

# The Ragchewer

March 2007

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

On the Web: [www.k8qik.org](http://www.k8qik.org)

Send email to [K8QIK@columbus.rr.com](mailto:K8QIK@columbus.rr.com)

## **Club Meetings :**

1<sup>st</sup> 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.

## **Nets:**

**Mondays** at 9:00 p.m.  
147.03 MHz (+.6)  
146.70 MHz (-.6) Alt. Freq.  
443.875 MHz (+5)  
**Thursday** at 8:00 p.m.  
443.875 MHz (+5)  
UHF linked system

Packet BBS 145.53MHz  
K8QIK-1 BBS  
K8QIK-2: Ohio53

## **Weather Spotter Net:**

146.76 Repeater with 123Hz  
tone Tuesday at 7:30 pm  
Alt frequency 147.24 MHz

## **March Birthdays**

John Hull	W8RRJ
Earl Ogg	AA8AT
Allen Sellers	KB8JLG
Ed Campbell III	KC8DPH
Jeffery VanMeter	KA8HQL
Gary Snider	W8GTS

## **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.

## **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  
Treasurer with your money.

## **April VE Test:**

The next VE test will be Sunday April 15<sup>th</sup> 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!

## **Monday Night 9:00 PM net**

Net check-ins for February  
Feb 5<sup>th</sup>----- 16 people      Feb 19<sup>th</sup> --- 29 people  
Feb 12<sup>th</sup> --- 18 people      Feb 26<sup>th</sup> --- 16 people

## **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

### **Public Relations:**

Allen Sellers, KB8JLG

### **Flower Fund:**

Mary Travis, KD8EEI

### **Chief Cook & Bottle**

### **Washer:**

Charlie Snoke, N8KZN

### **Editor:**

Jack Travis, AE8P  
(740) 687-1985

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## March 1, 2007 Meeting Minutes

At 7:30pm meeting called to order by President Stephenson, WD8PCF, who lead the pledge of allegiance.

There were 27 members and 1 guest present. Club membership application for James Shyrigh – KC8JPZ had its first review. Our guest was Adam Weisen from Heath.

### Officer Reports

#### **Secretary Report: Robert Northrup, KC8PSW**

Minutes are posted in the Ragchewer.

Motion to accept by Allan, KB8JLG and second by Dave, W8EZE. Motion carried.

These are corrections from the February meeting minutes as several items were left out of the minutes that were delivered to Jack, AE8P, who publishes the Ragchewer. Under the category of **New Business**:

A motion was made by Allan, KB8JLG and second by Griff, KG4IDG, to reimburse Charlie, N8KZN \$30 out of the general fund for dump fees incurred from the basement clean out and the \$50.35 made at the Nelsonville Ham Fest be put towards the Radio Fund. Motion carried.

The membership made a decision to allow a choice of email or snail-mail in sending the monthly newsletter. So from now on, you must state your preference to Jack, AE8P, as to which you prefer. You will not get it via both delivery methods.

Jack, AE8P also brought up the concept of a club PR man as many public relations type queries are made to Jack as editor of the Ragchewer but he cannot answer or knows the answer for each. Allan, KB8LJG volunteered to be the club's PR contact.

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

Ed gave the club financials and said he had received a notice from the IRS as to the 501C-3 status of our club. The IRS sends these forms every three years so Ed will complete the forms and return them to the IRS. Ed also said he had received the annual insurance renewal paperwork and will return within the required time. Motion to accept by Charlie, N8KZN and second by Robert, KI8JM. Motion carried.

#### **VP Report: Scott Snoke, WD8IXO**

No Report

Trustee Report: John Hilliard, W8OF. John reported that all was well with our equipment.

### Committee Reports

#### **VE Testing: Allan Sellers, KB8JLG**

The next VE session will be April 15th at the clubhouse. Testing begins 10:00 AM. Allan reported there were three who passed the Tech exam, and one who passed the Extra exam. Allan also said there will be a special "paper work only" night on Thursday March 8 at 7:00 PM for those who have passed element 3 and want to submit their documentation to upgrade to general class.

#### **Monday Night Net: John, KD8EEK**

Mar 5 ----- John, W8OF

Mar 12 --- John, KD8EEK

Mar 19 --- John, W8AGS

Mar 26 --- Charlie, N8KZN

Apr 2 ----- John, W8AGS

#### **Ragchewer: Jack Travis, AE8P**

Jack said all is going well and is ready for the next installment of the "Chewer". Jack is still looking for local content, ideas, kit building info or home-brew activities.

*Submit your article, news item, cartoon, or other Ham related bits of trivia to Jack at [k8qik@columbus.rr.com](mailto:k8qik@columbus.rr.com).*

#### **Emergency Coordinator: Ed Campbell, WD8PGO**

Ed noted there would be a Weather Spotter Training Class to be held on March 26 from 7-9PM at the Pleasant Twp Firehouse on Rte 188 and Coonpath Roads. Call the local EMA office at 740-654-4357 to register. The county will hold a HAZMAT exercise on May 17<sup>th</sup> with more info to follow.

CERT training class will be held in March for 4 weeks on Thursday nights (3/8, 3/15, 3/22, 3/29). Most club members received an announcement in the mail regarding the training.

Ed asked members if there was interest in getting photo IDs made up so those interested in working with the EMA can do so. Ed will arrange to get the required equipment and paperwork to the April meeting. So get your haircut, shave and clean up for your foto op!!!!

**Safety: Scott Snoke, WD8IXO**

No Report

**Station Engineer: John Hilliard, W8OF**

John said everything was fine.

**Activities Manager: Kaye Hanna, KC8HJW**

Kay said she has booked the Ponderosa on East Main St for our next Christmas party that will be held on December 15, 2007 from 6:30 to 9:30 PM. So mark your calendars. President Don asked members present if there was interest in making the Christmas Party more into a party and celebration. There was good discussion and this will need more flesh on it but we can get a guest speaker such as the Sheriff, EMA Director, Red Cross Director, County Commissioner, or others and hold door prizes to 5-6 and put club monies into better use towards ham related gear. Secretaries note: If spouses or significant others are present, then we need to include a few prizes for them and the speaker needs to be someone who will be of interest to all.

**Flower Fund: Mary Travis – WD8EEI**

Mary said there was \$19 collected and Fred, W8FZ, who donated it to the Radio Fund, won \$9.50.

**Fund Raising: Kaye Hanna – KC8HJW**

\$19.00 was collected and added to the previous \$36. Paul, WT8S won but was not present so the

funds go back into the 50-50 and will be drawn next month.

**Old Business:**

President Don, WD8PCF asked for volunteers to head up the 2007 field day that was highlighted by past president Tom, WB8USK at last months meeting. After some discussion, Jim, KC8JPZ volunteered to head up the 2007 Field Day. Jim has been busy planning activities for field day 2007 and has set up operating classes by skill level or equipment in use to take advantage of local equipment. Jack, AE8P will work with Jim on information for the Ragchewer.. More details will follow.

John, KD8EEK has been working on the calling tree and has separated the local area into five regions. There will be a “tree captain” for each region who will start the tree off. The idea is to call the next one in line until all are called. More details will follow. Mary, KD8EEI will work with John on something for the Ragchewer.

**New Business:**

Allan, KB8JLG asked if there were “new member” packets that could be handed out to those who passed their upgrade exams. Mary, KD8EEI noted there were plenty of club brochures in the back room and those would make a good handout on exam days. Allan will use the brochure and a club application form instead of new member packs.

Motion to adjourn was made by Griff, KG4IDG and second by Jack, AE8P. Motion carried. Meeting adjourned at 8:10 PM.

