The Ragchewer

November 2006

The monthly newsletter of the Lancaster & Fairfield County Amateur Radio Club

On the Web: www.k8qik.org

Send email to K8QIK@columbus.rr.com

Club Meetings :

1st Thursday of every month at 7:30 pm at the club house.

Radio Night:

Every Thursday except the 1st Thursday at the club house, 6:30 pm to 8:30 pm

VE Testing:

The third Sunday of every even numbered month. Register at 9:30 am and testing at 10:00 am

Club House Location:

On State Route 37 (Granville Pike) next to Beavers Field.

Net:

Mondays at 9:00 p.m. 147.03 MHZ (+.6)
146.70 MHZ (-.6) Alternate
Freq. 443.875 MHZ (+5)

Club Packet BBS
145.53 MHZ
K8QIK-1 BBS
K8QIK-2: Ohio53

Weather Spotter Net:

146.76 Repeater with 123Hz tone every Tuesday at 7:30 p.m.
Alt frequency 147.24 MHZ

November Birthdays

Robert L. Snider	W8BLS
Lynda F. Campbell	KB8ZBY
Brenda J. VanDyke	KC8OYP
James E. Gaffney	N8JEG
Robert C. VanDyke	W8RVD

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Thursday Night Radio Night

Radio night is every Thursday at 6:30 p.m. (except the first Thursday which is the club monthly meeting). Work a little HF, make a few DX contacts, maybe build something? How about a hot cup of coffee and a few good stories? We'll have them all waiting for you.

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ARRL Membership

When you join the ARRL, or renew your membership through the club, we retain $15 for each new membership OR lapsed membership (of two years or more), and we retain $2 for each renewal. Please support our club, it doesn't cost any more. Send or give all paperwork to the Treasurer with your money.

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December VE Test

The next VE test will be Sunday December 17th at the club house on Route 37. Register at 9:30 a.m. and testing begins at 10:00 a.m. Prepare yourself, take this test and upgrade!

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Free Swap and Sell

If you have anything ham radio related, you can swap it or sell it here. List your items for free. Give a price and how to contact you. Send the list to K8QIK@columbus.rr.com

2006-2007 Officers

President:
Don Stephenson, WD8PCF

Vice President:
Scott Snoke, WD8IXO

Treasurer:
Ed Campbell Sr., WD8PGO

Secretary:
Robert Northrup, KC8PSW

Trustee:
John Hilliard, W8OF

Station Engineer:
John Hilliard, W8OF

Net Manager:
John Fick, KD8EEK

Activities Manager:
Kay Hanna, KC8HJW

Flower Fund:
Mary Travis, KD8EEI

Chief Cook and Bottle Washer:
Charlie Snoke, N8KZN

Editor:
Jack Travis, AE8P
(740) 687-1985

November 2, 2006 Meeting Minutes

At 7:30pm meeting was called to order by Vice President Snoke who led the pledge of allegiance.

There were 24 members and 1 guest present. Our guest was Mr. Bob Prince who has recently moved into the area from Columbus.

VP Snoke circulated 2 applications for review by club members.

Treasurer Campbell began a discussion about the renewal application for Robert Ryan, KD8CBV, who submitted an app. last year about this time but for some unknown reason, it got lost and he was never voted into the club. After a good discussion of the situation, Ralph, W8BVH made a motion to accept Robert's induction into the club and was second by Bob, KI8JM. Motion carried. Sooo, a hearty welcome to Robert Ryan!!

Secretary Report: Robert Northrup, KC8PSW

Minutes are posted in the Ragchewer. Motion to accept by John, W8AGS and second by John, W8OF. Carried.

Treasurer's Report: Ed Campbell, Sr., WD8PGO

Ed gave the club financials. Motion to accept by Charlie, N8KZN and second by Jack, AE8P. Carried.

Trustee Report: John Hilliard, W8OF

John reported that he will meet with the new Lancaster Service Director of the Fairfield County EMA to discuss access to the radio site and get the document signed off that allows certain club members access to the radio equipment. We will also need an equipment enclosure for some equipment at one of the firehouses.

VP Report: Scott Snoke, WD8IXO

No Report

Activities Manager: Kaye Hanna, KC8HJW

The Christmas party will be held at the Ponderosa Restaurant on East Rte 22 on December 16 from 6:30PM to 9:30 PM. Come hungry for food and fellowship as well as some good prizes.

Station Report: John Hilliard, W8OF

No report as it was covered in Trustee section.

VE Testing: Allan Sellers, KB8JLG

At the October VE Session, there were 3 to be tested. Two passed their Technician exam and one failed. The next VE session will be December 16 at the clubhouse. Registration at 9:30 AM and testing will begin about 10:00 AM.

Monday Night Net: John, KD8EEK new Net Mgr

Nov 6	John, W8OF	Nov 20	Fred, W8FZ
Nov 13	John, W8AGS	Nov 27	Charlie, N8KZN
		Dec 4	John, KD8EEK

Ragchewer: Jack Travis, AE8P

Jack said all is going well and is ready for the next installment of the "Chewer".

If you wish to submit an article, news item, cartoon, or other Ham related bits of trivia, you can email him at k8qik@columbus.rr.com.

Emergency Coordinator: Ed Campbell, WD8PGO

Ed reminded members of the United Way 5K run, scheduled for Nov 4 at the fairgrounds and they have asked the club to help out with 3 persons.

Also, organizers for the Lancaster Holiday Parade have asked the club to help out with 8-12 folks along the parade route. The parade will be held on Nov 18 and when you go, go to the covered bridge at the Fairgrounds to get your assignment.

Safety Report: Scott Snoke, WD8IXO

No Report

The Flower Fund: Mary Travis, WD8EEI

There was $14 collected for the fund and Scott Snoke, WD8IXO won half. He donated his winnings back to the club radio fund.

Old Business:

Charlie said the firehouse antenna project is still being worked and will attempt to install the last remaining antenna soon at the Lithopolis station. Get with Charlie to help.

Swearing of our 2006/2007 club officers will be held at the December meeting.

There was much discussion about a "New Member's Welcome Packet" for those new to the club and also new to Amateur Radio. The packets will have Club By-laws, Constitution, Repeater codes, members list, club brochure, and an ARRL application. Several members have the resources needed to assemble these packets and they will be mailed to the address on the application after voting into the club. Robert, KC8PSW assumed the responsibility to get the packet out to the new members. It is anticipated the mailing fees will be about $1 per packet.

New Business:

This is a notice for past club officers/members who are no longer serving as an officer to return your club house key so that new officers may use them. Please bring it to the next meeting or mail your key to your club treasurer Ed Campbell, 1243 Quarry Rd SE, Lancaster, Oh 43130.

Members present voted to accept Ray Hurlbut, W8FLX, into membership. Welcome Ray!!

Charlie, N8KZN stated the grill we use for cookouts has a bad burner and needs repairs. However, the grill is an older donated one and it may not be financially worth while to repair it. He also mentioned possibly purchasing a deep fryer to cook French fries as well. John, KD8EEK said he works next to an auction house and will keep an eye out for a newer grill. Charlie will do more investigation.

Motion to adjourn was made by Charlie, N8KZN and second by Ralph, W8BVH

Meeting adjourned at 8:41 PM.

Respectfully submitted,
Robert Northrup, KC8PS

Upcoming Hamfests

November 11 is the Grant Amateur Radio Club hamfest in Georgetown. You can get more information at http://www.garcohio.net/

November 18 & 19 is the Fort Wayne Hamfest & Computer Expo in Fort Wayne, Indiana. This is the second best within a reasonable distance. Only Dayton beats this one. You can get more info at http://www.fortwaynehamfest.com

Tubes for Sale

If you need tubes for your boat anchor or TV contact Jeff Bell WD8JLI at 614-774-2973 or email at jbell@imagearray.net he has a huge supply for most needs.

Electrostatic Discharge Risks to Equipment

Humans become electrostatically charged as they do ordinary things such as walk across a carpet, walk across a vinyl floor, slide something inside a vinyl envelope, or slide their clothing across a workbench stool. Sensitive electronic components can be damaged either of two ways if an electrically-charged person discharges through them.

1) Discharge current can cause immediate catastrophic damage to a semiconductor junction, to a fine connecting-wire inside a semiconductor component, or to other sensitive parts.

2) Discharge current can cause latent damage that will cause one or more components to fail in the future even if they continue to function immediately after the event.

