

## Orange County Radio Amateurs (OCRA) Newsletter May 2007

### From the Editor

Since I was licensed in 1997, I have been privileged to be part of many amateur radio organizations. Each of these organizations has continued to strengthen my fascination with one particular facet of our hobby. That facet is the diversity of talents and interests of those who enjoy amateur radio. As you read through this month's newsletter, I hope you will share my astonishment. The articles that you will read have a vast range in subject from technical to historical, from updates to challenges, and from invitations to directions. Each one shares a common thread - pride in amateur radio and the desire to continue the tradition of our hobby. Join in the spirit and share the excitement!

I would like to sincerely thank all those who have contributed articles to this month's newsletter. If you are interested in contributing to a future newsletter, please send me your articles using the email address found below.

Now, get comfortable and take some time to read through your club's newsletter. And, remember -- Get radio active!

Best regards,  
Laurie - N1YXU  
[lbmeier@bellsouth.net](mailto:lbmeier@bellsouth.net)

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### Summary of the April 9<sup>th</sup> Meeting

The primary focus of the April meeting was Field Day planning. The following are the current plans for Field Day stations:

- 20 meter SSB: Russ KF4WDX [Captain] and Ted Hodges [Co-captain]
  - 40 meter CW: Steve KZ1X [Captain] and Mark WD4ELG [Co-captain]
  - 20 meter CW: Joe K4SAR [Captain] and Gary AI4GT [Co-captain]
  - 15 and 40 meter SSB: Jerry KD4YJV [Captain] and Jim KG4NEL [Co-captain]
  - 10 meter SSB: Robert N4ZAK [Captain]
  - 80 meter SSB and digital: Dave W4SAR [Captain] and Woody K3VSA [Co-captain]
  - VHF/UHF: Chris KG4CFX [Captain]
  - GOTA Station: Meg KI4LLL and Kate KI4LLM
  - Dee KU4GC will manage the logistics
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- Dan (KR4UB) gave us a verbal update on the repeater and also a "show and tell" repeater update. Thank you for bringing the repeater to the meeting!
  - Proceeds from the OCRA table at the RARSfest netted \$315 for the club!
  - The OCRA Cup was presented to Woody (K3VSA) for his many contributions to OCRA and to amateur radio. By the way, Woody actually purchased the OCRA cup in May 2005 for 25 cents. It has now come full circle. Congratulations, Woody!
  - Thank you to Dewey (WA4AHR) and Dan (KR4UB) for their work in reconditioning the generator which was recently donated to the club. And, congratulations and thanks to Justin (KD4CPM) for his winning bid to purchase the generator.
  - Congratulations to Steve (KZ1X) for winning the monthly OCRA paper contest! The topic of the contest was Field Day. [Yes, there will be a paper contest at the May meeting!]
  - We also had three items for Show and Tell - John (W4PAH) showed us a pico keyer he had built from a kit and

housed in an Altoids tin; Gary (AI4GT) shared a LogiTech keyer that he had built from a kit; and Dee (KU4GC) shared his LED invention. Thanks to all for sharing your projects! If you are interested in getting more information on the keyers that were shown, please go to the following URLs: <http://www.hamgadgets.com/> and <http://www.idiompress.com/>

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The May OCRA meeting will be held on Monday, May 15, at the Sunrise Church beginning at 7:30 pm. One of the main topics of discussion will be Field Day planning and updates from each of the station captains/co-captains.

The weekly Orange County ARES net meets on Saturdays at 9:30 am local on the W4UNC repeater [442.150MHz with a PL tone of 131.8Hz]. All licensed amateur radio operators are invited and encouraged to check in.

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## **President's QRM**

**by Dave Snyder, W4SAR**

Well, I missed last month's meeting due to a mishap while working out at the gym. After working some weight machines, I became light-headed and shortly found myself "horizontally polarized". The EMTs found a borderline sign of concern on my EKG so I ended up staying overnight at Duke Hospital for observation. I'm happy to say that all follow up tests showed no abnormalities. Indeed, the following morning I did a stress echocardiograph on a new treadmill machine they had installed. They told me I was the first patient they had to make it all the way up to level 5 (running uphill) before they decided to call it off. It was cool looking over my shoulder at a movie of my beating heart, watching the valves open and close. I've been cleared by my family doctor. It seems the best explanation was that when I did my abdominal crunches without breathing properly, I overstimulated my vagus nerve which caused a large drop in blood pressure, essentially a fainting episode! Thanks to all of you for your expressions of concern, but it seems that I'm likely to be taking up bandwidth for a long time to come.

