is 21 billion a day we spend on oil. That is 63 billion a month in oil, with 65% of it going overseas. **It's pushing nearly**

**half of one trillion dollars of wealth out of the USA every year to feed our oil gluttony.** That is why your dollar is dropping in value like a rock.

**7) The Pelosi "Premium"**

http://investorvillage.com/mbthread.asp?mb=2234&tid=4628582&...

"Republican lawmakers are using record high prices to pick at House Speaker Nancy Pelosi (D. Calif.). The office of Rep. Roy Blunt (R. Mo.), is calling the price increases since the Democrats regained control of Congress the "Pelosi premium.""

Apparently, the dimwit Congresslady from WA hasn't read the major study that was just done in her state by the state legislature to show there is nothing wrong with the current gasoline market? They already spent millions examining the market.

"Sen. Maria Cantwell (D. Wash.) and Sen. Amy Klobuchar, (D. Minn.) made a case for a federal probe as crude-oil prices rose 1.6% to $119.37 a barrel on the New York Mercantile Exchange.

"I think **the quickest fix** is for the president's fraud task force within the Department of Justice to initiate an oil and gas market fraud investigation," Sen. Cantwell said."

Oh, wow...you really think the Saudis and Venezuelans and Canadians and the Iraqis are quivering in their boots at the thought that the US Congress, busy in election year politics, is going to do anything but 'bash the oil companies'???? And try to 'blame it on Bush'?

"I think that they should work with the Federal Trade Commission, they should work with the Commodity Futures Trading Commission and others to get to the bottom of whether there is manipulation in the speculation of oil prices.""

Just to prove what the lib agenda is:

Another one of the lib democratic dimwits chimed in:

"With Earth Day as a backdrop to the concern about use of fossil fuels, Sen.

Dianne Feinstein (D. Calif.), said that "until we build the replacements for gasoline...there ought to be a **prohibition on market speculation.**""

As if some resolution passed by Congress would have any effect on the worldwide buying and selling of oil - the single largest traded commodity in the world – NOT!

# Dayton Hamfest

Due to unknown reasons, probably due to 'economizing', the folks at Dayton decided not to include the County Hunter Forum this year. So there is no county hunter forum scheduled.

To make news even worse, the Ryan's Steak House where we held the county hunter dinner in a reserved room is out-of-business. That makes the second place in 6 years that has gone out of business where we held our dinner. There is a nearby Golden Corral (just down the street from the Ryan's, but they don't have a separate room they will reserve, and now that Ryan's is shut, they are busier than ever – so seating of a group of 25 can only occur if all of us show up about the same time.

To cap it off, there is major construction one some of the major roads used to get to the hamfest. Visit

http://www.hamvention.org/hv2008/media/trafficnews.html

to find the best way to get there. Needmore Road will be down to one lane each way. I75 has closed lanes and construction. Take an alternate route!

It seems bad news comes in 'threes', so that should be it for Dayton. Does that mean 3 days of 75 degree sunny weather with a nice, slight breeze for cooling, and 'bargain prices' in the flea market? Let's hope so.

# The "Q" Multiplier

During the 1950s and 1960s, inexpensive superhets and military surplus receivers available to the ham radio community did not have very sharp selectivity for cw operation. Only the more expensive receivers (Collins, top of the Line Hallicraters, Hammarlund, etc) featured 'crystal filters' which were quite expensive. Ingenious hams and suppliers of ham radio equipment offered an inexpensive solution – the "Q" multiplier.

Hams know that the sharpness of a tuned circuit is dependent upon its "Q" – Quality factor. The higher the Q of a tuned circuit, the narrower the bandwidth will be. In a typical receiver of the 1950s or 1960s era, the bandwidth was determined by the bandwidth of the IF amplifiers – typically 8 or 10 KHz at the 6 dB down points. That was fine for AM and not 'too bad' but 'too wide' for simple single sideband operation. Usually, you had multiple CW signals in the bandpass – like listening today on your SSB transceiver with no cw filter, or with the cw filter switched out. One had to get very good at 'selective hearing' – listening for the audio tone of the desired signal, and 'tuning out' with your ear the others. It got very tiring to do, and when the other signals were much stronger, made copy hard as the AGC of the receiver would be affected by the stronger signals.

