



# The Spectrum

Issue 06 06

June 2006

## Words From the President

Field Day 2006 is right around the corner. June 24<sup>th</sup> & 25<sup>th</sup>, 2006 we will be located at the Deep Creek Locks Park off of George Washington Highway for 24 hours of fun!

For our new hams, Field Day is a 24 hour exercise to show how we as hams can operate under emergency conditions. It's also a way for us to show amateur radio to public. Although the ARRL says that Field Day is not a contest, it is treated as one by many clubs. The club gets points for contacts, news media, government officials, etc. This is a great opportunity to see how antennas are strung in the trees, see how HF communications differ from using a repeater, and most important, FOOD!

This has been a great year so far for the club! You all make me proud to say I am president of CARS. Whenever I go to an amateur radio event and Chesapeake comes up, I am always hearing others say positive things about our group.

Membership is up, the QRM room operating stations are complete, and we are closing in on finally getting more antenna height for our repeaters. We also have a new repeater ready to go on-line for 146.82.

Look forward to seeing everyone out at Field Day this year. Got a friend who may be interested in ham radio? Bring them out with you.

I can smell the food; hear the laughter and can't wait to pick up a mike and say:

**CQ FIELD DAY CQ FIELD DAY W4CAR CALLING CQ FIELD DAY...**

73's  
Keith  
KG4Z XK

## **JUNE 20 - NATIONAL TAKE YOUR HT RADIO TO WORK DAY**

Newington, CT -- Ham radio operators across the country will be taking the smallest of their radios to work with them on Tuesday, June 20 in a display of Amateur Radio capabilities. By wearing these handy-talkies, called "HT" radios, on their belt or placing them on their desks, they hope to raise awareness and inquiries about Amateur Radio from their co-workers. At lunchtime, the hams will demonstrate the radio's capabilities by making contacts both regionally and possibly nationally. Often using nothing more than these HT radios, the size of a cell phone, hams have been in the forefront of emergency communications because their radios work when other systems failed or were overloaded. The difference is because the ham's radios don't need a vulnerable infrastructure to work. The hams will also invite their co-workers to come and see full size stations in simulated emergency operations during Field Day Weekend the following Saturday.

*Continued on page 6*

| INSIDE THIS ISSUE |                                       |
|-------------------|---------------------------------------|
| 1                 | From the President / HT to Work       |
| 2                 | Upcoming Events / Field Day Operating |
| 3                 | 2006 Hurricane Info                   |
| 4                 | For Sale / Kids Day                   |
| 5                 | Antenna Geek                          |
| 7                 | Local Nets / Mtg Minutes              |

## **Links of Interest**

[Virginia Beach Amateur Radio Club](#)

[Portsmouth Amateur Radio Club](#)

[Home - KG4Z XK.COM - IRLP and much more!](#)

[Atlantic Basin Hurricane Tracking Chart](#)

[ARRLWeb: Kid's Day Rules June 18th](#)

[Take your HT to Work Day](#)

## Upcoming Events

### CARS Meeting

Monday, June 5th, 7:00 PM  
QRM Room  
116 Reservation Dr  
Chesapeake, VA 23322-5204

### KIDS DAY

Saturday June 17<sup>th</sup>

### TAKE YOUR HT RADIO TO WORK DAY

June 20<sup>st</sup>

### FIELD DAY

June 24<sup>th</sup> - 25<sup>th</sup>

### Field Day Operating Legalities

First a disclaimer, I am not a lawyer and have no aspirations to be one. With that said, I have chosen to write this article to rehash some of the questions that come up during Field Day.

Field Day among Amateur Radio operators is a universally known event. If you haven't heard about Field Day, you either are extremely new to Amateur Radio or would be eligible as a rare DX contact. The FCC always requires that we maintain our stations and exercise good operating practices. Field Day does take on an air of combativeness that during any other time would probably be called harmful interference. However, truly bad operating practices usually do not result in a high score.