The risks are highly dependent on relative humidity (RH), because humidity affects the amount of static charge that accumulates. For example, someone walking across a carpet at 15 percent RH will typically develop about a 35KV charge. The same person walking across the same carpet at 75 percent RH will typically develop only about 1.5KV of charge.

Local Radio Nets

These are the local radio nets to the best of my knowledge. Any errors or additions to the net list should be sent to me. K8QIK@columbus.rr.com.

Daily		
9:00am	147.030	Medicare Net (Lancaster)
7:15pm	147.240	Central Ohio Traffic Net (COTN) (Columbus)
Monday		
8:00pm	145.170	Delaware County Net (Delaware)
8:30pm	147.240	Swap-N-Shop & Discussion Net (Columbus)
9:00pm	147.030	Lancaster Amateur News Net (Lancaster)
Tuesday		
7:30pm	146.760	Central Ohio Severe Weather Net (March-Sept) (Columbus)
8:00pm	145.110	AMSAT Net (Columbus)
8:00pm	147.285	Madison County Amateur Radio Club (MARC) Net (London)
9:00pm	146.880	Newark Amateur Radio Association Net (Newark)
9:00pm	145.190	Buckeye Bells Net (YL net, OM's welcome) (Worthington)
9:00pm	147.450	Amateur Television Net (simplex)
Wednesday		
8:00pm	147.060	Central Ohio ARES Discussion Net (Columbus)
8:00pm	145.110	Dayton ARA ARES Net (Columbus)
9:00pm	147.345	Hocking County Net (Logan)
Thursday		
Friday		
8:00pm	145.490	CARA CW Learning Net (Columbus)
10:00pm	147.240	Late Night Discussion Net (Columbus)
Saturday		
Midnight	145.110	Round Table Discussion Net (Columbus)
Sunday		
7:00pm	145.490	Central Ohio (SSTV) Net (first Sunday of month (Columbus)
8:00pm	145.43	Central Oh Scanner (SWL Net (3rd Sunday of month) (Columbus)

Massillon Hamfest

I combined a visit with my son in Canton with a trip to the Massillon Hamfest. This year I remembered the clock change and didn't show up two hours early. If you are not a vendor, you have to wait till the 8AM opening to enter. There is a food stand and tables in the waiting room.

I got some interesting books on radios at a bargain and attended the auction where I got a box of World Radio magazines and an MFJ LC Antenna Tuning Unit.

There were about twenty lots of items and the auction started at 9AM and concluded at 1PM. Each lot consists of multiple boxes of stuff, for example I had 8 boxes for which I received a grand total of $20; last year I got $45 for 15 boxes. Like any auction, you never know what will be offered. This year the best items were two Swan and one Atlas 5-band HF transceivers that were supposed to be in working order. I had never seen an Atlas rig before although I wished for one in the early 70's. There were also two basic dipole assemblies and some antique (1960's tube-type) Code Practice Oscillators. The transceivers and CPO's briskly bid in increments of $5 and they were sold for $100 and $50 each respectively. A really grungy-looking Hallicrafters speaker enclosure sold for $35. I bid up to $5 for the dipoles but they sold for about $10.

The hamfest itself is in a nice building, heated and well-lit. There were about 50 tables of flea-market style ham-related stuff and I will probably go again. The next Hamfest I attend will probably be the Nelsonville event in January 2007.

Regards, Allen, KB8JLG

The Wayback Machine #5

By Bill Continelli, W2XOY

On November 2, 1920, Warren G. Harding was elected President of the United States. Millions read the election results in the newspapers the next day. In the Pittsburgh area, however, hundreds heard the election returns the moment they were wired in, thanks to Dr. Frank Conrad, a Westinghouse employee, who broadcast the results over 8XK, his amateur station. This station would evolve into KDKA, and the night of November 2, 1920 has been called the start of the multi-billion dollar broadcast industry. But was it? This month "The Wayback Machine" looks at the evolution of broadcasting, and the amateur's role in it.

The idea of broadcasting was first considered by Lee deForest in May, 1902, when he wrote that "Ultimately, wireless telephony will be possible". He urged the financial backers of the deForest Wireless Telegraph Company to develop and patent the concept. The stockholders, however, were more interested in immediate profits (through massive stock sales) rather than genuine development, and refused to finance the necessary research. Undaunted, deForest in 1907 formed the deForest Radio Telephone Company. In a statement that for 1907 must have appeared radical and even bizarre, but was amazingly prophetic, he wrote, "I look forward to the day when opera may be brought into every home. Some day the news and even advertising will be sent out over the wireless telephone".

Despite deForest's intense interest in this area, he was not the first to broadcast the human voice and music over the airwaves. That honor belongs to Reginald Aubrey Fessenden, a Canadian Professor. He was the first to recognize the inherent flaw in the concept of spark transmissions, and set out to find an alternative. His quest led him to Schenectady, NY, and the services of General Electric's most brilliant scientist, Charles Steinmetz. Fessenden explained his idea: an alternator capable of generating waves of 100,000 cycles per second (3000 meters). Steinmetz and his assistant, Ernst Alexanderson, worked for almost two years, and finally produced an alternator that met Fessenden's requirements. The Alexanderson Alternator, as it was now known, was delivered to Fessenden's station in the Fall of 1906. On the evening of December 24, 1906, ship and amateur operators heard something in their headphones they had never heard before: someone speaking! A woman singing! Someone reading a poem! Fessenden himself played the violin. (The Alexanderson Alternator would play a prominent role in early high power stations and will be fully covered in a column exploring Schenectady's contribution to the development of radio and television).

Not to be outdone, deForest continued his radio telephone experiments in the period 1907-1910, broadcasting from the Eiffel Tower and live from the stage of the Metropolitan Opera, where Enrico Caruso was singing. However, all of these transmissions had a major problem: without a pure, stable, direct current CW carrier to modulate, all the signals had a background whine and distortion. Real development in the area of modulated carriers would have to wait until Armstrong discovered the oscillating properties of a regenerative circuit.

By 1916, both Armstrong's circuit and the Audion were widely circulating in the radio world, and broadcasting surfaced again. Lee deForest resumed his transmissions, with programs of "good music, culture, and lectures". deForest can be credited with two "firsts" in 1916; the first advertisements (for his Audion and other products), and the broadcast of the Presidential election between Woodrow Wilson and Charles Evans Hughes. (Unfortunately, deForest signed off before the California results were in, so he declared Hughes the winner over Wilson).

Also, in 1916, amateur station 2ZK broadcast one hour of music each night. David Sarnoff, who had manned his station during the Titanic disaster, also got into the act. He wrote a memo to his employers at American Marconi suggesting a "Radio Music Box", which would become a "household utility". He went on to describe his vision of radio broadcasting, and then turned to finances. He predicted an income of $75,000,000 or more each year from the sale of receivers. Marconi, still focusing on ship to shore telegraphy, took no action on the memo.

After amateurs had returned to the air in November 1919, hundreds of them began to explore the area of broadcasting. In May, 1920, amateur station 8XK joined many other hams in the transmission of music. Incidentally, it WAS LEGAL for amateurs to broadcast music, news, sports, lectures, advertisements, or indeed just about anything else they wanted. The Radio Act of 1912, still in effect, did not mention "amateurs", rather, one

paragraph made a general reference to individual private or commercial stations. The only real restriction was the 1 kw power limit and the 200 meter wavelength. After that, the government didn't care. Thus, those amateurs who had built equipment to modulate their CW transmitters eventually played a phonograph record or two, sang (or tried to sing), or broadcast some form of entertainment.

With all of the above documented evidence, why is November 2, 1920 considered the start of broadcasting? The answer lies not at the transmitter, but at the receiver. Prior to that night, all broadcasts had, in effect, been from one amateur to another, or to a commercial station. The November broadcast, though, was designed and promoted by Westinghouse as a transmission to the general public. Starting in September, stores were selling basic receivers for $10.00 to receive 8XK. Westinghouse, in effect, had seized deForest's and Sarnoff's idea, and was marketing it to the general public. Thus, it was the makeup of the listening audience that defined the start of broadcasting.