Some hams used audiotuned circuits in the headphone circuits – surplus 'beam' filters that were tuned to 1020 Hz – which could be bought for a few dollars back then. Others tried to homebrew selective audio circuits for 'peaking'.

It wasn't long before Heathkit, Knight Kit, and others started to offer a "Q" Multiplier which would attach to your receiver IF, and increase the selectivity of the IF strip. How?

Here's from the Heathkit GD-125 Manual:

The Q Multiplier, which is connected across the input IF transformer of your communications receiver, acts like a very high Q tuned circuit. And since all high Q circuits have a very sharp resonance point, the Q Multiplier can be used for either of the following purposes:

1. It can be used to peak a desired signal by performing like a very high Q parallel resonant circuit. See Figure 4. As the Q is increased, the side slopes of the resonant peak become steeper and steeper. Therefore, at the resonant frequency of the Q Multiplier, the desired signal "sees" a very high impedance and passes on to the IF amplifier. All other frequencies "see" a relatively low impedance and are shunted to ground. The Tuning control on the Q Multiplier adjusts the resonant peak to any point in the IF bandpass.

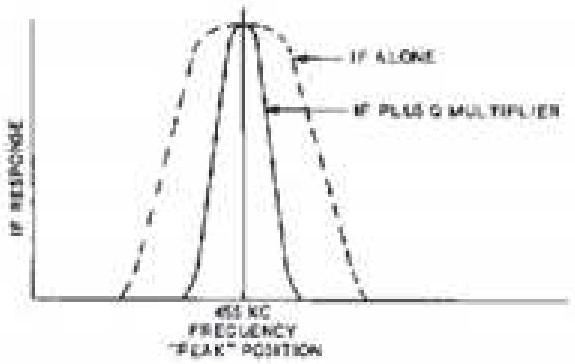



Figure 4

For peaking operation, the Q multiplier uses feedback (regeneration) to generate a very high Q circuit in parallel with the IF transformer. By adjusting the feedback, you can control the narrowness of the circuit.

For an audio null, the circuit is used as a series tuned circuit, which then shunts the IF to ground at the selected frequency, and passes all the others.

It can be used to null out an unwanted signal by performing like a very high Q series resonant circuit. See Figure 5. Here, the unwanted signal "sees" a very low impedance and is shunted to ground by the Q Multiplier. All other signals see the normal high impedance and pass on through the receiver. The null point can be adjusted to any point in the IF bandpass, therefore a heterodyne adjacent to the desired signal can be dropped into the notch (null point) and eliminated.

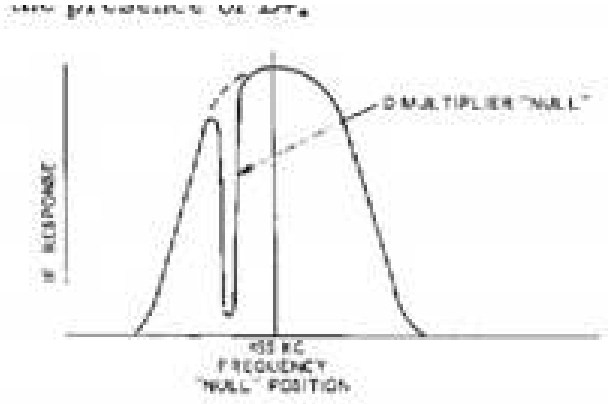



Figure 5

The Q multiplier essentially made your IF amplifier into a regenerative IF to increase the selectivity of the receiver. Naturally, the unit had to be built to use the IF of your receiver – mostly commonly 455 KHz, but not always.