One question has always been confusing. Field Day gives the opportunity for Ham operators with non-HF privileges to operate HF. How is this possible? With a license, you can be a control operator. However, under no circumstances can you use your call sign and operate out of your licensed frequency privileges. If you go to another Ham's station, you can use that person's call, say "P" and your call and use that person's station. But, again you must stay within your operating privileges. If you only use the other Ham's call sign, then you are operating third party. The other Ham must be at the control point. This is somewhat vague.

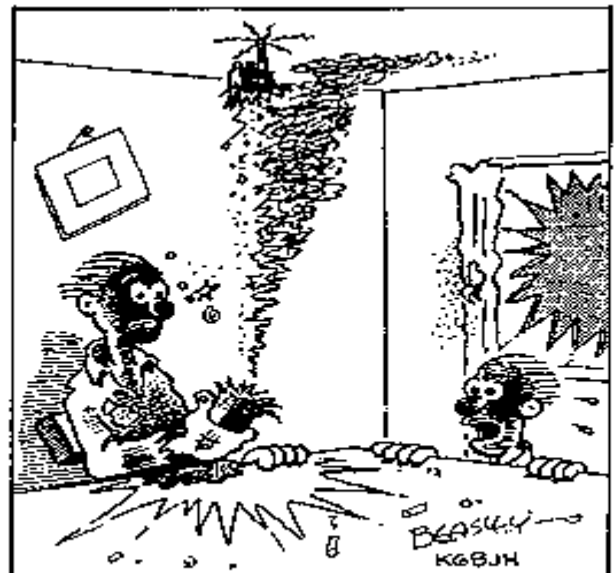
I often think of this as the wall socket, so that I can "pull the plug" if something is amiss. Third party agreements must be respected with one exception. The FCC stipulates "This prohibition does not apply to a message for any third party who is eligible to be control operator of the station" (Section 97.115).

When you have a group of 4 or more operators with a name, a document of organization, management, and a primary purpose devoted to amateur service activities, you have a club by FCC rules. The club trustee is responsible for designating club operators. The trustee and operators are both equally responsible for the operation of the station(s). Having a club call sign makes it much easier for large groups of Hams to participate during Field Day. If you don't have access to a club, you can go to another Ham station with a higher license and operate during Field Day using that person's call sign. If your license does not allow for HF privileges, you will be operating third party and a control operator with the appropriate license must be present.

During Field Day, we usually operate in the under 150-watt class. So concerns for accidentally operating > 200 watts on Novice bands are not a concern. Likewise, with the modern rigs, most of the transmission interference within each rig at the Field Day site is related to the proximity of the antennas and filtering of harmonics. Most receiving interference are improved by using headphones!

I hope this information clarifies that there are no "bending" of the rules during Field Day.

73  
Leo  
KG4PWC



WOW! NOW I KNOW WHAT THEY MEAN WHEN THEY SAY "BE SURE TO OBSERVE POLARITY WHEN INSTALLING BATTERIES!"

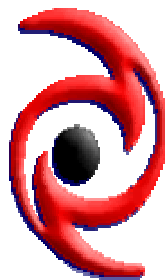
# 2006 Hurricane Season Resource

## June 1 to November 30

A hurricane is a tropical storm with winds that have reached a constant speed of 74 miles per hour or more. Hurricane winds blow in a large spiral around a relative calm center known as the "eye." The "eye" is generally 20 to 30 miles wide, and the storm may extend outward 400 miles. As a hurricane approaches, the skies will begin to darken and winds will grow in strength. As a hurricane nears land, it can bring torrential rains, high winds, and storm surges. A single hurricane can last for more than 2 weeks over open waters and can run a path across the entire length of the eastern seaboard. August and September are peak months during the hurricane season that lasts from June 1 through November 30.