Respectfully submitted,  
Robert Northrup - KC8PSW

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**Upcoming Hamfests**

**March 18** is the Toledo Hamfest and Computer fair in Maumee, OH. You can get more info at <http://www.tmrahamradio.org>

**April 15** is the Cuyahoga Falls ARC 52<sup>nd</sup> annual Hamfest in Cuyahoga Falls, OH. You can get more info at <http://www.cfarc.org/hamfest2007.htm>

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**Weekly CW Practice**

Bob Hughes, KI8JM and Gary Snider, W8GTS have started having CW practice over two meter radio every Sunday from 6:00 P.M to 7:00 P.M. The practice session will be on the 146.70 repeater. This is not for learning CW, but it is intended to improve your speed. Each session will start at the slowest speed and increase over the course of the hour.

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Copper-clad steel wire is produced by cladding a rod of steel core material with a copper strip and then drawing the clad rod to obtain a desired wire diameter. Both the steel core rod and the copper are thoroughly cleaned prior to cladding to make a complete bimetallic metallurgical bond possible. The drawing process that follows cladding further enhances the bond sufficiently that in the end the bond between the two metals is inseparable.

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## Items For Sale

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.

\*\*\*\*\**If you want your For Sale ads to run more than one month, you must contact me before the next issue of the Ragchewer is completed*\*\*\*\*\*

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## The Wayback Machine #9

By Bill Continelli, W2XOY

If Arthur Miller, Tennessee Williams, or Eugene O'Neill had been amateur radio operators, one of them certainly would have written a play about the VHF frequency allocation battle of the mid 1940's. For, except for sex, this event had all the elements of great drama--Power, Passion, Politics, Greed, and sudden twists and turns in the plot were the hallmark of this epic battle. It hastened the destruction of probably the greatest man in the history of radio, solidified the stranglehold of another in his quest for total television domination, doomed a viable alternative in the infant television industry, and gave birth to the predecessor of CB radio. Got your attention? Then let's open our Playbills and read the

### CAST OF CHARACTERS

#### **THE ARRL AND THE 50,000 AMATEUR RADIO OPERATORS**

Prior to World War II, hams were virtually the only major users of the "UHF" spectrum (as the frequencies above 25 Mc were then known). They had the use of the 10 meter band (28-30 Mc) and 5 meters (56-60 Mc) since the late 1920's, as well as a small slice of spectrum at 400 Mc. In the late 1930's, the FCC had allocated two new bands to amateurs--2 1/2 meters (112-116 Mc) and 1 1/4 meters (224-230 Mc). Except for 10 meters, most of the operations on these frequencies were done with very simple equipment. Modulated oscillators and super regenerative receivers were the mainstay of their activities. For those not familiar with this type of equipment, a modulated oscillator was a tube coupled to a tuned circuit directly on the desired frequency which was modulated by another tube. Since crystal control and frequency multiplication were not used, the resulting signal varied in both frequency and amplitude when the oscillator was modulated. The only way to receive such an unstable signal was with a super regenerative receiver. Invented by Major

Edwin Armstrong in the early 20's, the "supergenny" was extremely sensitive, but very broadbanded. It gave off a loud "rushing" noise (like an FM receiver unsquelched). A complete 'phone station of this type could be built with only 3 tubes--an important consideration for the Depression era hams.

Except for limited operation on the 112-116 Mc band in World War II under WERS (War Emergency Radio Service), amateur stations had been silent since December 7, 1941. Now, late in 1944, with the end of the war in sight and new VHF/UHF tubes in production for the War effort, the ARRL was making plans for more bands above 25 Mc.

#### **MAJOR EDWIN H ARMSTRONG**

The unquestioned "Father of Modern Radio", Major Armstrong had experienced several setbacks in the 1920's and 30's, partly because of his secretive nature and uncompromising attitude.

He had delayed in obtaining his original patent on the regenerative detector, and when he did finally apply, he omitted the oscillating properties of the circuit. Lee De Forest challenged Armstrong on this invention by submitting a circuit of his own that he claimed he developed in mid-1912. Armstrong initially won, based on the fact that De Forest's design was basically uncontrolled feedback. When, however, Armstrong flaunted his court victory (by flying a flag with his patent number on it where De Forest could see it), and when Armstrong refused to grant De Forest a license to manufacture regenerative receivers, De Forest went back to court--and this time won. In two separate cases, the Supreme Court ruled that De Forest, not Armstrong, was the inventor of regeneration. This was bad enough, but then Armstrong lost another court battle. Although he had invented the superheterodyne receiver while in France in 1918, it was based partly on a crude, barely functional converter designed by a Frenchman.

Despite the obvious superiority of Armstrong's design, the courts ruled against him again.

Desperate for a success to reverse these setbacks, Armstrong turned to the idea of FM. At that time, the late 1920's, the concept of FM was known, but it was widely believed that it was impractical, if not impossible. Armstrong, however, proved them wrong, and by 1933-34 had developed an operational, noise free, wideband FM system. He offered it to RCA, which had the first right of refusal. RCA, for reasons we will see in a moment, declined to fully develop FM, and Armstrong turned to GE. In Schenectady, NY, he found an ally in W.R.G. Baker, a GE Vice President, who saw the potential in FM. With GE's help, he continued to develop FM, got the FCC to allocate a slice of the VHF spectrum for FM broadcasting (42-50 Mc), and set up his first FM broadcasting station--W2XMN in Alpine, NJ. With two other pioneer FM stations, W1XPW in Meriden, CT, and W2XOY in Schenectady coming on the air in 1939-1940, the new Yankee Network was up and running. Armstrong was convinced that, once the war ended, FM would completely replace AM as the broadcasting standard, and he wanted a large chunk of VHF frequencies to accommodate it.

### **BRIGADIER GENERAL DAVID SARNOFF AND RCA**

For the first forty five years of it's corporate life, RCA WAS Sarnoff and vice versa. From his humble beginnings as a telegraph boy and the wireless operator who copied the "Olympic" wireless signals about the doomed "Titanic", he had risen quickly in the Marconi organization, and was with RCA from the start. Sarnoff had watched the progress of his old friend Armstrong as he developed FM. However, he had other plans for RCA. Sarnoff was convinced that television was the future and radio was the past. Throughout the 1930's, he had poured millions of RCA's dollars into an all electronic television system, to replace the crude mechanical "spinning disk" sets that were in the experimental stage. By the late 1930's, he had a viable, all electronic system ready to go. On April 20, 1939, at the New York World's Fair, Sarnoff introduced commercial television to the world, using the slices of VHF spectrum that the FCC had set aside for experimental television.

Sarnoff's interest in the VHF frequencies extended beyond obtaining large allocations for television; he also wanted to minimize the frequencies available for FM broadcast. To him,

radio was simply radio, an old technology made obsolete by television. He also realized that the public had a limited amount of disposable income available, and he wanted every spare dollar to be spent on TV sets, not FM radios. Sarnoff saw FM broadcasting as a serious threat to his beloved child, and he wasn't going to allow FM to gobble precious VHF frequencies that he felt rightfully belonged to television.

### **WILLIAM PALEY AND CBS**

Although only a supporting player in this drama, William Paley and his CBS Network almost changed the course of TV history, and, at one point, had both the FCC and the Supreme Court on their side. Paley, through the genius of Peter Goldmark, one of CBS' top engineers, had developed a working color television system with brilliant, lifelike colors more than a decade before RCA's color system was remotely viable.

In 1940, as CBS was looking for a way to get past Sarnoff and RCA's stranglehold of patents on their all electronic black and white system, Peter Goldmark came up with the solution. Going back to the 1920's and the mechanical spinning disk, Goldmark developed a hybrid electronic-mechanical system. Using the spinning disk (which CBS now called the color wheel) with red, blue and green filters, he scanned it with an electron beam. On the receiving end, a similar "color wheel" synchronized to spin at the same speed detected the color signal. On August 28 and September 4, 1940, CBS gave demonstrations of their color TV system to the FCC. The FCC was very impressed with the vivid, sharp clarity of the colors they saw on the screen. By contrast, RCA's color system was an embarrassing flop.