From the Heathkit QF-1 Manual:

Basically, the Q multiplier bears a resemblance to the old regenerative IF but is capable of higher Q and is more versatile. The circuit is centered around a coil having a Q of 200 or more (#40-68) and this coil's Q amplified by positive feedback in one triode section of the 12AX7 tube to an apparent Q of approximately 4000. This compares very favorably with the Q of the quartz crystal used in crystal filters. The other triode section of the 12AX7 tube is switched in as a negative feedback circuit to form the null circuit. The remaining coil (#40-67) is used to tune out the capacity of the coaxial cable connecting the Q Multiplier to the receiver IF stage. This is necessary to prevent detuning the receiver IF by the cable capacity.

Wow! A simple 2 tube circuit gives you the Q of a crystal filter (4000), more or less. Not quite the same, but pretty darn good for a less expensive alternative.

The Drake 2B receiver had a Q multiplier as well.

Heathkit GD-125 Q Multiplier

An earlier version of the Heathkit was the QF-1

Heathkit QF-1

Here is the optional 2BQ Speaker/Q Multiplier for Drake


Nice Drake 2B Receiver and Optional 2BQ Q Multiplier and Speaker
Up for sale on Ebay

Here is a very, very rare piece of equipment


Central Electronics DQ - Q Multiplier

Other manufacturers were selling ‘Sideband Slicers” and other devices to narrow down the wide bandwidth of AM receivers of the day plus provide product detection for good SSB reception.

My second receiver as a ham was the Lafayette HE-80 (actually built by Kenwood). It had a built in Q multiplier that made cw operation easier.

Lafayette HE-80 showing Q multiplier controls

The HE-80 and all other pictures here were items up for sale on Ebay – all sorts of interesting nostalgia to look at there!

With the popularity of SSB, receivers moved to narrower bandwidths. When Heathkit came out with the famous SB series, the transceivers used the crystal filter method of sideband generation. The same crystal filter could be used for receiving, providing a 2.7 to 3 Khz bandwidth. Since the receivers were designed around a crystal filter in the IF, Heath made available an optional 500 Hz wide cw filter as well. For most people, there was no longer any need to have an outboard Q multiplier.

For many years receiver bandwidth was determined by crystal filters – in some cases, cascaded filters to give even sharper bandpass characteristics. As digital electronics progressed, selectivity in receivers is often provided in software – digital filters allowing variable bandwidth from a few hundred

HZ up to 6 or 8. No need to buy various expensive crystal filters for each designed bandwidth for operation!

References:

BAMA manuals at http://bama.edebris.com/manuals/heath/

# Peak Oil

**Energy for the future**

The magnitude of the energy problem becomes apparent when you compare the energy that you can get per $1 of gasoline vs. the energy you can get per $1 for solar. Let's run the numbers for gasoline and then do the same for solar. The numbers below are rounded/approximations, but they should convey the magnitude of the differences.

If you fill up your car with gasoline, the pump delivers about 4 gallons per minute. Thus it takes about 15 seconds per gallon. If you use $3 per gallon for the cost of gasoline, then it takes 5 seconds to pump 1/3 of a gallon of gasoline which costs you $1. One gallon of gasoline has the energy content of about 120,000 BTUs (BTU = British Thermal Unit)..) Thus, using gasoline, it takes about 5 seconds and $1 to pump 40,000 BTUs into your car.

Next we calculate how long you would have to have a solar panel in place in order to get a similar amount of energy per 1$ spent. We will only consider the initial capital cost of the solar panel and ignore installation costs, repair costs, cost of land for placement of the panel, opportunity costs for the up front capital that has been used (cost of money), dust/dirt that accumulates on the panels and has to be washed off, etc.

A 200 watt solar panel costs about $1,000. This does not include installation costs, auxiliary equipment, etc. to tie the panel into existing electrical systems. The panel will only generate 200 watts when it directly faces the sun. In early morning or late afternoon hours you get very little useful power. Also, if it is cloudy, your solar panel will not help a whole lot. For calculation purposes, we will assume that you average the equivalent of 4

hours of direct sunlight per day on a yearly basis. Thus your daily energy generation per panel is 200 x 4 = 800 watt-hours per day.