Anyway, the Field Day planning went on and it looks like we have a good chance for a 7A operation, that is seven transmitters operating on battery power. Again, my notes here are more for the benefit of new attendees. Specifically, I'll talk about the physical preparations for Field Day. Next month, I'll talk about operating techniques and strategies.

As I mentioned last time, Field Day is part disaster drill, and as such we must operate as if the power grid is down, and, for our competing category use temporary structures. Therefore, the most critical areas we will deal with are protection from the elements, and having enough reliable power to operate 24 hours. In a survival situation, shelter is the most critical element. Fortunately, we won't have to deal with cold in late June, but protection from hot sun, heavy downpours and lightning will be necessary. Having a canopy or fly will provide shade and shelter from rain. If we have a thunderstorm bearing in on us, the best protection (after disconnecting antennas from your rigs) is to get inside a vehicle. Tents are useful as sleeping quarters. We may also have use of the Emergency Management bus, which if the generator is working, will have air conditioning just in case the heat gets too bothersome. Do keep in mind though that a little hardship is expected in a disaster situation, so be prepared to deal with a little discomfort. Dee Ramm ,KU4GC will be coordinating meals for us, and a cooler full of soft drinks will be on hand, but it does not hurt to bring along some of your own supplies. If you are not operating inside an enclosure, insect repellent will be a necessity. But be aware that DEET, the principle component, is a good solvent of plastics. So be sure to wipe any repellent off your hands before handling microphones or you'll etch fingerprints into them. Another minor hazard to be aware of is poison ivy in the woods bordering the field, watch where you are stepping, especially when wading into the brush to secure guy lines. Essentially, be prepared for any kind of conditions, and you'll have a more enjoyable time of it.

Power- For our category, the radio stations and all equipment INTEGRAL to radio operation must be powered only by batteries or non-petroleum driven power sources. We may not run stations off the power grid, nor by using vehicle engines or generators. We can, however, power non-radio equipment using generators: items such as logging computers, air conditioners, espresso machines. If a computer is being used to run a digital radio operation, it is integral equipment and

therefore must only be run off batteries. A computer used for logging is not integral to the operation of the transceiver, in that case it can be powered off a generator.

If there is one point I want to drive home is that batteries will be the limiting factor for continued operation. Therefore, bring all the batteries you can. I bring more than 800 Ah worth with me to Field Day. Even if you are not a band captain, by all means do bring any batteries with you to Field Day. It is always worthwhile to keep a good stockpile on hand. There is also no worse feeling than having a good run logging contacts, and then having to quit because your voltage is dropping too low without a fresh set of batteries to swap in. So again , the top and bottom of your list for items to bring to Field Day should be batteries!

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## **INVITATION TO HEAR TIM SLAY, N4IB, ARRL NC SECTION MANAGER**

Everyone is invited to attend the May 8, 2007 DFMA meeting to hear Tim Slay give an update on what is going on in the NC Section.

Tim will cover:

- What's going on in the ARRL?
- What's going on in Washington DC that impacts ham radio?
- Why has the ARRL filed a lawsuit against the FCC?
- Current NC Activities
  - Introduction of PRB-1 bill in NC Senate & House
  - Status of BPL in NC
  - National ARES database
- Average age of hams in NC?
- Ideas for growing ham radio in NC

The meeting will be at the Mayflower Seafood Restaurant, 3724 Durham Chapel Hill Blvd, Durham, NC. 147.225 will be monitored for anyone needing assistance finding the restaurant.

Dinner begins at 6PM followed by a brief business meeting and then Tim's presentation. You are welcome to come for dinner or to come later to hear Tim.

So we can be sure to have a large enough room, please e-mail Mac, WQ8U at [WQ8U@ARRL.NET](mailto:WQ8U@ARRL.NET).

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## **Perspectives from the Old Curmudgeon, Volume 2** by Mark Lunday, WD4ELG

Hello, you young whipper-snappers and the rest of you hams out there. It's my second installment of a series of articles about our wonderful hobby, amateur radio.