### 1. BEFORE HURRICANE SEASON STARTS

- Identify the media sources you will need to obtain information
  - Include The Emergency Email & Wireless Network at <http://www.emergencyemail.org>
  - Here you can obtain data via email and text messaging sent to your cell phone or digital pager
  - Share this information with family and friends send them a link to download this poster.
- Plan an evacuation route.
  - Contact the local emergency management office or American Red Cross chapter, and ask for the community hurricane preparedness plan. This plan should include information on the safest evacuation routes and nearby shelters.
- Learn safe routes inland
- Be ready to drive 20 to 50 miles inland to locate a safe place.
- Have disaster supplies on hand.
- Flashlight and extra batteries
- Portable, battery-operated radio and extra batteries
- First aid kit and manual
- Emergency food and water
- Non-electric can opener
- Essential medicines
- Cash and credit cards
- Sturdy shoes
- Make arrangements for pets.



## **KE4IZH has asked me to sell his Amateur Radio Book Collection.**

Books range from \$2.00 - \$10.00. They are looking for a good home.

Here is a deal ++ on Amateur Radio Manuals for sale by Rick KE4IZH.

If you are looking for some of the finer Amateur Radio Technical Manuals, these are real Bargains. Most are at least 1/2 off the original price. Even though they date back into the 1990s, the theory is still the same, and these books are often written better than the newer manuals.

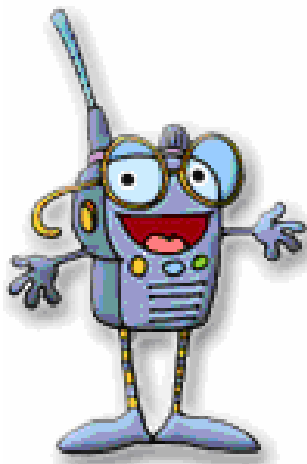
Rick's focus was on QRP operations and has many QRP books including W1FB QRP Manual Sets for sell.

Beyond the QRP manuals are:

Encyclopedia of Electronic Circuits Vol. 3  
Electrical engineering Concepts and Applications  
Understanding Circuits  
Building your own Intelligent Amateur Radio Station  
Radio Buyers Guides 2 Vol 1991 -1992  
Receivers Pass and Present  
Basic Electronics  
Solid State Design  
Electronics for the Future  
ARRL Operations Manual 1995  
1998 ARRL Hand Book  
ARRL Antenna Hand Book edition 16  
Other manuals too!

Buy them individually or all of them.

Contact Rich WA4BUE at home or on the air



## **Kids Day Rules**

**Saturday, June 17, 2006**

**Purpose:** Kids Day is intended to encourage young people (licensed or not) to enjoy Amateur Radio. It can give young people on-the-air experience so they might develop an interest in pursuing a license in the future. It is intended to give hams a chance to share their station with children.

**Date:** Saturday, June 17, 2006.

**Time:** 1800 to 2400 UTC. No limit on operating time.

**Suggested exchange:**

Name, age, location and favorite color. You are encouraged to work the same station again if an operator has changed. Call "CQ Kids Day."

**Suggested frequencies:**

28350 to 28400 kHz,  
21380 to 21400,  
14270 to 14300 kHz  
and 2 meter repeater frequencies with permission from your area repeater sponsor.

Observe third party traffic restrictions when making DX QSOs.

**Awards:**

All participants are eligible to receive a colorful certificate (it becomes the child's personalized sales brochure on ham radio).

**Please visit:**

[www.arrl.org/FandES/ead/kids-daysurvey.html](http://www.arrl.org/FandES/ead/kids-daysurvey.html)

Complete a short survey and post your comments. You will then have access to download the certificate page or send a 9x12 inch self addressed, stamped envelope to:

Boring Amateur Radio Club,  
PO Box 1357,  
Boring, OR 97009.

## Mutterings of an Antenna Geek Wannabe

First I must confess that I have not had much experience with Antenna Modeling software. I know that ARRL offers a very good course and one of these days I will get around to it. However, by reading in a number of sources, I would like to discuss two areas of interest. Part I covers the use of material other than copper or aluminum in the construction of antennas. Part II will be a qualitative analysis of the use of very high inductance coil in the use of a dual band shortened HF dipole antennas.