1000 watt-hours equals 1 kWh (kilowatt-hour). Your solar panel will generate 0.8 kWh per day. (If your electric rate is $0.10 per kWh, then your $1,000 solar panel will deliver $0.08 worth of electricity per day.) 1 kWh is the equivalent of 3413 BTUs. Your solar panel will deliver about 0.8 x 3413 = 2,730 BTUs per day. You spent $1,000 for your panel. Thus your energy return per $1 spent is just 2.73 BTUs per day.

Finally, we can calculate how long your solar panel has to be in place so that the energy return per $1 from your solar panel adds up to the 40,000 BTUs that you got in 5 seconds from gasoline. We just divide 40,000 by 2.73 to find out that it will take 14,652 days which is a tad over 40 years. It takes only 5 seconds to get the same amount of energy per $1 spent for gasoline.

We ignore the length of time it takes to "fill-er-up" with gasoline when we make a typical trip to the grocery store to buy food. What happens if it takes 40 years to fill up your electric vehicle with enough energy for one round trip to the grocery store? How about the trucks that delivers food to the grocery store? We assume that there will be some magic solution that will allow us to continue life as per usual. If you run the numbers, it looks like we are not even close to "a solution".

If/when the price of gasoline goes up by a factor of 10 (to $30 per gallon), does that make any difference in the viability of solar?

Now, in reality, the average car uses about 1% of the energy in gasoline to transport the driver. The rest is in losses, and hauling around 3000-4000 lbs of surrounding vehicle and conveniences. At best, a car uses 5-10% of the available energy in gasoline.

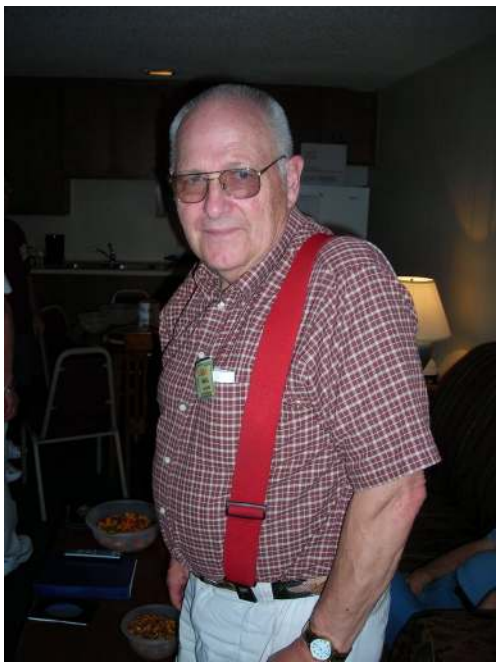
Over the past 15 years, the efficiency of the gas engine has been increased 30%. Did this go into providing better mileage to customers? No. And Heck NO. It went into bigger engines in cars (300-400-500 HP) and into bigger cars (6000 lb SUVs) and faster performance cars. The average mileage of cars hasn't increased in 15 years, but compared to cares 30-40 years ago, weight is up 30-50%, horsepower up 50-100%, and performance (acceleration) up 50%. All the 'gains' went into something that car makers could easily market, and that car addicted customers 'wanted'.

So where does it end? With rationing of gas? $8/gal gas? Shortages?