I hope you liked the first one...if not, then write your congressman (or woman). Remember I'm a crabby OT (old-timer) - been doing this hobby since before a lot of you were born, and the rest of y'all were wandering around wondering how that radio thing works in the first place. I'm going to share some thoughts with you on the hobby, as a curmudgeon. Maybe you'll pick up some wisdom. I don't know much - but I want to share what I do know to make the hobby better.

This month's topic is civility, or the lack thereof, on the amateur bands. I was tuning around on 80 meters SSB last week,

and I was shocked at some of the things I heard. Not just poor habits, but rude and inconsiderate folk – deliberate interference, profanity, name-calling. Lots that is not fit to print in this well-respected and widely-read newsletter, especially with the classy ladies we have in our club who read this publication. So to get away from the chaos, I went down into CW regions and heard some of the same. What’s wrong with folks these days?

There’s no denying “...these times they are a-changing.” More stress is everywhere (road rage was an unknown term until 10 years ago). But that’s not what our hobby is all about – we amateurs are known for their courteousness and professionalism. Our licenses are a privilege to operate, issued to us on a temporary and conditional basis. What are those conditions? As outline in Part 97, they are summarized as follows:

- The license is not a lifetime issuance; it has a time-limit, and must be renewed
- Competency demonstration is needed to earn the license; passing a written exam
- Operation must not intentionally interfere with other amateur or government transmissions
- Operation must follow established frequencies, modes, and power limits appropriate to the service and the class of licensee

What happens when an amateur operator does not comply with those conditions? Just check out some of the FCC enforcement letters on the ARRL website [http://www.arrl.org/news/enforcement\\_logs/](http://www.arrl.org/news/enforcement_logs/) :

- Written warnings
- License suspension
- License revocation
- Monetary fines
- Jail time (yes, in the slammer!)

Although we hams are many in number, the FCC has equipment for triangulating signals. They DO listen on the airwaves. And they DO take action. If somebody is operating in a deliberately malicious way, that person will get caught. It may take some time, but the FCC has a very long arm.

But I digress - back to the HF bands. The problems on the bands can be classified in two categories: insanity and ignorance.

- **Insanity** – these folks are very few and far between (thankfully). They jam others, spew out profanity and hate, and cause chaos on the bands. Why do they do it? I’m no Sigmund Freud head-shrinker, but I think these nut jobs suffer from low self-esteem and like the attention they get from annoying others. The best thing to do is ignore them. They need help, and their problems can’t be fixed by you unless they are on your couch and you’re a trained professional in that sort of thing. You CAN take one action, if you’re sure the operator is acting maliciously – write an email to the FCC Enforcement Division, Riley Hollingsworth, K4ZDH. Riley is actively involved with helping improve the airwaves. Some good articles on Riley’s efforts are here: <http://www.arrl.org/news/stories/1999/12/09/2/>
- **Ignorance** – I don’t mean it like a bad thing. I’m referring to an operator who simply does not know better or is not aware. It’s most likely from lack of experience, and it’s not intentional. No profanity, just interference with others or operating habits that are “not the norm” or unfamiliarity with equipment. How to fix it? Easy:
  - Conditions - sometimes the propagation conditions prevent ops from hearing each other. This is very true with distant stations.
  - Education and awareness – publications, training, “Elmers.” Volunteer your time to share your knowledge – that’s a big part of our hobby!
  - Set the example – make yourself as proficient as you can, and others will follow. Everybody likes to interact with a good operator and a clean signal.
  - Direct “feedback” – this can be very tricky. Nobody (especially us old-timers) likes to be told that he or she is wrong. If it’s a problem with equipment, then a friendly call over-the-air is on order. If it’s a habit or behavior that is not intended to be malicious, then a courteous one-to-one communication off-the-air MIGHT be in order. Be careful with this, it is a learned skill. If the other op is interfering with my station or my QSO, I will VERY politely ask him/her to please change frequency on-the-air. There is no requirement that

he/she change, so I do it in as an "ask." No indignation, no hostility; I do it like I was 16 again and having dinner at my girlfriend's house, and I was asking my girlfriend's father to pass the potatoes...very subtle, gentle, and in a calm fashion. I also send emails to other hams - on digital modes. I make audio recordings and capture images of signals and say "SWL report OM, NICE signal." For poor signals, I offer to help the hams and say things like "...it sounded to me like the audio MAY have been distorted. Can I help?" But I NEVER point out fault in blunt fashion.