When the word of this successful transmission got out, more amateurs got into the act and set up their own little broadcast stations. By the end of 1921, it was estimated that about 1200 amateurs had made at least one broadcast. Some had a regular schedule of programs and would evolve into commercial stations, others did it just out of curiosity. But there were listeners. Over 400,000 people heard the Dempsey-Carpentier fight on July 2, 1921. Radio sales were approaching 100,000 per year, not counting crystal sets which were selling at the rate of 20,000 per month. However, with this explosive growth came two problems for the amateur.

The first was an identity crisis; what should the role of the amateur be in broadcasting? Some thought we should stay out of it and just stick to traffic handling on CW. Others envisioned the amateur as a jack of all trades, expert CW operator and relay station, as well as community broadcaster. In fact, a new name evolved to describe this amateur/broadcast hybrid, "Citizen" radio or wireless. Even QST was confused; for a period of time in 1921, the word "Citizen" replaced "Amateur" on the front cover.

The other problem was frequencies. Everyone - amateur, broadcaster and hybrid - was on 200 meters. Tuning across the dial in 1921, one would mostly hear CW, a few spark holdouts and the new broadcasters. While the amateurs were used to the interference, the general listening public was not. They had purchased their radios to hear music, not CW. Complaints started to pour into the Secretary of Commerce. Legally he was powerless, as the Radio Act of 1912 offered no solutions. A conference was called for all interested parties, held in Washington in February 1922 to try to resolve the impending crisis.

Even though he was exceeding his authority under the Radio Act, Secretary Hoover was able to get the following proposals accepted at the conference:

1) Henceforth, special broadcast licenses would be issued. Two frequencies would be available for broadcasters immediately, 360 meters (833 kHz) for regular transmissions, and 485 meters (619 kHz) for crop reports and weather forecasts.

2) After the marine interests had abandoned the 220 to 545 meter range (1363 to 550 kHz), it would be turned over to broadcasting.

3) Broadcasting was forbidden by amateurs, who were defined for the first time by name as stations operating "without pay or commercial gain, merely for personal interest".

4) "Quiet Hours" were imposed on all amateur stations effective from 8:00 to 10:30 PM daily, and on Sunday morning.

The fact that the number of broadcast stations dropped from 1200 to 30 immediately after these regulations went into effect shows just how many amateurs were, in fact, pioneer broadcasters. This agreement, however, was a house of cards. Secretary Hoover has stretched his authority under the Radio Act of 1912 well past the breaking point. In 1926, the cards came tumbling down, and the "Summer of Anarchy" was ushered in. How would amateurs fare with no enforceable regulations in place? Join us next time as "The Wayback Machine" explores the events leading up to the creation of the Federal Radio Commission.

Daylight Saving Time Starting in 2007

Beginning in 2007, daylight saving time will start on the second Sunday of March and will end on the first Sunday of November, intended to promote energy conservation by starting daylight saving three weeks earlier and ending it one week later, the change is part of the Energy Policy Act of 2005.

ARRL President Airs Concerns About Required Red Cross Background Checks

ARRL President Joel Harrison, W5ZN, is urging Amateur Radio Emergency Service (ARES) and other ham radio volunteers to tread cautiously when submitting information for background checks the American Red Cross (ARC) now requires. The ARC, with which the ARRL has a Statement of Understanding (SoU) <http://www.arrl.org/FandES/field/mou/redcro.html> , this summer notified local chapters that volunteers and staff members must submit to criminal background checks by October 31. Harrison says the requirement extends to ARES volunteers who support Red Cross disaster relief efforts. In a statement <http://www.arrl.org/FandES/field/RC-Background-Checks0610.pdf> October 24, Harrison said the League recommends that anyone submitting personal information for a background check very carefully read what they are giving the ARC permission to collect.

"The Red Cross is requiring volunteers to grant permission for more than just a criminal background check," Harrison asserted. "They are also requiring permission to draw a consumer and/or investigative consumer report on the volunteer." Harrison said that could also include credit and mode-of-living checks.

"The Red Cross has stated that they will not use credit reports," he noted. "Requiring that volunteers authorize the procurement of a credit report is inconsistent with this assurance."

The ARC has contracted with MyBackgroundCheck.com LLC (MBC) to handle the on-line background checks. Prospective volunteers visit a secure, encrypted Web site <http://www.mybackgroundcheck.com/>, click on the ARC logo and submit name, address, Social Security number (or other acceptable government ID), telephone number, and date of birth. The Red Cross says the overall results of the background check are not shared with the ARC.

In the course of applying, prospective volunteers must agree to let MBC obtain a wide range of personal information bearing not just on criminal background and creditworthiness but, MBC says, "character, general reputation [and] personal characteristics." MBC advises, "The nature and scope of this disclosure and authorization is all-encompassing . . ."

The Red Cross says its new policy is aimed at safeguarding clients, volunteers and employees alike. "Unfortunately, in this day and age it is critical that the American Red Cross and other agencies, employers and organizations perform due diligence in researching the people who will represent them," the ARC said in a statement supplied to ARRL.

The ARC apparently has not disseminated policy specifics at the national level. The only reliable information on what the background checks will entail is that on the MBC site. Various chapter-level memoranda the ARRL has obtained contain conflicting information about the program.

ARRL Field and Educational Services Manager Dave Patton, NN1N – whose department supports the ARRL Field Organization -- is among those who believes the Red Cross stands to lose a fair number of volunteers because of the requirement -- and not necessarily just ARES volunteers.

"ARES members who are providing communications for ARC are working for ARC," Patton maintained, "and, as such, will follow their guidelines." He said the decision to go along with the new Red Cross policy is up to individual volunteers.

The SoU between the League and the ARC is ambiguous as to whether ARES members become Red Cross volunteers when supporting the ARC. While the document says "each organization retains its own identity in providing service," it further stipulates that ARES volunteers "in such cases when the operators are required to carry American Red Cross identification" must register as American Red Cross volunteers. The SoU does not address the issue of background checks, however. The SoU comes up for review in 2007.

Radio amateurs who volunteered in the wake of Hurricane Katrina last year and following 9/11 in New York City were badged through as ARC volunteers. The practice still upsets some ARES volunteers.

Contact the Red Cross (toll-free 800-507-3960) with any questions regarding the background check program.

Red Cross Background Checks Comments by Jim Weaver, K8JE, Director Great Lakes Division, ARRL

I doubt if anyone believes the Red Cross should blindly accept just anyone who comes in off the street as a trusted volunteer. Most people who volunteer are fine, upstanding citizens who have the highest motives; however, there are those among the public who are . . . well . . . dishonorable. Just imagine what injury folks with perverted ideas of honesty could do to disaster victims and their property during relief operations. The Red Cross has responded to the risk of having dishonorable people try to infiltrate its ranks by turning to background checks for all employees and volunteers.

I believe the Red Cross has the right and duty to keep unscrupulous people from joining its ranks. I also believe it has the right to require, somehow, background checks for all its personnel -- paid or not. The Red Cross needs a way to determine the honesty of its workers as best it can. When it comes to most volunteers, this is where I draw the proverbial line. Requiring background checks for criminal activity is thing. Requiring permission to do credit checks and more is just too much for non-employees, but this is precisely what Red Cross is doing.

As one ham who is a long-time officer in his local Red Cross Chapter said, "The Red Cross is requiring volunteers to grant permission for more than just a criminal background check, they are also requiring permission to draw a consumer and/or investigative consumer report on the volunteer. This would include a criminal background check, credit check and a mode of living check."

The ham Red Cross Chapter official? He authorized his superiors to do a criminal check, only. He still has his position at the Chapter.

Incidentally, some amateurs have expressed concern that MyBackgroundcheck that does the checking will have access to all of the credit and personal information on persons who have been checked even though Red Cross says they do not want it, themselves. Frankly, I'd trust the Red Cross folks that I know long before I'd trust many other people.

My suggestion: Read carefully what is being demanded and be sure you are willing to agree with it. If you agree, by all means give your consent to the full background check. If you don't agree, don't give your consent. You might even try sending a letter to your local chapter giving consent for them to do a criminal check but withholding your consent to other checks. Use your personal judgment.

FCC Invites Comments On Two Amateur Radio Rule Making Petitions

The FCC has invited comments on two Amateur Radio-related petitions for rule making. Both petitioners seek changes in the FCC's Part 97 Amateur Service station identification rules, specifically §97.119(a). That rule now requires stations to identify "at the end of each communication, and at least every ten minutes during a communication . . ."