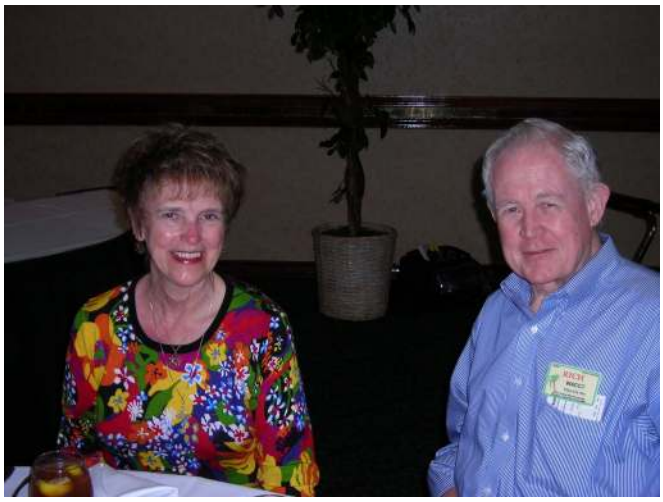
# Awards

| | | |
|---|---|---|
| Second Time #356 | NN9K, Pete | 4/5/2008 |
| USACW II #19 | NN9K, Pete | 4/5/2008 |
| Bingo III #11 | N9STL, Joyce | 4/17/2008 |

# Picture Gallery – More Pics from Weslaco 2008



Larry, W9SUQ, USACA #889



Rich, W4CCT, USACA 767, and XYL

# Operating Events for County Hunters – May 2008

Info courtesy the ARRL Contest Corral, QST, May 2008

Lots of good things this month to keep county hunters busy!

MARAC CW Contest -- sponsored by the Mobile Amateur Radio Awards Club from 0000Z **May 5-2400Z May 6**. Frequencies (MHz): 3.550, 7.050, 14.050, 21.050, 28.050. Work fixed station once/band and mobiles once from each county and band. Categories: Mobile, Fixed and Mixed. Exchange: RST, 2-character state code and 4-character County abbreviation. County line QSOs count as one QSO, but separate multipliers. QSO points: Fixed stations in US -- 1 point, DX -- 5 points, Mobile -- 15 points, one station must be in a US County. For mult list see www.bnk.com/w0qe/countyabbrev-v3-4col.pdf. For more information: www.countyhunter.com. Logs are due Jun 9 to aa8r@aol.com

10-10 International Spring Contest -- CW/Digital, from 0001Z **May 5-2359Z May 6**. Logs due May 21 (see Feb QST, p 100, or www.ten-ten.org).

Indiana QSO Party -- CW/SSB, sponsored by the Hoosier DX and Contest Club from **1600Z May 5-0400Z May 6.** Frequencies (MHz): CW -- 1.805 and 40 kHz above the band edge on 80-10 meters; SSB -- 1.845, 3.850, 7.230, 14.250, 21.300, 28.450, try 160 at 0200Z, no crossband QSOs. Categories: SOAB (HP, LP, QRP, no spotting assistance), MS (includes SO using spotting assistance), Mobile, Portable. Exchange: RS(T) + S/P or IN county (DX stations send RS(T) only). QSO points: SSB -- 1 point, CW -- 2 points, contact stations once per band/mode and once per county. County line stations count for 2 counties max. Score is QSO points × IN counties or S/P/C counted once per mode. Bonus for working W9KT. For more information: www.hdxcc.org/inqp. Logs due Jun 15 to inqp@hdxcc.org (Cabrillo format preferred) or HDXCC, c/o Mike Goode, N9NS, 10340 Broadway, Indianapolis, IN 46280-1344.

New England QSO Party -- CW/Phone, **2000Z May 5-0500Z May 6 and 1300Z-2400Z May 6.** New England is ME, NH, VT, MA, CT and RI. Frequencies (MHz): CW -- 3.540, 7.035, 14.040, 21.040, 28.040; SSB -- 3.850, 7.280, 14.280, 21.380, 28.380; no crossmode or crossband QSOs, all CW QSOs in CW band segments. Categories: SOAB (HP, LP and QRP), MS (includes stations using any kind of spotting assistance), mobiles use same categories. Exchange: RS(T) and S/P (non-US/VE send DX) or NE county/state. Work stations once per band/mode and mobiles in each county. County lines logged as two QSOs. QSO points: phone -- 1 point, CW and Digital -- 2 points. Score: Non-NE stations -- QSO points × NE counties; NE stations -- QSO points × S/P/C; mobiles total QSO points from all counties and count multipliers only once. For more information: www.neqp.org. Logs due 30 days after the contest to logs@neqp.org (Cabrillo format preferred) or NEQP, PO Box 3005, Framingham, MA 01705-3005.