How do you tell the difference between insanity and ignorance? It's easy - start off by assuming the best in folks, that it's ignorance. Don't conclude it's insanity until you see something SPECIFIC to confirm it.

Some great references for operating practices:

- From a ham in Belgium, ON4WW: <http://www.on4ww.be/OperatingPracticeEnglish.html>
- ARRL Operating Guide and the ARRL Handbook are terrific sources of information

Never forget that our licenses are a privilege; we are entrusted with a responsibility. I will end this month's column with ten suggestions from Riley Hollingsworth, K4ZDH, of the FCC (as listed in:

<http://www.arrl.org/arrlletter/00/0901/rileys10.html>)

1. Be proud of what you have and let your feelings be known. Let the public know what you are, what Amateur Radio is, and why it's valuable. Let your feelings be known to Congress, to the FCC, to the media, to your states and to emergency agencies. Sprint does. AT&T does. Motorola does.
2. Operate as if the whole world is listening. It is!
3. Take nothing for granted. Bill Gates can't, and you can't either.
4. You're at a crossroads now. An old Chinese philosopher (or my grandmother--I can never remember which!) said, "Be careful what you wish for. You may get it." Seize the moment, and make this your finest hour. Ham radio has been at a crossroads before and has thrived. Continue that tradition.
5. Make sure that, on your watch, Amateur Radio never becomes obsolete.
6. Teach the new licensees all you know. We've needed numbers for a long time. Respect this wonderful legacy known as Amateur Radio that our mentors and Elmers gave us. Every time you key the mike or hit the key, think about what a legacy you were given and your duty to pass it on.
7. Enjoy ham radio. Celebrate it. But realize it comes with responsibility. Every gift of lasting value always does.
8. Stay away from arrogant, negative operators who know all the answers. They just haven't thought of all the questions. Encourage them to take their anger and hate to the Internet. Every minute they are on the Internet is a minute they aren't on Amateur Radio.
9. Never allow Amateur Radio to become the audio version of The Jerry Springer Show.
10. You may not always agree with the ARRL, and that's fine. But I'm standing here before you tonight talking about enforcement because they never gave up. Take care of the one voice you have. You must never doubt that a small group of dedicated people can change the world. They just did.

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## **Monthly Technical Article - The "Other" Kind of Vertical Antenna** by Steve Jackson, KZ1X

Part 1 of a 2 part article

When I was a kid, I used to marvel at the powerful signal and range of my local AM broadcast station. Of course, it helped that the station was the ABC network flagship, New York clear-channel 50 kilowatt WABC 770 ! The network status and special call sign and even the fifty thousand watts weren't what made the station powerful, however.

Radios don't know about all that stuff. They just know antennas. And our ham stations get the same laws-of-physics treatment from our radios that the big boys get. WABC has a great antenna. You can, too.

OCRA members of any tenure know that W4SAR's full-size 80 meter quarter wave vertical is a Field Day performance

marvel. With its efficient large-diameter 60' main element and comprehensive ground plane radial wire system, this antenna aims its best signal at the horizon, for terrific DX punch.

It also takes 10 people to set up, and often an hour or more, plus prep time. Sure is worth the effort, though, especially these days when the sunspots are gone and the higher bands are so quiet.

As a matter of fact, most amateur vertical antennas are some kind of variant of the quarter-wave ground plane. The antenna on my wife NIGMR's minivan is a quarter-wave, too. Yet it is far more diminutive than Dave's big HF monopole, because Kim's antenna is on the 440 MHz UHF band. Same technology, just a wee bit smaller.

The popular Butternut, Hustler, HyGain, and other similar multiband HF vertical antennas hams use are all variations on the theme of vertical quarter wave radiators, with some kind of electrical counterpoise.

Why is this "counterpoise" needed?

Well, in lay terms, the radiating element in these quarter wave vertical antennas is only half of the antenna. The radio wave wants to "see" the other half. In the case of Dave's Field Day special, his many ground wires, spread radially out from the feed point, allow the earth to make up the necessary remainder of the antenna. If Dave used fewer radials, the antenna performance would diminish. Likewise, the small whip on the roof of Kim's van "sees" the metal around the antenna base as the so-called "ground plane" and the antenna is complete. It works great! The whip is half the antenna, and the car body makes up the rest. For the W4SAR monster, the GROUND is actually the ground plane, and the radial wires are there to make sure that the dirt does its job well.