RM-11346, filed December 9, 2005, by Murray Green, K3BEQ, would raise the required ID interval to 30 minutes as well as at the end of each communication. Green argues in his petition that while he has no problem with the Commission's requirement that Amateur Radio stations identify, "less frequent identification should not hinder the Commission's enforcement of Amateur Radio regulations, as demonstrated by the station identification requirements for other radio services." He suggests the current 10-minute requirement is a result of "an abundance of caution" on the FCC's part.

A second petition, RM-11347, filed May 19, 2006, by Glen Zook, K9STH, would revise §97.119(a) to more closely resemble the old FCC §12.82(a) Transmission of call signs rule. The FCC's Amateur Radio Service rules were under Part 12 prior to a revision that put them under Part 97.

In what he calls "a minor but important change," Zook proposes requiring radio amateurs to transmit the call sign(s) of stations with which they are in communication plus their own call sign at the start and end of each single transmission or of a series of transmissions between stations in communication "each transmission of which is of less than three minutes' duration" (operators could omit the ID at the end when the entire series is less than three minutes), at least every 10 minutes during a series of transmissions between stations in communication, and at least every 10 minutes during any single transmission more than 10 minutes long.

"Unfortunately, too many Amateur Radio operators, especially when using FM repeaters, do not identify during their first transmission," Zook asserts in his petitions. "In fact, a considerable number of these operators never seem to get around to identifying even after 10 minutes of operation and a 'fair' number never seem to get around to giving their call sign at all."

Zook believes his suggested changes will "clarify the existing regulations and to help eliminate problems with station identification in the Amateur Radio Service" and actually legalize some commonplace on-air station identification behavior.

Comments on these petitions are due by November 29. Interested parties may file using the FCC's Electronic Comment Filing System (ECFS). In the "Proceeding" field, commenter should enter the full petition identifier with "RM" in capital letters followed by the hyphen and the five digit number.

Discount Lithium-Ion Batteries

Beware of purchasing lithium-ion batteries that are offered at exceptionally low prices. Lithium-ion batteries must be recharged periodically during storage to retain their design runtime performance. It is expensive for dealers and distributors to repeatedly recharge batteries in inventory, so many don't do it. The performance of lithium-ion batteries that have been in stock a considerable time without recharging will be poor. Even where inventory has been recharged periodically, each recharge during storage will have subtracted from the total number recharge cycles that will be available after purchase. It is important to check lithium-ion battery code-dates and insist of freshly manufactured batteries.

AM Broadcast Band Filters

The performance of most HF communication receivers is significantly degraded by high-power AM broadcast stations located within a radius of several miles of receiving antennas. There are several forms of degradation, including harmonic signal production, signal mixing between stations resulting in the production of interfering signals at a variety of non-harmonically-related frequencies, and receiver overloading that reduces sensitivity. All these adverse effects can be eliminated or greatly reduced in nearly all cases by inserting a high-pass filter in an HF receiving antenna feed-line. Lightning static reduction is side-benefit, because lightning energy levels are much higher at lower frequencies and lightning energy at various low and medium frequencies mixes both with itself and with broadcast station signals to produce broad-spectrum HF energy. High-level low-frequency lightning energy also overloads receiver RF amplifiers, producing lightning-energy-harmonics and reducing receiver sensitivity during lightning crashes.

Lead-Free Solder

An EU directive restricts the use of certain hazardous substances, including lead, in electrical and electronic equipment sold after July 2006. Continued repair of equipment sold before that date using tin/lead solder will be allowed, but equipment sold after that date must be repaired using lead-free solder. Though it is an EU directive, most equipment manufacturers worldwide are changing their designs to comply and solder manufacturers have been testing various formulations of lead-free solder. The lead-free solder found to be generally best for free-hand soldering is called 99C alloy, because it is an alloy of 99.7% tin and 0.3% copper. Common tin/lead solder melts at 183 degrees C, but 99C requires 220 degrees C. Most existing soldering irons do not reach that temperature. If you are going to buy a new soldering iron, buy one capable of reaching at least 220 degrees C while in contact with components being soldered.

- If you're too open-minded, your brains will fall out.
- Age is a very high price to pay for maturity.
- Not one shred of evidence supports the notion that life is serious.
- Once over the hill, you pick up speed.
- I love cooking with wine. Sometimes I even put it in the food.
- Whatever hits the fan will not be evenly distributed.
- Everyone has a photographic memory. Some just don't have any film.
- I know God won't give me more than I can handle. I just wish He didn't trust me so much.
- Dogs have owners. Cats have staff.

How to Prolong Lithium-Based Batteries

Battery research is focusing heavily on lithium chemistries, so much so that one could presume that all portable devices will be powered with lithium-ion batteries in the future. In many ways, lithium-ion is superior to nickel and lead-based chemistries and the applications for lithium-ion batteries are growing as a result.

Lithium-ion has not yet fully matured and is being improved continuously. New metal and chemical combinations are being tried every six months to increase energy density and prolong service life. The improvements in longevity after each change will not be known for a few years.

A lithium-ion battery provides 300-500 discharge / charge cycles. The battery prefers a partial rather than a full discharge. Frequent full discharges should be avoided when possible. Instead, charge the battery more often or use a larger battery. There is no concern of memory when applying unscheduled charges.

Although lithium-ion is memory-free in terms of performance deterioration, batteries with fuel gauges exhibit what engineers refer to as "digital memory". Here is the reason: Short discharges with subsequent recharges do not provide the periodic calibration needed to synchronize the fuel gauge with the battery's state-of-charge. A deliberate full discharge and recharge every 30 charges corrects this problem. Letting the battery run down to the cut-off point in the equipment will do this. If ignored, the fuel gauge will become increasingly less accurate.

Aging of lithium-ion is an issue that is often ignored. lithium-based batteries have a lifetime of 2-3 years. The clock starts ticking as soon as the battery comes off the manufacturing line. The capacity loss manifests itself in increased internal resistance caused by oxidation. Eventually, the cell resistance will reach a point where the pack can no longer deliver the stored energy, although the battery may still contain ample charge. Increasing internal resistance is common to cobalt-based lithium-ion, a chemistry that is found in laptops and cell phones. The lower energy dense manganese-based lithium-ion, also known as spinel, maintains the internal resistance through its life but loses capacity due to chemical decompositions.

There are no remedies to restore lithium-ion once worn out. A momentary improvement in performance is noticeable when heating up the battery. This lowers the internal resistance but the condition reverts back to its former state when the temperature drops.

If possible, store the battery in a cool place at about a 40% state-of charge. Some reserve charge is needed to keep the battery and its protection circuit operational during prolonged storage. The most harmful combination is full charge at high temperature. This is the case when placing a cell phone or spare battery in a hot car. Running a laptop computer on the mains has a similar temperature problem. While the battery is kept fully charged, the inside temperature during operation rises to 45°C (113°F).

Removing the battery from the laptop when running on fixed power protects the battery from heat but some battery and laptop manufacturers caution against it. They say that dust and moisture accumulating inside the battery casing could damage the laptop. The dealers will be happy to provide you with a new pack when a replacement is needed a little sooner.

A large number of lithium-ion batteries for cell phones are being discarded under the warranty return policy. Some failed batteries are sent to service centers or the manufacturer, where they are refurbished. Studies show that 80%-90% of the returned batteries can be repaired and returned to service.

Some lithium-ion batteries fail due to excessive low discharge. If discharged below 2.5 volts per cell, the internal safety circuit opens and the battery appears dead. A charge with the original charger is no longer possible. Some battery analyzers (Cadex) feature a boost function that reactivates the protection circuit of a failed battery and enables a recharge. However, if the cell voltage has fallen below 1.5V/cell and has remained in that state for a few days, a recharge should be avoided because of safety concerns. To prevent failure, never store the battery fully discharged. Apply some charge before storage,

and then charge fully before use

All personal computers (and some other electronic devices) contain a battery for memory back up. This battery is commonly a small non-rechargeable lithium cell, which provides a small current when the device is turned off. The PC uses the battery to retain certain information when the power is off. These are the BIOS settings, current date and time, as well as resource assignment for Plug and Play systems. Storage does shorten the service life of the backup battery to a few years. Some say 1-2 years. By keeping the computer connected to the main, albeit turned off, a battery on the PC motherboards should be good for 5-7 years. A PC should give the advanced warning when battery gets low. A dead back-up battery will wipe out the volatile memory and erase certain settings. After battery is replaced, the PC should again be operational.