In addition to wanting television to start off directly with color, Goldmark was also convinced that the postwar TV frequency allocations should be on UHF, not VHF. In fact, CBS was so sure that their UHF color system would become the industry standard that they had no plans to apply for any VHF TV license.

And so, the players in this drama wait in the wings for their cue to come out on the stage. How will they react to the FCC's first VHF allocations proposal, issued in late 1944? Who will live past ACT I? Who will make it to the final curtain call? "The Wayback Machine", with front row seats, will have the answers.

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## More Nikola Tesla – Part 3

In 1904, the United States Patent Office awarded the patent for radio to Guglielmo Marconi, though his work is based on Tesla's widely-discussed demonstration years prior. In May 1905, some of Tesla's patents expired, stopping the royalty payments and causing severe reduction to the funding of the Wardencllyffe Tower. Tesla advertised services of the Wardencllyffe facility to find alternative funding to little success.

Around 1910, Tesla designed the Tesla turbine at Wardencllyffe and produced Tesla coils for sale to various businesses to generate funding. He developed a two-hundred horsepower sixteen-thousand revolutions-per-minute bladeless turbine. It was shown to an audience on his fiftieth birthday.

Of the 700-plus patents accumulated by Tesla, the most controversial today is his Wardencllyffe Tower. The tower was meant to be the start of a national (and later global) system of towers broadcasting power to users as radio waves. Instead of supplying electricity through a current grid system, users would simply "receive" power through antennas on their roofs. At the time the power grid was quite limited in terms of who it reached and the Tower represented a way of significantly reducing the cost of "electrifying" the countryside.

Though never completed successfully in Tesla's lifetime due to lack of funding, and finally dismantled for scrap during wartime, its principles are currently being implemented by a U.S. military project in Alaska, spanning several hundred acres. However, Project HAARP, as it is called, targets a different objective. While Tesla's tower was to be his supreme test of the applicability of transmitted power, HAARP is being used to study ionospheric effects on radio communication. Wardencllyffe also provides a basis for a current search for practical applications for focused wave and particle beams, such as the laser and maser.

In the financial panic of 1907, Tesla set Westinghouse free from payments on his patents over the induction motor for a nominal sum of money. Diminished in strength by the "War of the Currents," the Westinghouse Company survived due to Tesla's act of generosity. Between 1912 and 1915, Tesla's finances unraveled. Newspapers of the time labeled Wardencllyffe "Tesla's million-dollar folly."

Due to the fact that the Nobel Prize was awarded to Marconi for radio in 1909, it was believed that Tesla and Edison were to share the Nobel Prize of 1912 (or 1915; some accounts differ). Tesla's rumored nomination for the Nobel Prize in Physics was primarily for his experiments with tuned circuits using high voltage high frequency resonant transformers. It was possible that Tesla was told of the plans of the physics award committee and let it be known that he would not share the award with Edison.

Prior to the First World War, Tesla looked overseas for investors to fund his research. When the war started, Tesla lost funding he was receiving from his European patents. Wardencllyffe Tower was also demolished towards the end of WWI. Tesla had predicted the relevant issues of the post-World War I environment (a war which theoretically ended) in a printed article (December 20, 1914). Tesla believed that the League of Nations was not a remedy for the times and issues. In 1915, Tesla filed a lawsuit against Marconi attempting, unsuccessfully, to obtain a court injunction against the claims of Marconi. Around 1916, Tesla filed for bankruptcy because he owed so much in back taxes. He was living in poverty.

Tesla started to exhibit pronounced symptoms of obsessive-compulsive disorder in the years following. He became obsessed with the number three. He often felt compelled to walk around a block three times before entering a building, demanded a stack of three folded cloth napkins beside his plate at every meal, etc. The nature of OCD was little understood at the time and no treatments were available, so his symptoms were considered by some to be evidence of partial insanity and this probably hurt what was left of his reputation. This obsessive-compulsive behavior may have originated from the observations over repeated polyphase systems in nature that Tesla researched.

At this time, he was staying at the Waldorf-Astoria, renting in an arrangement for deferred payments. In 1917, around the time that the Wardencllyffe Tower was demolished, Tesla received the highest and most significant honor the IEEE can award to any person who uses scientific knowledge to solve practical problem, the Edison Medal. The incongruities between what might have been and the situation at hand probably did not pass without notice by Tesla.

Nikola Tesla, in August 1917, first established principals regarding frequency and power level for the first primitive RADAR units in 1934. In the 1917 The Electrical Experimenter, Tesla stated the principals of modern military radar in detail. Tesla's study of high voltage, high frequency alternating currents lead to this development. Tesla had formed the concept of using radio waves to detect objects at a distance.

"For instance, by their standing electromagnetic waves use we may produce at will, from a sending station, an electrical effect in any particular region of the globe; with which we may determine the relative position or course of a moving object, such as a vessel at sea, the distance traversed by the same, or its speed."

Tesla proposed to use electromagnetic waves to determine the relative position, speed, and course of a moving object and other modern concepts of radar. Tesla had proposed it may help find submarines (which it isn't

well-suited for), though it was first applied successfully to find aircraft (after their later proliferation) and surface ships during World War II. Emil Girardeau, working with the first French radar systems, stated he was building radar systems "conceived according to the principles stated by Tesla".

By the twenties, Tesla reportedly negotiates with Great Britain's Prime Minister Chamberlin over a ray system. Tesla also had stated efforts had been made to steal the "death ray" (though they had failed). The Chamberlin government was removed though before any final negotiations occurred. The incoming Baldwin government found no use of Tesla's suggestions and ended negotiations.

On Tesla's seventy-fifth birthday in 1931, Time magazine put Tesla on the cover. The cover caption noted his contribution to electrical power generation.

In 1935, many of Marconi's patents relating to the radio were declared invalid by the United States Court of Claims. The Court of Claims decided that the prior work of Tesla (specifically US645576 and US649621) had anticipated Marconi's later works. Tesla got his last patent in 1928 on January 3, an apparatus for aerial transportation which was the first instance of VTOL aircraft.

In 1934, Tesla wrote to consul Jankoviæ of his homeland. The letter contained the message of gratitude to Mihajlo Pupin who initiated a donation scheme by which American companies could support Tesla. Tesla refused the assistance. Tesla choose to live by a modest pension received from Yugoslavia and keep researching.

When he was eighty-one, Tesla challenged Albert Einstein's theory of relativity, announcing he was working on a dynamic theory of gravity and argued that a field of force was a better concept and did away with the curvature of space. Unfortunately the theory was never published, but Tesla may have been developing a theory about gravity waves. This theory provides a basis for plasma cosmology.

Tesla died alone in the hotel New Yorker of heart failure, some time between the evening of January 5 and the morning of January 8, 1943. Despite selling his AC electricity patents, Tesla was essentially destitute and died with significant debts.

At the time of his death, Tesla had been working on some form of teleforce weapon, or Death ray, the secrets of which he had offered to the United States War Department on the morning of January 5. It appears that his proposed death ray was related to his research into ball lightning and plasma. He was found dead 3 days later and, after the FBI was contacted by the War Department, his papers were declared to be top secret.

Immediately after his death became known, the Federal Bureau of Investigation instructed the Office of Alien Property to take possession of Tesla's papers and

property, despite his US citizenship. All of Tesla's personal effects were seized on the advice of presidential advisors. J. Edgar Hoover declared the case "most secret," because of the nature of Tesla's inventions and patents. Tesla's Serbian-Orthodox family and the Yugoslav embassy struggled with American authorities to gain these items after Tesla's death due to the potential significance of some of Tesla's research. Eventually, Tesla's nephew, Sava Kosanovich, got possession of some of his personal effects (which are now housed in the Nikola Tesla Museum in Belgrade, Yugoslavia).