My primary sources of information are [www.arrl.org](http://www.arrl.org), [www.cebik.com](http://www.cebik.com) and The ARRL ANTENNA BOOK 20<sup>TH</sup> EDITION.

### Part I

With regards to antenna material, copper and aluminum are superior conductors with copper being slightly better. However, structurally, steel offers superior strength and particularly in the mobile environment, stainless steel is often used in the whips. Many people have used their steel towers as an effective form of vertical radiator for the low frequency bands particularly 160 meters. One of the most recent uses of steel in our club activities was the tape measure 2-meter beam for Fox Hunting. Aluminum is often used for tubing for self-supporting antennas. It is 30% the weight of copper. But few people have used aluminum wire for antennas. You can get electrical fence aluminum wire in 17 AWG. However, do not forget that copper and aluminum when placed side by side in a moist environment can experience significant galvanic corrosion even though aluminum oxide is usually resistant to further corrosion by itself.

So what can we say about steel? Using other metal other than copper or aluminum incurs a higher resistance penalty. By itself, the resistance does not appear to affect velocity as would covering the metal with an insulator. The effect of an insulator can result in an estimated decrease in the calculated length of resonant frequencies by about 3%

Alternating Current (AC) is affected significantly by the skin effect. AC will travel more at the surface of a metal that is a good conductor or is easily magnetized (high permeability). The resistance (not impedance) is a combination of the material's resistivity, which is a function of the material and the cross sectional area, and the skin effect. The higher the frequency, the more alternating currents tend to travel on the outside surface or "skin" of a conductor. Putting this all together and remembering that conductivity and resistivity are the inverse of each other the formula for skin effect depth and resistance of a conductor to AC is shown below.

Skin effect depth =  $1/\text{SQRT}(\pi \times \text{freq} \times \text{permeability} \times \text{material conductivity})$

Stated another way:  $\text{Skin Depth} = \delta_s = \sqrt{\frac{2\rho}{2\pi f \mu_0 \mu_r}}$

$\rho = \text{bulk resistivity (ohm-meters)}$

$f = \text{frequency (Hz)}$

$\mu_0 = \text{permeability const. (Henries / meter)} = 4\pi \times 10^{-7}$

$\mu_r = \text{relative permeability}$

from: <http://www.microwaves101.com/encyclopedia/skindepth.cfm>.

For a round wire, the AC resistance is approximately

Where:  $d = \text{Skin Effect depth}$

$D = \text{Diameter of conductor}$

$L = \text{Length of conductor}$

$\rho = \text{Resistivity of conductor}$

$$R = \frac{\rho}{d} \left( \frac{L}{\pi(D-d)} \right) \approx \frac{\rho}{d} \left( \frac{L}{\pi D} \right)$$

Resistivity of

Copper =  $1.7 \times 10^{-8}$  Ohm-meters

Silver =  $1.59 \times 10^{-8}$

Aluminum =  $2.82 \times 10^{-8}$

Iron =  $1.0 \times 10^{-7}$

Notice that iron has more than 5 times the resistance of copper. The relative permeability of iron can be 150 times that of copper or aluminum. So the skin effect can be more pronounced even though the conductivity is lower. Therefore actual resistance may be some 25 times greater for iron. Stainless steel has even less conductivity than iron. Based upon what is published at [http://www.equiptolec.com/rprcots0401\\_equipto\\_proof.pdf](http://www.equiptolec.com/rprcots0401_equipto_proof.pdf) the (relative conductivity) x (relative permeability) is 65 times greater than copper. Therefore stainless steel should have about 320 times greater resistance than copper for the same frequency. However, we are dealing with very low numbers of resistance in the  $10^{-6}$  Ohms so that 320 times a very small number is still a small number. The diameter of #8 AWG copper wire is 3.26 mm. The surface area of the cross section equals  $8.347 \times 10^{-6}$  square meters. So resistance for 1 meter long #8 AWG wire is  $1 \times 1.7 \times 10^{-8} / 8.347 \times 10^{-6} = 0.002$  Ohms. For the same size stainless steel wire, it would be 0.64 Ohms.