Simple Guidelines

Avoid frequent full discharges because this puts additional strain on the battery. Several partial discharges with frequent recharges are better for lithium-ion than one deep one. Recharging a partially charged lithium-ion does not cause harm because there is no memory. (In this respect, lithium ion differs from nickel-based batteries.) Short battery life in a laptop is mainly caused by heat rather than charge/discharge patterns. Although memory-free, apply a deliberate full discharge once every 30 charges to calibrate batteries with fuel gauge. Running down the battery in the equipment does this. If ignored, the fuel gauge will become increasingly less accurate. The battery life will not be affected. Keep the lithium-ion battery cool. Avoid a hot car. For prolonged storage, keep the battery at a 40% charge level. Consider removing the battery from a laptop when running on fixed power. (Some laptop manufacturers are concerned about dust and moisture accumulating inside the battery casing.) Avoid purchasing spare lithium-ion batteries for later use. Observe manufacturing date. Do not buy old stock, even if sold at clearance prices.

Aerials – A Lost Art

by George Murphy, VE3ERP

'Way back in the early days of ham radio, before electricity was invented and when all rigs were run on kerosene, an early experimenter by the name of Whitfield Whire noticed that his spark-gap transmitter emitted a lot of sparks, but his signal wasn't getting out. Wanting to get at the underside of the chassis, he hung his radio from the ceiling with a piece of wire and found to his surprise that the rig worked better with some wire attached to it. So he left it there and stopped calling it a "wireless set". He reported his findings to the **ARRL**. They published it in a ***QST*** article about the Whire Aerial.

A few years later, Garfield Grownd noticed that the desk lamp in his shack had two wires going to it, but his Wire Aerial (which he had built from the article in ***QST***) had only one wire-so how come it worked? He had also noticed that in his brand-new, four on the floor Model T there was also only one wire feeding the lights, stereo and air conditioner. The other wire of each was attached to the car frame. Through clever deduction he decided that the same thing might work with his rig, so Mr. Grownd pounded a piece of pipe into the earth and ran a wire from it to the chassis of his rig. His signal was much better and was copied at **W1AW**. News of this innovation was subsequently published in ***QST***, with the recommendation that every station should have a Grownd.

The next major advance in aerial development was an invention by Diogenes Dipole. One day as Dip (as he was known to his friends) was walking past a playground on his way to a hamfest at Charlie's Bar and Grille, he noticed a couple of members of the local Lion's Club on one of the teeter-totters. What impressed him was the way the Lions kept that thing going at a good clip with hardly any pushing. He said to himself, "It must have something to do with Balanced Lions-perhaps I can do the same thing with my aerial." When he got home from Charlie's, he attached a wire to the chassis of his rig and ran it up alongside his Whire lead in, then ran it off in the opposite direction to his Whire flat top. Thus was born the aerial, still in use today, named in honor of Diogenes Dipole. (About this time other experimenters, who didn't know about Balanced Lions, were trying to coax their signals out as best they could, which led to the invention of ***coax cable.*** But that is the subject of another article.)

Upon reading about the Whire Grownded Balanced-Lion –fed Dipole aerial in QST, a European nobleman by the name of Count Herpoise noticed that there were three wires involved in getting a signal out. His desk lamp also had three

wires because his country was on 330V, so it all seemed quite natural. But he got to wondering why three wires were necessary in North America. After much contemplation Count Herpoise realized that, like himself, the aerial must like to bounce its problems 3 LETARC PROPAGATION off a close friend. This little known and seldom recognized theory was correct, and those of us who are serious students of aerials still refer to the other wire as a Counterpoise, named after that early genius, Count Herpoise. When the article describing the Whire Grownded Count Herpoise Balanced-Lion-fed Dipole aerial was published in QST, it was read by another early innovator, Theo Von Trap, who decided to build such an aerial, even though there wasn't room enough on his property to properly install on. So he shortened the flat top by coiling up the wire every few feet of so along the aerial, and kept the coils from spreading out by soldering condensers (we now call them capacitors) across them. Thus was born the aerial known to this day as the Trap Dipole.

Having read all the ***QST*** articles to date on the development of the aerial, the legendary physicist Morris Nimatch theorized that with all this wire around, some of the power being fed into aerials might not be able to get out. Mo (as he was known to his friends) wanted to see how much of the power was not getting out, and therefore being returned, and invented the See What Returns (or SWR) meter. This device is still known, in honor of its inventor Mo Nimatch, as the Monimatch. (You, too, can build one from one of the many articles that have appeared in ***QST*** or the ***ARRL Handbook*** over the years, or you can buy an inexpensive one from Radio Shack, part no. 21-525) ***QST*** duly reported the astounding success of the Monimatched Whire Grownded Count Herpoise Balanced-Lion-fed Dipole, and it only remained for the True Guru of Aerials, Raoul Random, to add the final touch. One day, seeking solace and inspiration, Raoul took his Junior Op to the very teetertotter that Diogenes and Balanced Lions had made famous. Raoul noticed that it would neither teeter nor totter until he slid *up* the board toward the center. He had discovered that, with proper adjustment, two things could be balanced even though they are physically different. The result of his research was duly reported in ***QST***. The splinters collected by Raoul Random as he slid up the board are still on display in a glass case in the **ARRL** museum. It is because of these relics that those of us in the Aerial World who claim that a Random Whire is a great aerial are known as a splinter group.

This traumatic experience set Raoul to thinking, and after extensive study of the published works of Whire, Grownd, Count Herpoise, Diple, Nimatch and Trap, he came up with the universally applauded Random Theorem, which states:

1) A radio works better when it has a wire attached to it. This wire is called an "Aerial" (according to Whire).
2) The rig works even better if its chassis is connected to Mother Earth (according to Grownd).
3) Signals are improved if the aerial can bounce things off a nearby companion (according to Count Herpoise).
4) The aerial wires hanging out of the back of your rig work better if they are electrically balanced (according to Dipole).
5) The balance can be monitored with a simple See What Returns (SWR) meter (according to Nimatch).
6) An aerial can be shortened by coiling it up a bit and introducing some capacitance (according to Trap).
7) The balance between the aerial wires does not have to be physically symmetrical (according to Random)

Grounding

Gary Zanghi, KB2YJ

In the September 2002 QST, I saw a question on grounding in "The Doctor is IN" section from STARS member John Mosley N6MZN.

This prompted me to dig out the article that I wrote a couple of years ago and submit it to the Telstar editor for a republish. I adjusted it slightly from the original, so please give it a reread.

With many of you upgrading to the General or Extra class, this will bring you to the world of HF operation, and a new type of RFI problems. You may ask if I have any training in the area. Well, I was trained in the service as a Power Generation Specialist. I was in charge of setting up and running a launch site for Pershing Nuclear Missiles. This included wiring and grounding with 440 volt 60 and 400 cycle power all of the launch sites and maintenance on all other systems.

I will try to give you some do's and don'ts when it comes to installing HF antennas, grounding and

etc. When it comes to grounding, most of us cannot afford to do it to specs. That is burying a 12-foot square metal plate 10 feet down and attaching ground rods to each corner. So, we try to do our best with just stakes and wire.

There are two types of grounds, electrical and RF. A good electrical ground may not be a good RF ground. When installing the ground to the shack, you must use a good, and in my opinion, ***solid copper ground stake*** at least 6 to 8 feet long. You must try to keep the runs to your ground stake as short as possible. When too long, they can radiate harmonics and cause RFI. You can get by this by using heavy shielded wire or coax.

If you chose to use any kind of shielded wire, you must solder a capacitor rated at .001uf at 1000 volts between the shield and center conductor. This isolates the center wire from spurs and bleeds off any RF to ground. This method works very well on 6 and 10 meters.

There is also some thought to attaching to your stake a bare wire which is 1/4 wavelength of the frequency that you are operating on or an offending frequency. Let's say that you are having problems on 75-meter phone. Then you would want to run a bare wire from your ground stake out about 65 feet.

If you have copper or the old galvanized piping in you house, you may want to run a separate ground wire and stake. Also, you may want to bond all of your joints to give you a good solid connection throughout your house. This will help to bleed off any harmonics to ground instead of radiating them. If installing more than one ground stake, you will have to check the impedance between them. The standard is less then 5 ohms between them, so if you can not achieve that then you will need to increase the conductivity of your ground stake.

Just remember that if you live in a new home your gas and water service lines past your meters may be plastic pipe, not a very good ground.