Tesla's funeral took place on January 12, 1943 at the Cathedral of Saint John the Divine in New York City.

Tesla always disputed the claim that Marconi invented radio. An ongoing lawsuit regarding this was finally resolved in his favor after his death. This decision was based on the fact that there was prior work existing before the establishment of Marconi's patent. At the time, the United States Army was involved in a patent infringement lawsuit with Marconi regarding radio, leading some to postulate that the government granted Tesla the patent in order to nullify any claims Marconi would have to compensation.

In 1976, a bronze statue of Tesla was placed at Niagara Falls.

#### **Nikola Tesla Memorial at Niagara Falls**

*Tesla was the first to successfully convert mechanical energy of flowing water to electrical energy.*

Perhaps because of Tesla's personal eccentricity and the dramatic nature of his demonstrations, conspiracy theories about applications of his work persist. The common Hollywood stereotype of the "mad scientist" mirrors Tesla's real-life persona, or at least a caricature of it—which may be no accident considering that many of the earliest such movies (including the first movie version of Mary Shelley's Frankenstein) were produced by Tesla's old rival, Thomas Edison.

There are at least two films describing Tesla's life. In the first, arranged for TV, Tesla was portrayed by Serb actor Rade Šerbedžija. In 1980, Orson Welles produced a Yugoslavian film named Tajna Nikole Tesle (The Secret of Nikola Tesla).

Tesla believed that war could not be avoided until the cause for its recurrence is removed. Tesla was opposed to wars in general. Tesla possessed a hatred of war, from his parents and homeland. Tesla sought to end warfare scientifically by devising protective measures that would prevent wars. Tesla found exceptions and some justifiable situations where conflict is necessary. Tesla envisioned war of machines, not of humans, and of more terrible weapons in the future. Tesla made the first of a race of robots which could carry out combat maneuvers. These weapons' destructive actions and ranges would have virtually no limit, he believed. Tesla sought to reduce distance, such as in communication (for better

understanding), transportation, and transmission of energy, as a means to insure friendly international relations.

Tesla's other solutions included the development of expedients for preventing any conflict. By the 1930s, Tesla had developed what is known as a "Tesla shield", which armaments could not penetrate by the utilization of a electromagnetic shell. Tesla shields would transmit electrical energy without wires and produce destructive effects at a distance. A wireless transmitter, as described in the technical patent US1119732, projects electrical energy (not necessarily destructive) in any amount to any distance and apply it for innumerable purposes, both in peace and war.

A system for "Projecting Concentrated Non-Dispersive Energy Through Natural Media" known as teleforce was reportedly developed later in his life commonly known as a "death ray" or "peace ray" (primarily a defensive weapon, with characteristics of a weapon of offense). Teleforce was a type of defensive particle-beam weapon that would provide protection from invasion by enemies approaching by sea or air. Tesla could not find financing for demonstration of the "death ray" discoveries. The system's large dimensions naturally limited its use as an offensive weapon. Tesla also advocated developing wireless energy transmission and electrically powered airplanes.

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## Volunteers Needed For Calling Tree

We are starting a calling tree to be activated in case of emergency. Simplex communications may be necessary depending on conditions. Volunteers are needed for the following areas:

1. Canal Winchester, Lithopolis, Pickerington
2. Millersport, Baltimore, Carroll
3. Amanda, Sugar Grove, Rockbridge
4. Bremen, Rushville, Hideaway Hills

5. Lancaster area (need people in East, West, North & South)

If you are interested in accepting the responsibility of being the first person contact point when the calling tree is activated for any weather related emergency services, **please contact John Fick, KD8EEI, via the radio or cell 740 215-7096 or email kd8seek@yahoo.com.**

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## Which Antenna ?

By Jack Travis, AE8P

I own several hand held radios that I use for various purposes. They are all Yaesu and are the VX-5R, VX-2R, FT-60. As such, I subscribe to special interest groups for those 3 radios on the internet.

The groups are kind of a free-for-all as any of the members can ask questions and the other members will try to answer those questions to the best of their ability. By far the most asked question is "I just got a new \_\_\_\_\_ radio and I want to get the best antenna for it." Then the fun begins as there are at least a dozen different antennas suggested, each one "absolutely the best antenna you can get".

My tolerance for such answers has reached the bottom and I must respond. I have also heard the same question on our repeater from time to time. Here is the answer – not taken from the ARRL antenna book - but from my high school physics

book. The best antenna is going to be the largest and tallest resonant antenna you can find.

All radio manufacturers install a relatively small antenna as standard equipment since it is unobtrusive. If you want to replace it, by all means do that and buy one that is as tall and uses as much internal wire as you're willing to tolerate. If you want to have over six feet of vertical antenna on your hand held, it will outperform a 4 inch stubby – guaranteed.

There is no "magic" metal you can make your antenna from and there is no "magic" 4 inch antenna that will outperform a 19 inch antenna. Antenna manufacturers are quite adept at presenting misleading information to entice you into buying their antenna. Remember the criteria, large and tall resonant and buy accordingly.

If there is evidence contradicting the information I have just presented, I'd be glad to hear your views. Until such time, good physics prevails.

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## No Code

By Allen Sellers, KB8JLG

As a result of the FCC's recent ruling eliminating CW testing requirements Technician class hams have the following additional operating privileges WITHOUT doing anything... no tests, no paperwork, etc.

They can use CW on 80M, 40M and 15M and they can use CW, RTTY, Data and SSB on 10M - See new band allotments for frequencies allowed. The new band allotments can be found on the internet, if you don't have the recent issues of QST.

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## February VE Testing

By Allen Sellers, KB8JLG

Six persons tested on February 18, 2007 in spite of the snow and cold. Two youngsters, a girl and a boy passed the Tech test as did one adult. Two passed the Extra and George Lambert, KB8USP, by special request, passed the 5 WPM code test by sending the test material. George now has a Tech Plus and will be one of the last to earn this.

I forgot to mention last month that Bob KD8EXK donated an ARRL Study Guide for me to use in the Tech License class that started February 20, 2007. Thank you very much Bob as it really helped me prepare my teaching plan.

Now that I am retired, I am willing to start a CW session for persons that want to brush-up and get on the air... getting on the air at the clubhouse will be a requirement for everyone after they become proficient again. Why CW? One of our club members tried to contact the recent Peter I DXpedition but couldn't get through on SSB... he says that he is almost positive that his 100 watt CW signal could have done the job as the pile-up there was a lot smaller. Let me know if you are interested. From scratch it takes about 6 weeks and at least 30 hours of practice, so a refresher course should take less time.

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## Swan Radio

By Ralph Howes, W8BVH

Thought this was of some interest. I always wanted to know where some of these old radios came from. (Got this from the Boatanchor reflector that I subscribe to). Someone wanted to know if Drake and Swan were, at one time, made by the same people. Everyone knew where Drake came from but didn't seem many knew much about Swan.)

Herb Johnson was born November 10, 1920, in Pittsburgh, PA and died February 1, 2000. The son of Swan and Ruth Johnson, he spent his childhood in Ashtabula, OH. A lifelong amateur radio enthusiast, he designed his first radio at age 14, and at age 15 earned his amateur radio operator's license.

After moving to Benson, AZ, he founded Swan Engineering (later, Swan Electronics) in 1961. Originally working by himself out of his garage, Herb created a line of radios that became a favorite of amateurs around the world. Herb chose the brand name "Swan" in memory of his father, whose name in his native land of Sweden was "Sven". Upon arrival in the USA, his name was Americanized to "Swan".

Swan moved to California in 1962 and became a subsidiary of Cubic Corporation in 1967. Amateur

equipment production continued until around 1979. In its heyday, Swan cranked out some 400 transceivers a month from its Oceanside, California, plant. Swan also manufactured station accessories.