7th Area QSO Party -- CW/SSB, sponsored by the Central Oregon DX Club from **1300Z May 5-0700Z May 6.** Frequencies: 160-10 meters, 6 and 2 meters; CW: 40 kHz above band edge; SSB: 3.855, 7.235, 14.255, 21.355, 28.455; no repeater QSOs. Exchange: state and county code (see Web site) or S/P/C. QSO points: SSB -- 2 points, CW -- 3 points. Score: QSO points × 7th area counties (7th area stations add states and provinces plus up to 10 DX) counted only once. For more information: www.7qp.org. Logs due Jun 10 to 7qplogs@codxc.org or 7th Call Area QSO Party, c/o CODXC, 61255 Ferguson Rd, Bend, OR 97702.

Mid-Atlantic QSO Party -- SSB/FM/CW, sponsored by the Independent Mid-Atlantic QSO Party Committee from **1600Z May 12-0400Z May 13**. Mid-Atlantic States include DE, MD-DC, NJ, NY, PA, VA and WV. Frequencies: 160-10 meters, 50 kHz from bottom of band segment for operating mode; 50, 144, 222 and 432 MHz. Categories: Standard (SO < 200 W), QRP, MO, Mobile. Exchange: serial number and QTH (Mid-Atlantic stations send 3-letter county and 2-letter state, US/VE send S/P, DX send DX). QSO points: Phone -- 1 point, CW -- 2 points, Mobile -- 3 points. Score: QSO points × Mid-Atlantic counties (Mid-Atlantic stations count S/P + 1 DX) counted only once. For more information: www.qsl.net/maqso. Logs due 30 days after the contest to logs@maqp.info or Mid-Atlantic QSO Party, Attn: Walter O'Brien, W2WJO, PO Box 4922, Clinton, NJ 08809.

Nevada QSO Party -- CW/SSB/RTTY -- sponsored by the Area 51 Contest Club from **0001Z May 12 - 2359Z May 12**. Frequencies: 160 - 6 meters, CW 15 kHz and SSB 25 kHz above General class band edge. Categories: SO-LP/HP, MO-LP/HP, and Portable-SO/MO. Exchange: RST and S/P/C or NV county. QSO Points: 1 pt/QSO. Score is QSO Points × NV counties or S/P/C counted only once. For more information: nv.arrl.org/NQP. Logs due Jun 15 to w7gk_1@yahoo.com or Nevada Mustang Roundup 2007, Elko Amateur Radio Club, PO Box 5607, Elko NV 89802.

US Counties QSO Party -- SSB, sponsored by The Mobile Amateur Radio Awards Club, **from 0000Z May 19-2400Z May 20**. Frequencies (MHz): 3.880, 7.240, 14.275, 21.340, 28.340. Work fixed stations once per band and mobiles once from each county and band. Categories: US fixed, mobile operator, mobile team, Canadian operator and DX operator. For more information: www.marac.org. Logs are due Jun 30 to maracssbcontest@sktc.net (preferred) or to Bill Blake, KØERE, 214 S 1st St, Clearwater, KS 67026.

CQ WW WPX Contest -- CW, sponsored by CQ Magazine from **0000Z May 26-2400Z May 27** (see Mar QST, p 90, or www.cqwpx.com). - Good for getting prefixes and band-counties!

Beware the ARRL DX contest early May….not a good time to be out putting out counties. CW- May 5-6

Dayton Hamvention in May – many mobiles headed there including WG6X, N4CD, K0RU and likely 100 others. Lots of opportunities for counties!

That's it for this month. See you at Dayton and in the Next CHNews! Travel while you can! Gas will be, by the N4CD prediction, $5 or $6 in two or three years, and by 2020, you might be looking at $10/gal gasoline! That's only 12 years away.

73 de N4CD