The conductivity of the ground and the ground stake is also very important. Just because you pound a stake into the dirt does not necessarily mean that you have a good ground. If you have low moisture or if your property is shale, you may want to consider watering your ground stake. This can be accomplished in any number of creative ways. With a post hole digger, sink a 4 to 6 foot hole near your ground stake, then put a piece of 3 to 4 inch pvc pipe in it "Don't forget a cap for the top". Then back fill around the hole with small stones, and fill it with water until it can not take anymore. You may also try to run the discharge of your sump pump. Others also may want to consider running the discharge of your water softener.

When we last talked about watering your ground stake, I forgot to add that you may want to add a few cups of rock salt in the pvc pipe. This will increase your conductivity from your ground stake to the ground itself. Be careful not to use too much salt. I did this at one QTH that I lived in 20 years ago, and it killed the grass around the pipe for a long time. "Wasn't such a bad thing Hi Hi."

When grounding a rooftop tower or a ground-mounted tower, you should also consider installing a heavy duty wire. For the roof-mounted tower, you should use an insulated wire so that any static build up that is discharged to the ground does not set your roof on fire. For the ground-mounted tower, you can use any heavy duty non insulated wire.

You should have one continuous piece of wire from the top of the tower to your ground stake. This way you will not have any impedance bumps in the line. Remember, lightning is looking for the quickest, shortest path to ground, so you will want to keep the bends and angles to a minimum.

I have always found that using 3 eight foot ground stakes tied together is the best way to go. You may also want to bury about 40 to 60 feet of bare wire. This helps to discharge any static build up and any direct hit from the Gods. Make sure that all of your connections are clean and tight.

Last time, I said that you should NEVER ground your radios or antennas to the cold water system in your house. Well, about 2 weeks ago during the bad storms that hit the area a fire hydrant took a direct lightening strike. As a result, the hydrant was blown out of the ground and 2 houses had every piece of equipment that was plugged into an outlet ruined. So much for it being a good ground. In closing, having a good solid efficient ground for your ham shack and antenna system is one of the most important projects you will need to do. Not only will you generate a better signal, but your harmonics will go to ground and not elsewhere in your house or neighborhood. I hope that this information will help some of you that are new to the hobby, when you go to install your antenna system or towers.

Greenwich Mean Time

By Ken Anderson W4JQT

Since Amateur Radio has always used Greenwich Mean Time (GMT) for logging and QSL confirmation, it should be of interest to amateurs to know how Greenwich, England became the time standard for the world.

In just one minute of time, the Earth at the Equator spins 15 nautical miles. For a ship at sea to know its position from home port to within 15 miles, it must know the time at its home port to within one minute. In the 17th Century, ships at sea had no way to determine this. They could use the stars to determine their latitude, but not their longitude. In those days, most ships did not venture far from the sight of land. The best brains of England pondered this problem from the late 17th Century onward. Led by Sir Isaac Newton, they believed the answer must lie in astronomy.

In 1675, the British government built an observatory at Greenwich, England. The purpose was to observe the Sun and stars and find a way to fix the exact time of day. If a way could be found, then ships at sea would have a means to accurately determine both latitude and longitude, using the stars for navigation.

The site at Greenwich is a suburb of London, a dozen kilometers to the east, and on high ground on the south side of the River Thames. The first buildings of the Greenwich Observatory were designed by the famous English architect, Sir Christopher Wren. Scientists at the observatory observed the movements of the Sun and stars and, with mathematical calculations, figured out a year in advance just where in the sky the Sun and stars would be on each day and night. This information was published in a book called the *Nautical Almanac*, which experienced wide use on ships at sea for navigation, but did not solve the problem of determining longitude.

Although the problem of finding longitude remained unsolved, the research and publications at Greenwich resulted in a practice among navigators to use Greenwich as a reference, and it eventually became the site of the prime, or zero, meridian. Thus, the time at Greenwich became very important to navigation.

In the early 1700's, finding longitude was still mostly guess work, and in 1714 the British government offered 20,000 Pounds to anyone who could devise a way of fixing a ship's longitude to within 30 nautical miles after sailing for six weeks across the Atlantic Ocean.

John Harrison was a little-known Yorkshire clockmaker but he had discovered some valuable secrets. In 1726, at the age of 33, he had made a wooden clock that lost or gained no more than one second per month. The secret of this clock was a pendulum whose length did not change with temperature, and by eliminating friction through the use of roller bearings, which he invented. Such a clock as this, however, could not be used on a lurching ship at sea.

Harrison came to London in 1737, had an interview with Edmund Halley (after whom the comet is named) at the observatory and, with the help of others, managed to raise enough money to get started on building what he called his sea clock. His first model, called H-1, met the test of determining a ship's longitude but was quite large and not suitable for general use aboard ships. Harrison did not claim the prize, as he felt he could do better. The second model, H-2, was better but still Harrison was not satisfied. This clock was also large and somewhat delicate. During his work on H-3, he realized his approach was flawed and he moved on to H-4, which turned out to be the prize winner. It was only 5 inches in diameter and similar in construction to a pocket watch.

By this time Harrison was 68 years old and the year was 1761. After several trials, H-4 was used on a trip from Britain to Barbados in 1764. The results found that H-4 had just 39 seconds error after the voyage, or 9.8 nautical miles. This was one-third the error allowed in the terms of the prize.

John Harrison spent over 30 years building the world's first useful marine chronometer. He was an infinitely painstaking man with a genius for perfection. The marine chronometer allowed sailors, for the first time, to know where they were at sea. Great Britain went on to build an empire on sea power and on sea-borne trade. John Harrison, as much as anyone, made that possible.

The observatory time at Greenwich gradually was accepted as the time standard for the world. By 1884, all the countries of the world had decided to accept Greenwich Time as the standard.

The old observatory is now a national maritime museum, and the actual time pieces that John

Harrison built still tick away in Greenwich today, representing over 230 years of continuous operation. One of the buildings, setting on higher ground, has a tall pole with a large red ball that drops at exactly 12 noon so that ships in the Thames River can still set their chronometers to Greenwich Time.

Over the years, the time at Greenwich, England has been universally recognized as the standard time in all international affairs, including Amateur Radio. Thus for amateur radio contacts wherever you are, you and the station you contact will be able to reference a common date and time easily. Greenwich Mean Time is now called Coordinated Universal Time (abbreviated UTC) from the French Universelle Tempes Coordinate.

What is MUF?

The Basics of the Maximum Usable Frequency

There are two definitions for the abbreviation, "MUF." The International Telecommunications Union ITU-R (Recommendation P.373-7 10/1995, in force) recommends two definitions for MUF:

1. Operational MUF (or just MUF) is the highest frequency that would permit acceptable operation of a radio service between given terminals at a given time under specific working conditions (antennas, power, emission type, required S/N ratio, and so forth), and,

2. Basic MUF, being the highest frequency by which a radio wave can propagate between given terminals by ionospheric propagation alone, independent of power.

The difference in frequency between operational MUF and basic MUF is in practice from ten to thirty-five percent. In most prediction software and in amateur radio and shortwave listening references the MUF refers to the first definition. On each day of the month at a given hour, there is a maximum observed frequency (MOF) for a mode. The median of this distribution is called the MUF. In other words, the MUF is the frequency for which ionospheric support is predicted on 50% of the days of the month, i.e. 15 days out of 30 days. So on a given day communications may or may not succeed on the frequency marked as the MUF.

To ensure a good communication link between two locations, the operating frequency is typically chosen below the predicted MUF. A commonly used formula for finding the optimal operating frequency for a given path is to calculate between 80 to 90% of the MUF. Depending on what model you use for determining MUF and OWF, this percentage of usable days may be 50% or 90%. VOACAP uses 50%, for example. Synonyms for the optimal operating frequency are FOT (frequency of optimum traffic), OTF (optimum traffic frequency or optimum transmission frequency), and OWF (optimum working frequency).

So, as an example, if you find that the MUF is 23 MHz on a day with a Smoothed Sunspot Number of 130, over a path between you and some far off point, you would find the OWF as between 18.4 MHz and 20.7 MHz. You might be able to work 15 meters to that distant point. Most likely, you would find better conditions on 17 meters.

There are more factors involved in finding the "right" frequency to use between two points. These include absorption by lower regions (like the D layer), the "take off angle" of the radio signal from the originating antenna, and so forth.