After Herb sold the Swan Company to the folks from Cubic in 1968, he stayed on for about five years until he formed the Atlas Company which produced some outstanding solid state rigs. After the Japanese entered the market, most of the American companies took a beating and Herb decided to suspend the production of Atlas equipment.

Did you know that Swan built over 82,000 rigs? At one time they were producing as many as 400 per month. Quite a success story from a company that started out on the strands of a shoe string, I'd say! The Swan Company was the classic American success story. I think that is why I am so fascinated with the equipment. Herb had hand built most of the first rigs (the single banders) and even hand lettered the dials, etc. They were always designed to become multiband rigs and were made larger than they had to be because the mentality was one of bigness in those days. Ever see a Johnson Viking?

You can visit the Virtual Swan Museum at <http://www.pcs.mb.ca/~standard/>.

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There is a knock on St. Peter's door He looks out and a man is standing there. St. Peter is about to begin his interview when the man disappears. A short time later there's another knock. St. Peter gets the door, sees the man, opens his mouth to speak, and the man disappears once again. "Hey, are you playing games with me?" St. Peter calls after him.

"No," the man's distant voice replies anxiously. "They're trying to resuscitate me."

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## Antennas, System Grounding and Safety

By: Stuart Rohre K5KVH

One of the recurring confusion factors in ham radio is what to do about station grounding. Recent discussions have shown once again how confusing this all can be to new hams (or old)!

In general, grounding to earth is done to lessen danger of electrical shock due to problems with AC powered equipment. It is to put the chassis of the radio equipment at the same zero potential as the earth pin of the AC supply, subject to ohmic factors giving rise to a voltage gradient from the AC mains earth to any separate radio earth point. (AND this can be the cause of serious problems if lightning hits.) Bonding of all earth rods or halowires, radials, etc. seeks to equalize lightning fault voltage potential differences, although at the extreme voltages and currents of direct hits, most materials used by hams at home are of doubtful suitability to dissipate a direct hit without substantial collateral damage to both equipment, grounding means, and possibly the structure. In any gathering of hams, there will be a couple or more who have tales of damage, in spite of ground rods.

In all cases of woe I have heard, there was knowledge of storms being likely, and there were feed lines left connected to antennas, and into the shack, and computers and radios were plugged into AC power, but often turned off. I unplug from antennas and AC at all times except when operating, and have had close calls, but radios survived. Same for the club station I maintain at the local Red Cross Chapter--everything unplugs after use. And we try to keep AC connections away from antenna cables, as after a lightning bolt has traveled 10 miles down through the air, is that one foot between your AC and coax going to look like high impedance? At Red Cross, we have a 60 foot grounded tower. Above the tri-band beam, and stacked 2M Yagis, is a low band ground plane for the Red Cross VHF frequency. It has been seen to act as a lightning rod in numerous storms, and has finally shown problems, even though its tallest part is a grounded folded unipole element. (One side grounded, as are the radials.) When it is replaced, we plan to try a dissipating top hat on the new antenna.

No one who has a grounded antenna feed entry panel, and who removes equipment from connection to AC power seems to get hit. Their grounded tower

outside may, but if they have a mast or dissipation array atop the tower it may discharge a buildup safely without any other problems.

Now if you live in a poor RF ground area, which also often means a poor AC ground area, you may get multiple hits or annual hits. (Been there as 9M2SM in the tropics!)

But, to confuse the issue, some antennas are incomplete radiators as usually built, and in a rather few "good RF ground" areas of the earth, may work better when operated with a physical earth connection under them. The quarter wave vertical element or mobile whip is the usual example of this.

Areas where earth is not useful to launching RF waves include desert soils, jungle soils in equatorial regions and rainforests, rocky outcrop regions of non-conductive material, and any areas of low ground conductivity. Mountainous areas where you are up on the rocky outcrop suffer as well. Your good elevation may mask the problems in this case.

Antennas to avoid in such areas are any of the unbalanced, non-dipole type antennas. These would include quarter wave verticals, so called "long wires", short random wires, and in general any antenna that works best when adding radials, counterpoises, or a ground plane. If you can add an adequate reference plane for such antennas they can work well. But that takes extra work in RF poor ground areas, unless you live by a body of water. Quarter wave verticals over salt-water edge have won DX contests in tropical areas. I am not saying the unbalanced antenna will not work, it will just work so much better if an RF ground is provided effectively with them.

Antennas that are earth independent are of course the balanced antennas such as dipoles, extended double Zepps, Yagi beams, and quads, loops, vertical half wave vertical dipoles, half squares, rectangles, Hentennas, etc. Note that I am saying balanced when looking at the antenna itself. You may be feeding a balanced antenna with an unbalanced feed line, such as coax to a horizontal half wave dipole. Another way to think of "balanced" antennas is to consider that it is an antenna with two elements connected to the feed, and well independent of earth, or a full wave or less, element in a loop or closed geometric form. (Includes loop like antennas) Note that Fractal antennas can be earth independent if made up of symmetrical parts, and symmetry is a feature of

balanced antennas in this context.

If you want mainly Near Vertical Incidence, in state coverage, you may want to put a near ground element wire under a balanced half wave horizontal dipole. Thus, extra RF grounds may be used with balanced antennas for specialized pattern control.

For good DX, you may want to elevate a quarter wave vertical and provide elevated radials for it.

Thus, grounding serves in the first case to alter a pattern for an already complete dipole antenna. In the second, the radials complete the "missing half" of the vertical, since its element was only a quarter wave. Neither case serves the lightning protection function.

All cases considered here are dealing with near fields of the antennas, and other effects of type of earth enter in further out from any antenna. Thus, to "ground" or reference at your antenna or not should address two needs, RF circuit completion and charge buildup dissipation that will assist with lightning concerns.

Now a side point on safety grounds. In the local area, there is about half of the utility's service area that is over shallow soil on rock, where driving earthing rods vertically works only for 18 inches.

Thus, they did some computer studies of great use to hams. An effective safety earth can be created with an alternate to ground rods. This would be 200 feet of at least no. 10 wire or larger, buried as deep as practical around the structure to be protected. The charge dissipation concept is to have a circle of this wire for charges to enter earth over a distributed area. The 25- ohm substation ground standard can be met in the worst areas for conductivity, and of course use of more conductors can bring earth resistance down to a more desirable 5 to 10 ohm value. The measurement is done by the three-prong "fall of potential" method recently discussed. Incidentally, for those asking how this is done, it was covered in the last few years of the ARRL Handbook or Antenna book, another good reason to renew your technical library with updated Handbooks! You can build your own fall of potential measuring rods, and use a lamp bulb to limit the 60 Hz current used for injection in the soil to be measured. An AC voltmeter/ Ammeter and Ohm's Law completes your tools.

Hope this clarifies the various purposes grounding may play with various antennas and their location.

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## Station Grounding for Hams

By Bill Chesney, N8SA

Now is the time to get our ducks in a row and our stations ready for operating time. So, let's talk about the station ground we have been putting off. This is a very important piece of a complete, and I might add, SAFE station. As hams we ground our stations for two reasons; lightning protection, and RF abatement in the shack. We like to keep the RF in the antennas and feedlines, not in us! Is that new top of the line radio acting squirrely every time you key up? Are you getting buzzed off the key or mike when you transmit? Then you probably have a grounding problem. So, let's make a plan to get it done right.

First we ground all the antennas for lightning protection. Despite the recent price increase of copper, DO NOT cheap out on this! This is your life, your home, your radios. They are important! You need 0 gauge bare copper ground wire to the base of towers to at least three 8 foot ground rods spaced in a triangle and interconnected with the same 0 gauge (single OTT in the vernacular of the trade). This ground should also interconnect to the shack ground system. This will be discussed further down the page.