Cebik using information programmed into antenna modeling software for 4 MHz showed that for the same free space gain, a #8 AWG stainless steel wire had the same efficiency as #24 AWG copper wire. This #24 AWG copper wire has 25 Ohms/1000ft vs. < 1 Ohm/1000 ft for #8 AWG copper wire. The diameter and circumference of #8 wire is more than 6 times greater than #24 wire. Using the same modeling software and changing materials from copper to stainless steel for a resonant free space 7 MHz dipole, there is a 10% drop in efficiency and 25% drop in dbi. Using a higher frequency will increase the resistance by the skin effect by the square root of the relative change. This is more than offset by the much shorter length of material and the use tubing instead of wire. Using a stainless steel tube for VHF/UHF beams can have satisfactory losses that are more than offset by the durability of stainless steel for commercial applications.

The velocity of propagation of a signal is more affected by coupling with the return path conductor, other metals or dielectric materials. That is why ladder line has a higher velocity than twinlead, which has a higher velocity factor than most coax cable. The relatively thin dielectric used between the conducting surfaces of a coax is not as good an insulator as a large space of air. Therefore the conducting material used to make an antenna should not have that great effect on the resonant frequency length. However, using a less conductive material will decrease the radiation efficiency. Judging from the above, copper or aluminum is still the best. Bronze or brass is not as bad as steel. Silver would be very good but very expensive.

Another question that comes up, which is even more difficult to answer is the affect of metal oxide formation. Both aluminum and copper oxide are not very good conductors. So if a thin coating of oxidized metal develops around the radiating element, what happens? Does the metal oxide act as a thin dielectric? In which case the radiating surface will be just below the oxide. Will the oxide especially copper oxide, which has a high permeability act to dampen the signal? Perhaps at very high UHF and higher frequencies? Practically speaking, the effect appears to be minimal or immeasurable at the common Amateur Radio operating frequencies. Remember an S unit is 6 db change which amounts to a 4 fold change in radiating energy. This kind of change will most likely happen with high SWR and transmission line losses and compromised antenna designs. However, since there is little published, examining the effect of oxidation would be an interesting experiment to perform.

The next question with regards to materials is the effect of using different metals for the director and reflector of a Yagi antenna? There is even less information regarding this. However, it stands to reason that since the effectiveness of the elements is related to the currents induced in the elements, higher conductivity equates to better efficiency and stronger radiation. Again element diameter can compensate for skin effect related resistance.

What does this all mean? It means that when designing an antenna, compromises always occur in choosing materials for their strength, radiation efficiency and cost. When possible, aluminum and copper are still the conducting material of choice for most amateur radio applications.

73

Leo  
KG4PWC

***HT to Work from page 1***

The Amateur Radio Service is recognized internationally for its abilities to provide emergency communications in a disaster situation. Most recently, the hams were the primary means of communication and coordination of rescue efforts after the Katrina event. In the United States, we now recognize that our technologies are vulnerable and the hams are critical in a major disaster. The FCC has formally recognized "the value of the Amateur Radio to the public as a voluntary noncommercial communication service, particularly with respect to providing emergency communications."

Aware of the threats that face us today, hams are reaching out to encourage others to also get their Amateur Radio licenses and have this capability for themselves and their families. The initial license to become a ham has been simplified - you do not even need to know Morse code anymore. The hams will have information about local classes to aid people in getting their first licenses. More information can also be found at [www.hello-radio.org](http://www.hello-radio.org).