The ionosphere is made up of several regions. The ionosphere is that part of the atmosphere, extending from about 70 to 500 kilometers, in which ions and free electrons exist in sufficient quantities to reflect and/or refract electromagnetic waves. These regions are the F2 region (250 to 400 km above the Earth), the F1 region (160 to 250 km), the E region (95 to 130 km), and the D region (50 to 95 km), under which is the Troposphere and so forth.

When a radio signal (an electromagnetic wave) propagates into the ionosphere, it might be absorbed, attenuated, refracted, or it might shoot right through and out into space. If a signal makes it through the lower regions, a redirection will occur for those signals whose frequencies are at or below a "critical" frequency (that being the frequency just below those that punch through the F regions and out into space). The redirection is a bending by a complex processing involving reflection and refraction.

Depending on the angle of the radio wave (or, "angle of incidence") as it enters the region where it is redirected, the signal will be "reflected" back to the Earth at some variably distant point. Think of a flashlight beam that you shine at a mirror.

When you shine on the mirror straight on, you have the beam of light coming almost straight back at you, but if you angle the light beam, the reflected light will move further away from you.

The amount of radio wave bending depends on

the extent of penetration (which is a function of frequency), the angle of incidence, polarization of the wave, and ionospheric conditions, such as the ionization density.

The Lowest Usable Frequency (LUF) is that frequency in the HF band at which the received field intensity is sufficient to provide the required signal-to-noise ratio for a specified time period, e.g., 0100 to 0200 UTC, on 90% of the undisturbed days of the month. The amount of energy absorbed by the lower regions (D region, primarily) directly impacts the LUF. If a signal at 5 MHz is totally absorbed by the D region, but a signal at 6 MHz makes it through without a lot of loss, and the E or F layer refracts the 6 MHz signal, the LUF will be near that 6 MHz part of the spectrum. The MUF might be 12 MHz. The OWF (optimum working frequency) will be somewhere between 6 and 12 MHz, probably around 10 MHz.

Frequency of Optimum Transmission (FOT): In the transmission of radio waves via ionospheric reflection, the FOT is the highest effective frequency (or best working frequency) for a given path that is predicted to be usable for a specified time for a percentage of the days of the month.

Technical Topics - SWR

By Kevin Arber, W3DAD

When power is delivered to a transmission line by a generator (transmitter) the power travels up the line until it reaches the load (antenna). If the load has a pure resistance value equal to that of the transmission line, then the load absorbs all the power. In the case of an antenna it would all be radiated. If, however, an impedance mismatch exists between the load and the line, some of the power will be reflected back down the line to the transmitter causing standing waves of voltage and current. VSWR is the ratio between the maximum and minimum voltage on a transmission line. Normally VSWR is simply referred to as SWR.

VSWR = SWR = Emax/Emin = Ef+Er/Ef-Er

Where: Ef = E forward and Er = E reflected

SWR is measured with a bridge circuit. The bridge circuit components are chosen to match the impedance of the transmission line used, making it an impedance sensitive device. Therefore, one can not use a standard 50-ohm SWR bridge to measure SWR on 75-ohm or other impedance value transmission line. Most modern HF transceivers have an SWR bridge built into the output circuit that is sufficient for the basic measurements needed between the transceiver and the input end of the line. A stand-alone SWR meter is normally required at VHF and above, as an SWR meter is less likely to be built into the transceiver. Inexpensive SWR meters for VHF and above may be quite frequency sensitive and may not work well above 450 MHz. For UHF and microwave a specifically designed and dedicated SWR meter may be required.

SWR readings can be taken anywhere on the line between the generator and load; the readings will be identical. The reason is that SWR is a ratio and is not dependent upon exact values of voltage, current or impedance, all of which are different at different points on the line. Therefore, there is no need to hang off a tower or ladder to make the measurement exactly at the antenna feed point when an SWR measurement made at the transmitter will do. This assumes that the transmission line is in good condition.

RF Test instruments are available to the amateur community that are affordable and provide quite good accuracy. Specifically, instruments made by Autek Research, MFJ and AEA, Division of Tempo Research Corp. work well and are capable of SWR measurements up to 500 MHz. The advantage of using an instrument of this type is that it contains its own oscillator, will provide impedance values, and can be swept across the band without causing interference to others. It won't be long before these types of instruments will provide a computer connection port.

Two other terms that come up in SWR measurement are reflection coefficient and return loss. Reflection coefficient, called by the Greek letter rho (p) in engineering texts, can be obtained from the equation SWR = 1+p/1-p or p = SWR-1/SWR+1. In simpler SWR meters where a switch was used to obtain a forward and reflected voltage reading, the forward value is set for 1.0 and then the bridge was reversed (usually by a switch) and the reflected voltage was read. The value of the reflected voltage was the reflection coefficient. Return loss is the ratio in dB of the incident and reflected power on a transmission line. Return loss is related to SWR and reflection coefficient by RL = 20 log p and is expressed as a negative number. Return loss is often used to characterize the input matching quality for

low noise amplifiers at VHF and above. Higher return loss values are better; that is, higher return loss values translate to lower SWR values.

SWR meters and the RF instruments above can be used to determine the quality of a transmission line. When a transmission line is either open or shorted, all the incident power will be reflected back to the source. The difference between the forward and reflected power can be used to determine the line loss. The matched line loss value is given by loss = 10 log SWR+1/SWR-1. Some problems may be encountered using a transmitter and a SWR meter as the transmitter may not operate into a high SWR and the meter may not be accurate for values above 5. The RF instruments will not have these problems and can accurately measure SWR up to values of 15 or so.

Telegrapher's Side Job

By Richard Arnold, AF8X

If you were in the market for a watch in1880, would you know where to get one? You would go to a store, right? Well, of course you could do that; but if you wanted one that was cheaper and better than most of the store watches, you went to the train station! Sound a bit funny? Well, for about 500 towns across the northern United States, that's where the best watches were found.

At the train station—but not for the reason you might think. The railroad company wasn't selling the watches, not at all. The telegraph operator was. And most of the time, the telegraph operator was located in the railroad station because the telegraph lines followed the railroad tracks from town to town. It was usually the shortest distance and the right-of-ways had already been secured for the rail line. Also, most of the station agents were skilled telegraph operators, and that was the primary way that they communicated with the railroad. They would know when trains left the previous station and when they were due at their station. And it was the telegraph operator who had the watches.

As a matter of fact, they sold more of them than almost all of the stores combined for a period of about 9 years. And mostly, this was arranged by Richard, who was a telegraph operator himself. He was on duty in the North Redwood, Minnesota train station one day, when a load of watches arrived from the east.

A huge crate of pocket watches. No one ever came to claim them. So Richard sent a telegram to the manufacturer and asked them what they wanted to do with the watches. The manufacturer didn't want to pay the freight back, so they wired Richard to see if he could sell them. Richard did that. He sent a wire to every agent in the system, asking them if they wanted a cheap, but good pocket watch. He sold the entire case in less than two days and at a handsome profit. That started it.

He ordered more watches from the watch company and encouraged the telegraph operators to set up a display case in the station and start offering high quality watches for a cheap price to all the travelers. That worked!

It didn't take long for the word to spread to all kinds of people; and before long, people other than travelers came to the train station to buy watches.

Richard got so busy he had to hire a professional watchmaker to help him with the orders. He did, and that person was Alvah. And the rest is history, as they say. The business took off and soon expanded to many other lines of dry goods. Richard and Alvah left the train station and moved their company to Chicago. And it's still there. IT'S A LITTLE KNOWN FACT that for a while in the 1880's, the biggest watch retailer in the country was at the train station. It all started with a telegraph operator, Richard Sears, and his partner: Alvah Robuck!

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dBi, dBd and other dB's

By Mont O'Leary, K0YCN

The power gain of an antenna system is usually given in *decibels*. The decibel (dB) is simply the common logarithm of the ratio of two power levels: dB = 10*log10(P1/P2)

It is used for the comparison of one power to another since it gives a reasonable approximation of the effect of a change in relative power. One decibel represents a just detectable change at a distance. As an absolute reference, one of the powers has to be defined. Thus you may have a qualifier attached to the raw dB such as dBm or dBW. The term dBm expresses the ratio of a power to a one-milliwatt reference. The term dBW expresses the ratio of a

power to a one-watt reference thus a 20 dBW source emits 100 Watts. Since these are logarithmic values successive gains or losses may simply be added or subtracted to obtain the overall result.