The shack ground should be at least 8 gauge single strand bare copper, or if you use insulated, it should have as few conductors as possible. RF hates stranded wire. Lots of technical reasons I won't get into here. Memorize this fact and get on with the job. The length of wire from shack to ground system should be less than ¼ wave at highest HF frequency used, typically 10m so it should be 8 feet or less. This will take some planning to locate shack this close to ground. When planning your new shack this part needs to be planned FIRST, not last for obvious reasons. This shack ground should go to an eight foot ground rod as its connection point to the rest of the ground system. The tower or antenna ground wires and rods should be interconnected to this point also. Use bare single strand copper for this interconnection and as big as you can get up to and including that 0 gauge. Above 2 gauge there is no single strand. It goes to 7 strand at that point so you can handle it. Use proper silicon bronze grounding connectors for all connections. Connection grease won't hurt either. It is cheap insurance against corrosion, and believe me in Michigan it WILL corrode in the ground. The wire will not corrode enough to worry about it. Just the connection points

need be coated. No-ox is the most popular brand, but others will work.

Next we add the counterpoise to our ground system. This is critically important to keep RF out of the shack, and you, while operating and keep your radio's CPU sane. The counterpoise is to balance out the RF in your antenna system and keep you shack at a zero potential at all times. Here is the most important fun fact to commit to memory when dealing with RF and grounding. RF will NOT penetrate soil further than 1/2"!! SO, the bare copper counterpoise wire we are going to connect to our shack ground rod needs to go on the top of the ground. With pets, lawn equipment, kids, etc this is a balancing act. I prefer to run bare 8 gauge single strand around the foundation on top of the ground. It needs to be at least 1/4 wave on the lowest frequency you plan to use. It can be used to interconnect all the grounds around the house. You can tuck it under wood chips or filter fabric in the landscaping but NOT under the ground. You can fasten it to the ground by 'staking' it with bent copper wire stakes fashioned out of your counterpoise wire. If you add one about every two feet it will stay in place nicely. I run it right next to the foundation to keep it away from lawn equipment, etc. If you have metal fencing, run a wire out to it and bond to it solidly. This is as cheap of a counterpoise as you can get, but it should NOT be your only ground. The ground connection resistance is too high to be useful for lightning protection. Stay with lots of ground rods and heavy wire for that!

If you are interconnecting your electrical and cable TV, etc grounds to the shack ground (A

MUST!), this counterpoise wire is ideal for doing that. Make it the ground 'bus' to interconnect these ground points. Every piece of equipment that is grounded (cable, electrical neutral, satellite TV) must have it's own rod and then connected to the ground 'system'.

The theory is to let everything in your house that relies on ground to rise together during ground rise (lightning in area). If everything rises together, all is well. It is not the voltage that kills, it is the voltage difference! IF your whole house rises several thousand volts relative to the area 'together' it is no big deal. If your house electrical neutral rises several thousand volts relative to your grounded shack, that is a VERY BIG DEAL! I call it the 'bird on the wire' theory. Notice that birds land on the high voltage electrical wires all the time and are not hurt. That is because their bodies rise to the voltage of the wire. A bird can land safely on 345,000 volt wires safely as long as they do not bridge to ground so there is a voltage difference across their bodies. That is what squirrels do. They jump onto hot wires and their tails are still contacting a grounded or lower voltage surface such as the pole or a tree—then bang--fried squirrel and your lights go out! Birds are much smarter than squirrels. Be the bird!

PS, this was sent to me by N8ZCI asking my opinion. I like to use it as a model grounding plan. Your plan should be as thorough. Note the 'Polyphasers' I did not mention in the article due to the short length I wanted on the article. They are important too. The only critique I gave was to bond the fence to the system.

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## Introduction To APRS

By Frank Ingle, KG4CQK

The Automatic Position Reporting System (APRS) was invented by Bob Bruninga, WB4APR, now living up in Glen Burnie, MD. APRS is not just a communications tool like Packet or RTTY, but rather a whole set of tools all designed to work together.

**Geographic Information Systems:** APRS provides the display of data on a wide variety of maps. Virtually any map that can be displayed on a computer may have APRS data displayed over it. The display may be in two dimensions (position on the earth's surface) or three dimensions (including altitude). Some of the data typically displayed on a map include storms, weather observations, airplanes,

vehicles, runners, bicycles, ham stations, homes, fires, etc.

**APRS Software:** This is the tool which ties all the parts together and sorts incoming data into meaningful tables. The APRS software may be run on virtually any computer which supports MSDOS (2.0 or higher), MS Windows (3.0 or higher), Macintosh, LINUX and Java. APRS programs have also been written for a variety of postage stamp processors, and at least two Kenwood and one Alinco receivers. This software provides for the handling of data such as position reports, status reports, objects, weather reports, storm data, telemetry, bulletins and beacons.

### **Global Positioning Satellite (GPS) Systems:**

The GPS allows users to pinpoint their exact location on the surface of the earth (or above it). Typically, a small antenna--about the size of a computer mouse--can provide digital data containing the latitude, longitude and (sometimes) altitude of the device. When these data are input to the APRS system, all users can see the exact location of that device on a map as it moves. For example, a mobile ham station using APRS could have its location constantly reported to an EOC. APRS can also work with LORAN systems used in the maritime environment.

**UI Radio Packets:** Packet Radio is a system invented by hams to transmit digital data over radio circuits designed for voice. Data to be transmitted are split into small units ("packets"), converted to audio tones (often via FSK) and then transmitted as an audio signal. On the receiving end, the tones are converted back to digital data and assembled into the original stream of data. "UI" refers to Un-numbered Information, which is a specific type of packet that does not require acknowledgement. Radio frequencies most commonly used by APRS include 144.390, 7.085 (*Ed note: Right in the DX SSB window!*), 10.151 and 18.107 LSB. However, APRS packets may be transmitted over almost any voice channel including police radios, amateur repeater systems, business band, marine band, Citizens Band, cell phones, and even land-lines.

**APRS Digipeater Network:** In the 2-meter band, APRS stations with as little as 1-watt power can reach stations as far as 400 miles away. This is accomplished by a network of dedicated digital repeaters (digipeaters) which relay the signals. To avoid network saturation, packets are repeated only three times, hence the 400-mile limit.

**Trak-Net:** For mobile users in remote areas not served by digipeaters, packets may be repeated via orbiting satellites. The mobile station requires a 10-watt output and a 5/8-wave antenna to uplink a signal on 144.900.

**APRS-NET:** In addition to staying in touch via radio, APRS can take advantage of the Internet to transmit data to stations out of radio range, or to stations not equipped with radio capabilities. By design, APRS data are only transmitted about 400 miles by radio. However, the Internet allows users all over the world to exchange data when desirable. Virtually any computer with APRS software and a modem may receive data from the APRS-Net. (ISP not required!)

**ZIP-LAN:** For computers not already connected to a network, a very inexpensive serial data network may be set up to provide all users access to APRS data. This would be useful in a Police HQ or EOC where there may be computers that normally work independently but would all need access to APRS data in an emergency.

**Weather Station:** Inexpensive weather monitoring equipment may be connected to an APRS station to provide a continuous stream of weather observations from that station's location. Parameters such as temperature, wind speed and direction, barometric pressure, rainfall and humidity are often available on a real-time basis.

**Aircraft Communications and Reporting System - ACARS:** Commercial aircraft use this packet system to stay in touch in the 129 - 131 MHz band. If a TNC is programmed to recognize these packets, they may also be reported by APRS, giving position information on all participating aircraft within 200 miles.