## Local Nets

|   |   |
|---|---|
| <b>SKYWARN NET</b><br>Fridays 1900 hours.   | 146.820 MHz   |
| <b>CARS 2M Net</b><br>Sundays 2030 Hours  | 146.820 MHz   |
| <b>CARS 10 Meter Net</b><br>2000 hours on Mondays CARS doesn't meet                             | 28.400 MHz  |
| <b>Hampton Roads Public Service Net</b><br>Mon-Sat 2100 hours                                   | 146.970 MHz   |
| <b>VBARC 10 Meter Net</b><br>2000 hours on Thursdays VBARC doesn't meet                         | 28.400 MHz  |
| <b>Portsmouth "RagChew" Net</b><br>Monday & Wednesday 1930 hours                                | 146.850 MHz   |
| <b>Southeastern Virginia Traffic Net</b><br>Sun, Tues, Thurs @ 2000 hours                       | 146.850 MHz   |
| <b>Portsmouth Amateur Radio Emergency Services Net</b><br>Fridays 2000 hours                    | 146.850 MHz   |
| <b>Tidewater Radio Association WT4RA net</b><br>Thursday 1930 hours<br>(code drill follows net) | 147.195 MHz   |
| <b>RASON</b><br>Sunday thru Friday 1930 hours   | 145.330 or 442.95 MHz<br>Repeaters linked<br>PL: 131.8 for both |



## CARS CLUB MEETING MINUTES 5 / 1 / 06

### Not approved by membership

Meeting called to order at 7:05 pm.  
Attendees: 21

Ruth KB4LIF and Bill KE4EPI presented a discussion about Skywarn.

Paul K4PRB read the minutes of the BOD meeting of 4/29/06. The previous month's club meeting minutes were not read because Paul accidentally left them at home. They can be read at next month's club meeting if anybody is interested.

Rich N5RAG presented the budget summary and read the Treasurer's report covering April and May.

Dennis, K4DKR moved to accept the Treasurer's report as read. Seconded and approved.

Paul K4PRB moved to approve membership applications of:  
Harvey Hoffman WA1YCP  
Bob Chiddres AC5ST  
Seconded and approved.

Paul K4PRB moved that the club reimburse Bill WF4R 300 ft. of hardline and connectors being used at the Bowers Hill site. Seconded and approved.

Selection of controllers for the various repeaters was discussed briefly, and the matter was referred back to the BOD for development of a more definitive plan. Club approval of expenditures beyond the current repeater budget will be required.

Ruth, KB4LIF reported that the Corps of Engineers confirmed verbally to her during the previous week that the transfer of the adjacent Corps property and facilities to the City for CARS use was still on track to be accomplished, although it may take until the end of the year to happen.

The 50 / 50 raffle was won by Barry K5VIP

Meeting adjourned at 8:45.

## The Spectrum

Monthly newsletter of the Chesapeake  
Amateur Radio Service (CARS)

Post Office Box 6867  
Chesapeake, VA 23323-6867

<http://www.qsl.net/cars>  
Email: [w4car@yahoo.com](mailto:w4car@yahoo.com)

**Newsletter Editor:** Rich Graham – N5RAG

**Webmaster:** Leo Kusuda – KG4PWC

### CARS : Repeaters

146.610 MHz (PL 100.0)  
146.820 MHz  
444.000 MHz

**W4CAR Trustee:** Bill Runyon WF4R

### CARS OFFICERS & CHAIRPERSONS

**President:** Keith Ainsley KG4ZXX

**Vice President:** Bill Runyon WF4R

**Secretary:** Paul Buckwalter K4PRB

**Treasurer:** Rich Graham N5RAG

#### **Communications Officer**

Reggie White W5SSB

#### **Past President:**

Ruth Bigio KB4LIF

#### **Public Service Coordinator:**

Leo Kusuda KG4PWC

#### **Repeater Committee Chairman:**

Bill Runyon WF4R

#### **Spring Fest Coordinator:**

Leo Kusuda KG4PWC