For expressing antenna gain, we must have a reference antenna for the ratio. Gain expressed in dBi is relative to an *isotropic* (point source) reference. An isotropic reference is simply the feed point power expressed at any distance using only the inverse square relationship. This is a mathematical concept that is easy to express, and is very useful for antenna performance calculations. You can directly find the field strength the antenna will provide at any distance knowing only the input power and the dBi gain of the antenna (and the propagation loss of the path).

The term dBd is the antenna gain over a resonant dipole in free space. It can be shown that, in the broadside direction, this value is 2.14 dB greater than a point source. So an antenna gain quoted in dBd will be 2.14 dB less than the gain it would have when expressed as dBi. Of course real dipoles don't operate in free space and isotropic antennae don't exist but these terms are the *de facto* standards for expressing antenna gain.

To compare the relative gains of two antennae their gains must be expressed in the same reference units. For example, if one antenna is quoted as having a gain of 10.2 dBi and another is quoted as having a gain of 8.0 dBd, you must subtract 2.14 dB from the former or add 2.14 dB to the later for comparison. In this example, the antennae are essentially equal.

Antenna gain given simply in dB is meaningless, because you must know "compared to what?" since no reference is given. It may mean the gain over a wet string, or gain over a ground rod! So when you see antenna gain quoted in raw dB, you should be dubious of the seller's veracity.

There is a place for raw dB numbers in other antenna specifications, however. For example, you would use raw dB to express an antenna's front-to-back ratio or front-to-side ratio. The reference is implicit in those cases since you are talking about ratios in the same antenna rather than attempting to compare two different antenna gains.

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9 Tips (+ 1) For Learning Morse Code

By Chuck Adams, K7QO & Rod Dinkins, AC6V

1. Start! Whether you use audio cassettes, CDs, computer software, or a partner to send and receive, you won't get anywhere until you get started.

2. As a small child learns first to crawl, then to walk, and finally, to run, you, too, must learn in steps. Learning Morse code (CW) properly requires both self-study, and the help of someone sending CW to you.

3. Learn each character as a sound. Morse code is a language of sounds. Never write dots and dashes.

4. Repetition is the key to remembering anything, including Morse characters. Some folks master it in days, others in months. All who kept at it got it.

5. The Farnsworth Method is recommended. With the Farnsworth Method, you learn each character at 15 words per minute with large spacing in between characters. This has been proven to be the best method for long-range development. Once the characters are learned, copying speed is easily increased by decreasing the spacing between each character.

6. Practice, practice, practice. No matter if you learn quickly, or slowly, the key to learning is practice. With enough practice, just about anyone can learn Morse code. Sometimes, skipping a day or two of practice is helpful, and can get you back on track.

7. You don't need to copy 100%. Being able to copy MOST of what is sent, usually results in a passing grade.

8. Take advantage of all available practice. If you have a rig or shortwave receiver, you'll benefit from any CW you hear. Just listen and copy as many characters as you possibly can. The more you listen, the more you'll be able to copy and understand. After a while, you'll be copying more characters than you are missing. While driving down the road, I would translate road signs to Morse code in my head - the faster the better.

9. One of the best ways to practice is to use the "Buddy System." Get a friend, spouse, relative, or anyone willing to share their time, to learn along with you. Enlist the aid of an experienced CW operator for answering questions, and making sure you don't develop any bad habits.

Plus 1 I have a terrific little program on my computer called the G4FON Koch Method Morse Trainer, thank you to Jeff Wolf, K6JW, who

originally sent it. It uses the Farnsworth method as mentioned above. Anyone who wants a copy please let me know and I'll send it on. Ginger,KG6TAU. ginger.garnett@gmail.com

OR

Go directly to Ray Goff's web page at http://www.g4fon.net/ where you'll find the G4FON CW trainer and some other nifty ideas and programs.

RADAR (Radio Detection And Ranging)

By Vern Eubanks KØLVS

Radar was patented by British scientist Sir Robert Watson-Watt in 1935 Early radar systems were in the VHF region using frequencies between today's 6 meter and 2 meter ham bands. The British "Chain Home" air defense radar even operated as low as 30 MHz (10 meters).

There was no technology to produce RF at high power levels in the UHF (300-3,000 MHz) and SHF (3,000-30,000 MHz) spectrum at the time. While those radar systems provided limited utility; they suffered from accurate azimuth (angle of bearing from the observer), and the abililty to resolve multi-aircraft raids down to individual targets. Practical radars cannot exist in the VHF region because VHF antennas have insufficient gain and have too broad a beam width to identify individual targets. Radar scientists recognized the need to generate UHF and VHF signals at high power levels.

As WW2 approached, the major countries worked feverishly (but in utmost secrecy) to improve radar performance for their war machines. British engineers Harry Root and John Randall invented the multicavity magnetron in 1939, opening the way for radars operating at 3 GHz (3,000 MHz) and higher.

For the first time, radar antennas with pencil thin beams could be produced for ship and aircraft installation. 12 prototype "Maggies" (as magnetrons became known) were produced. One was shipped to the US in 1940 under the ultra-secret "Tizard Mission". Within a month, a US military "RADLAB" (Radiation Laboratory) was set up at MIT. The RADLAB technical staff grew to more than 1300 engineers and scientists, including ten future Nobel Laureates.

RADLAB developed more than one hundred models of radar, including early warning systems, anti-aircraft gun-laying radars, antisubmarine radars, ground approach systems, and bomber targeting radars. Nearly one million radar sets were produced in the U.S. as the war progressed! The Japanese, who had independently invented the multicavity magnetron before Root and Randall, were hampered by bureaucratic entanglements, military secrecy and personnel shortages as engineers were drafted into the army as ordinary soldiers. The Germans never produced an SHF radar during the war and were caught in a losing game of technical catch-up.

Why we have amateur radio privileges

§97.1 Basis and purpose.

The rules and regulations in this Part are designed to provide an amateur radio service having a fundamental purpose as expressed in the following principles:

(a) Recognition and enhancement of the value of the amateur service to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communication.

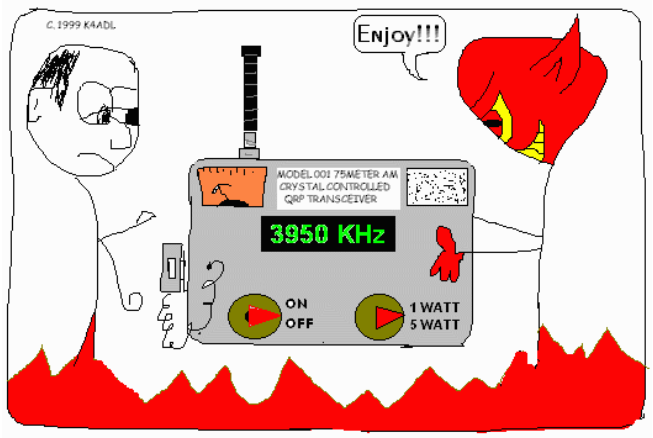
The year was 1913, and a large wind storm created havoc in the Midwest, tearing down telegraph and phone lines (what few existed then), shutting down power plants and blowing down transmission lines.

Amateurs at the University of Michigan and at Ohio State University, along with scores of individual amateurs in the region, successfully bridged the gap between isolated communities and the outside world. This was the first recorded instance in this country of Amateur Radio in providing emergency communications.

Emergency communications is an Amateur Radio communication directly relating to the immediate safety of human life or the immediate protection of property, and usually concerns disasters, severe weather or accidents. The ability of amateurs to respond effectively to these situations with emergency communications depends upon experience, training and skills. This includes ARES and RACES volunteer emergency communication support to an Emergency Management Agency at an Emergency Operations Center, Mobile Command Post and various emergency field locations. Amateur radio can link communication points together to insure that all disaster response agencies, governments and organizations are coordinated,

when normal communication modes are overloaded or disabled. Emergencies are nearly always recognized and declared by agencies or authorities outside of the Amateur Radio Service. Amateur radio operators and net control stations do not have independent authority to declare an emergency.

IN A RARE BURST OF CREATIVITY, JIMMY SPAMS THE NEWSGROUPS WITH A QUESTION THAT HAS NEVER BEFORE BEEN ASKED.



STANDARD EQUIPMENT ISSUE IN HAM HELL

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