In summary, there is a lot to APRS--more than can be learned in one sitting. As "a picture is worth a thousand words", one could learn a lot more about APRS by seeing it than by reading about it. The best way to learn APRS is to obtain a shareware copy of APRS software, load it, and experiment with it. You don't even need a radio or packet equipment to get started. If you can connect to the Internet, you can see the whole world on APR

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## Weather Spotter Training

The 2007 Fairfield County Weather Spotter Training will take place on:

- Date: Monday, March 26, 2007
- Location: Pleasant Township Fire Department  
(Fire Chief Jeff Mathias)  
2925 Lancaster-Thornville Road  
Lancaster, Ohio 43130

➤ Time: 7:00pm - 9:00pm

➤ Cost: FREE

I will be creating a flyer to distribute to the public, media, etc. in January 2007.

Matthew J. Keefe, Director  
Fairfield County Office of Emergency  
Management and Homeland Security.

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## Comments

By Bob Prince, KD8EXK

I think we need to thank the ladies in the club for fixing the food for us on Thursday nights. Sometimes we forget to tell them we are thinking about them and they are not forgotten. Just a little thank you goes a long way!!!!

Some of us don't think about these things. But I think it's a big deal to me what they do.

Thanks, Bob

*Editors note: Thank you also to Charlie, N8KZN the designated Chief Cook and Bottle Washer.*

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## Care for Old Radio Equipment

By Gregg Mulder, WB8LZG

Many of the hams who have been around for a while often have used gear somewhere gathering dust. For many, it may be an old piece of gear they used while a novice or just a particular fondness for a rig from years past. You can see these rigs at your favorite HAMFEST on many weekends.

Some of the rigs you'll see are still as if they were brand new, others look like they were actually used as boat anchors, and most are someplace in between. If you want your equipment to retain that "looks just like new" appearance then read on.

First step, tender loving care. Beautiful old gear doesn't just happen by accident. It's been cared for every time it was used, and keeping the gear clean is the best and easiest way to keep the appearance up. If possible use a cover of some sort to protect the rigs from dust and scratches during periods of no use. If they do get dirty, don't be afraid to wipe them down with a soft rag rinsed in mild soap and water and squeezed so no water gets it to the gear.

Often a good cleaning will bring new luster back to even a very dirty rig. Don't forget to clean the rubber feet on the bottom too, if neglected they will crack and wear out. Radios that have fans circulating

air through them should have their covers removed yearly and any dust and dirt build-up blown out.

This is also a good time to clean the insides of the dial or replace burned out dial lamps. Resist the temptation to clean strong stains with harsh chemicals or abrasives as they may damage the paint or finish.

Step two, use the gear. Regular usage will help keep the caps from going bad, and will also help keep vital moving parts moving freely. Regular use will help alert you to potential trouble too. Maybe a low output means it's time for a new final tube. This will also insure that the rig works in times of need.

Step three, proper storage. If you are going to store a radio for an indefinite amount of time, please be sure to package it properly to protect from damage, and strive to store it in a clean, low humidity environment. A damp musty basement is to be avoided if possible.

Hope you got a few pointers here to keep your radio gear looking great. Remember, a clean rig is a happy rig, and every ol' timer ham will tell you, a shiny radio bags more DX! . Keep the dust off your key!

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## Output Power

By Mont O'Leary, K0YCN

Your Bird Wattmeter reads 100 watts forward and 10 watts reverse. What is the power output of your transmitter?

- a) 100 watts
- b) 90 watts
- c) some other value

Assuming the meter is in a 50-ohm coax line of negligible loss, power out of the transmitter is equal to that delivered to the load, and that is, by definition, the difference between the two readings. In this case it is 90 Watts (b). OK, you say. But if only 90 watts is produced by my transmitter and the load dissipates

90 watts, where does the extra 10 watts come from? Where is the 10 watts going? What about the First Law of Thermodynamics (conservation of energy)?

The 10 watts was put into the line in the first few nanoseconds after you applied power and it remains there. During this very brief transient period your transmitter actually did put 100 watts into the transmission line but, because of an impedance mismatch, only 90 watts was absorbed by the load while the remaining 10 watts was reflected to create standing waves. This energy is not available for any other purpose since it is required to maintain the steady state standing wave status. Once the steady

state has been reached, the transmitter puts out 90 watts and the load continues to accept 90 watts. The higher the impedance mismatch, the greater is the magnitude of energy stored in the standing waves.

Let's take an extreme and easily analyzed case of a lossless half wavelength 50-ohm line that's open at the far end. As you turn on your transmitter, it doesn't immediately know that the line is open at the far end. It happily sends it's full 100 watts into the line, which it can't tell from a 50-ohm resistor. At this instant, the line has 100 watts forward with zero reverse power. When the voltage and current waves arrive at the far end they are reflected, arriving back at the source after the round trip. There, they encounter the signal still being applied from the source, resulting in a complete re-reflection at the input end of the line. At that moment, the apparent impedance seen by the source jumps from 50 ohms to infinity; what it sees looks like another source producing exactly the same voltage, so current flow from the source ceases. The source quits putting any power into the line since it's now looking into an

apparent open circuit, but the re-reflection of the initial waves provides exactly the same voltage and current for the forward wave that were formerly provided by the source. So the forward wave, initially generated by the source, is now being furnished entirely by the re-reflected reverse wave. On the line, you've got 100 watts forward and 100 watts reverse, bouncing back and forth forever (remembering that our line is lossless). After the initial waves, your transmitter supplies none of this.

So in our example, as soon as a steady state is reached, 10 watts of the total forward power is not currently being delivered by your transmitter. It was initially delivered by the transmitter, only for the length of time required for the standing waves to stabilize. Since the waves travel at the speed of light times the velocity factor of the transmission line, this took a very short time after which your transmitter is only delivering the 90 Watts indicated by the difference between the forward and reflected power reading on your meter.

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## E-mail Addresses

If you are currently receiving The Ragchewer via regular mail but have an Internet account, the Ragchewer can be sent to you and save the club some money. You'll also get your Ragchewer about a week earlier and contains more than double the

content of the printed version. Send me your e-mail address and tell me to take you off the snail mail list. If you have a new email address, be sure to also let me know. Editor at [K8QIK@columbus.rr.com](mailto:K8QIK@columbus.rr.com)

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## History Has Been Made

Jim Weaver, K8JE, Director  
ARRL Great Lakes Division

Regardless of one's personal views on the situation, Amateur Radio history was made when the FCC's rule that abolished Morse code requirements for ham licensing became effective this past Friday. Any effort to continue the arguments against dropping the code requirement are equivalent with continuing to beat a dead horse for not running. I strongly suggest the best thing all of us can do at this time is to help newer amateurs become full citizens in

our great service and Elmer them to become top-quality operators.

Amateur Radio may not be Amateur Radio without Morse code, but even under the new rule, Amateur Radio still has Morse code. It is simply no longer required to demonstrate the ability to use Morse before getting a license. Morse code will be around for a long time. Now that learning Morse has been made optional, its use may even become more wide-spread than during any time over the past 50 years.

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## Balun 101

By Mont O'Leary, K0YCN

Several articles have mentioned the desirability of using baluns to couple balanced antennas such as dipoles to unbalanced transmission systems that include almost all transmitters, tuners, and coaxial cable. Unfortunately, when used improperly baluns

typically do more harm than good. Hopefully, this article will increase your understanding of what a balun is (and is not) and what it can and cannot do.

First off, a balun is not a transformer in the sense that we use that word in AC power or audio applications -- that is, it will not accept any load

impedance and transform it in the ratio that we usually use to describe them, i.e. 1:1, 4:1, 9:1, etc. A balun is really a transmission line coupler and instead of being composed of windings of a certain number of turns on a core like a conventional transformer, it is made from short sections of transmission lines, each having specific characteristic impedance.

As a simple example, a 4:1 current balun designed to match a 50-ohm unbalanced line to a 200-ohm balanced load is usually made from two 50-ohm transmission line sections wound around a ferrite toroid core. The two lines are connected in parallel at the 50-ohm input and in series at the 200-ohm output. As long as this balun is presented with a 200-ohm resistive load, its input will be 50 ohms resistive, provided that the frequency is within the design range of the balun. Baluns must be designed for and used with specific input and output impedances or their behavior is unpredictable and almost always undesirable.

Now, suppose that you have a multi-band non-resonant dipole (for example a G5RV) that you intend to feed with 450-ohm ladder line with a transition to 50-ohm coax before you come into your shack. What type of balun should you use to make the ladder line to coax transition? If you answered 9:1 you are probably in the majority but also very wrong!

The 9:1 balun will only work efficiently when presented with a 450-ohm resistive load. It is highly unlikely that the 450-ohm line will ever present the proper input impedance to the balun as you use this antenna system. In fact, it will vary from a few ohms to several thousand with significant reactance as you change bands. The losses in the 9:1 balun could be very large and your transmitter would generally not see a 50-ohm resistive load. Also, reactance in means reactance out so you would not achieve complete unbalance at the input to the balun and thus you would have common mode current on the coaxial cable and, potentially, a "hot" shack.

In the situation we just described, you should use a 1:1 choke balun and let your antenna tuner at the other end of the coax take care of the impedance transformation and reactance canceling required to obtain a 50-ohm resistive load for your transmitter. The choke balun prevents common mode current on the outside of the coax and forces the current in the ladder line into balance. It is also very low-loss when designed properly.

There are excellent references available on balun theory and construction. Look up authors such as Jerry Sevick, Roy Lewallen, and Walter Maxwell. Any Internet search engine will lead you to them.

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## Are You A Real Ham

You hear a lot of discussion about who's a real ham. Some say if you don't have the code, you're not a real ham. Others say if you don't work the low bands, you're not a real ham. Well, I'm here to tell you, whether you're a real ham or not has nothing to do with frequency, mode, code or packet, DX, or anything pertaining to your favored ways of operating. It pertains to your degree of obsession with the hobby. I therefore have devised this simple test which you can take to determine if you're a real ham.

1. Do you spend more on radios than on cars?
2. Do you look at cellular phone monopoles and wonder how they would load up as a 160 meter vertical?
3. Do you spend more time in the shack than in bed?
4. Do you ever eat dinner in the shack?
5. Do you ever get up at two in the morning to see if 20 meters is open to Asia?
6. Have you ever gone 6 months without watching TV?
7. Do you take an HT to work?
8. Are hamfests the biggest affairs on your social calendar?
9. Have you ever checked zoning laws and covenants before calling the realtor to look at a new house?
10. Have you ever drilled a hole in the top of your car to mount an antenna? (If car was new, count for 2 yesses!)
11. Do you ever agonize about whether to spend your weekend at a hamfest or working a contest?
12. Do you consider a 65 foot tower with a three element 40 meter beam an enhancement to the esthetic milieu of a neighborhood?
13. Has a ham in a ragchew QSO asked you if you were married or had kids, and you had to stop and think about it?
14. Have you ever had to make a choice between spending time and/or money on an amateur radio venture or on a major problem like a broken furnace, and opted for the radio project?

## GRADING

6 or fewer yesses--forget it, you're a wannabe.

7-9 yesses--real ham in training...you need a bit of work.

10-12 yesses--Congratulations, you're a Real Ham!

13-14 yesses--you may need counseling...perhaps therapy.

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## W6SAI Truth Table

By Lynn Tamblyn, K9KR

Perhaps many of you know that antennas are one of my passions. I have enjoyed experimenting with many different antenna versions over the 46 years I have had a ham license. Some have worked well and some not so well. I have written about some of my antennas in past issues of Hamtrix and I plan to continue writing about them in future issues.

As I was preparing to change my QTH to a smaller lot prior to retirement, I did a lot of reading on gain antennas to see if I wanted to continue the setup I had at the old QTH, or change to something "better." Some manufacturer's claims about antenna gain really amused me. Others intrigued me. One thing I found though is that antennas follow pretty well defined rules of performance. The "gain" was the item - could I rely on those claims?

Then it hit me like a hammer. Bill Orr, W6SAI, had written about a Truth Table many years ago. I had not really looked at it for many years. I had always considered Bill to be "the antenna guru." In fact, in discussions I have had with our WARAC antenna expert Ron Gorski, N9AU, over the years, he had quoted Bill more times than I can remember. Perhaps Bill could help. So I dug out his reference book. And help me he did.

We have a lot of newer hams in the club.

Perhaps some of you know of Bill. Perhaps even his truth table. However, I suspect a lot do not know. So I decided that I would pen an article about the truth tables, not to start a war among gain antenna owners, but simply to present the table to newcomers. The table presents comparisons in gain over an isotropic as well as over a dipole. I include both, since nowadays manufacturers seem to like to reference the isotropic instead of a dipole, which is my preference:

Bill also has another basis for comparison, his Seven Ground Rules of the Game, which is an accurate way of determining performance for any antenna. But that's the subject matter for another article.

Antenna Type	Db Gain Over Isotropic	Db Gain Over Half-Wave Dipole
Isotropic Radiator (theoretical antenna)	0	-2.1
Ground Plane	0.3	-1.8
Half-wave Dipole	2.1	0
5/8 wave antenna	3.3	1.2
Quad Loop one element	4.1	2.0
Yagi two element	7.1	5.0
Yagi three element	10.1	8.0
Yagi four element	12.1	10.0
Quad Loop two element	9.1	7.0
Quad Loop three element	12.1	10.0
Quad Loop four element	14.1	12.0

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## AM is Alive and Thriving

Amplitude Modulation (A3) mode on the Ham bands is alive and thriving. If you tune the 160 and 75 Meter bands in the evening you will hear groups of AMers, or as they call themselves Yea'ammers having nice QSO from all over the northeast. If your HF transceiver has the AM mode on the mode dial try a tune across the band and take a listen. If you do not have a HF transceiver and have a shortwave AM receiver that tunes through the 75-Meter (3.7-4 MHz) you can hear the AMers that way. When the bands are open you will find AM activity on the 20 and 10 Meter bands on a regular basis. 10 Meter AM popularity is due to old CB transceivers retuned from 27 to 29 MHz.

K1MNW, W1ZE and WD1F are in the process of building up older design tube transmitters to be placed into AM activities on 80 Meters. Bill, K1MNW has salvaged the parts out of an old Gates AM broadcast transmitter to build up a KW transmitter on AM.

Bruce, W1ZE checks into the 6-meter AM net several times a month. You will find AM activity on six meters around 50.400 MHz, just above the SSB window.

The following is a list of recommended Amplitude Modulation operating frequencies:

### 160 Meters:

1.885, 1.900, 1.945, 1.985 MHz

### 75 Meters:

3.825, 3.870 (West Coast), 3.880, 3.885 MHz

50.400 MHz (generally), 50.250 Northern CO

**40 Meters:**

7.290, 7.295 MHz

**20 Meters:**

14.286 MHz

**17 Meters:**

18.150 MHz

**15 Meters:**

21.285, 21.425 MHz

**10 Meters:**

29.000-29.200

**6 Meters:**

**2 Meters:**

144.400 MHz (Northwest)

144.425 MHz (Maine, Massachusetts & NH)

144.280 MHz (NYC-Long Island)

You can use your trusty Japanese solid-state Radio to make AM QSOs, but the die-hard AMers like to resurrect old tube-type equipment with plate or screen modulation so it has that warm AM sound like you hear on an AM broadcast band. **Give it a try, Hope to hear you on AM!**

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## Dictionary Definitions

**‘Windows XP:** *n.* 32-bit extensions and a graphical shell for a 16-bit patch to an 8-bit operating system originally coded for a 4-bit microprocessor, written by a 2-bit company that can’t stand 1 bit of competition.”

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