(If you built a dipole for the same band, you would have two "sides" each a quarter-wave long ... that's how we get the name DIpole ... a "complete" antenna, from the radio's perspective.)

Now, back to WABC.

That radio station operates on 770 kHz, and a quarter-wave vertical for that AM broadcast band frequency would be about 325 feet tall. That's a big antenna! Of course, the big time New York City radio station is a profitable business, so, they can put up the kind of money to build a pro-grade tower and all that goes with it.

As it happens, though, WABC's antenna is actually 648 feet tall. Yes, 648 feet. That's WAY taller ... wait ... it's pretty much twice as tall as it needs to be, right? Wow.

Yes. And, no. That is because the WABC tower is a half-wave vertical. It's the "other" kind of vertical. Bigger (twice as big) but far more advantageous, and boy, it belts out a signal. In fact, as I write this, I am listening to WABC, here in North Carolina. I bet if they had a quarter-wave antenna instead of the half-wave, it might be harder for me to pick them up.

Now you ask, other than, um, being TWICE as tall, and having some gain, why should we hams need to know about half-wave verticals? After all, if it's hard to put up a quarter-wave, a half-wave is darned near impossible. Plus more expensive. We hams are cheap!

There are some VERY compelling reasons for hams to consider half-wave vertical antennas. First off, most of the frequencies we operate on are far above the AM broadcast band, which has wavelengths even longer than our own 160 meter band. A half-wave vertical for, say, 30 meters is only 47 feet tall. You can make (and I have made) an aerial that long out of a single piece of scrap wire launched up into a loblolly pine tree. On 20 meters, a 33 foot wire will do! (Still want to get on the lower bands? You can home-brew a shortened version of a 75 meter half-wave vertical that's only 60 feet tall, with only minor effect on the performance. N6LUZ is putting one up soon. As we say, "stay tuned.")

So, it seems like the height issue of the half-wave antenna isn't so onerous, after all.

Wait - It gets better ... a half wave-vertical, when fed at the ground end, does not need a radial field to get efficient operation! Only a nominal connection to earth is needed, and often times, this can be as little as a short ground rod, or even just a short piece of wire. If you are faced with a situation where making a good radial field is tough or impossible, the half-wave vertical could be just the ticket.

More questions ... I hear you asking as you read this:

"Steve, wait. You tell us stuff like this all the time! If this antenna is so great, why isn't everyone using one? Why aren't YOU? What's the catch?" That would be an honest question, and there are two answers.

One, your radio wants to connect to an antenna that has a 50 ohm impedance. Dave's big 80 meter quarter-wave vertical has an feed point impedance of about 40 ohms, and that's pretty close to what the radio wants, close enough to not really even make any additional matching worth while. If the same antenna was a half-wave long, the feed point impedance would be around 3000 ohms. To connect THAT to the coax, you'd need a matching network. It's easy to build one, but you still need to have it.

Second reason: for all practical purposes, the half-wave end-fed vertical is a one-band antenna. Sure you can "make" it work on frequencies it isn't tuned for, but if you do that, the benefits of the big radiator are compromised on those other bands. Many hams (especially in the past 15 years or so) seem to insist on having multi-band antennas everywhere, despite the compromises they yield in cost and performance. Sadly, mono-band antennas often don't get a fair shake, even this one.

To get you ready for the next installment of this article, here is a story: in preparing for writing this, over the past weekend I went into the garage and cut a 47 foot long piece of wire, a half-wave for the 30 meter band. I built a quick matching network from a couple of surplus parts from the RARSfest, and I went out to my side yard where I had a spare hoist line in a tree, up 50 feet. Using NO ground connection at all, I raised the wire up to full height and connected it to the matching box I made, lying it right on the ground. I adjusted it to 10.1 MHz with my antenna analyzer, hooked the box to my little Elecraft K1 and set the power for 5 watts.

First contact: Damien, F5RRS, near Geneva, in the French Alps.  
Report: 559. On 30 meters, at 10:30 in the morning.

Next month: How YOU can make this simple, cheap, easy-to-install antenna, and get out like WABC!

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## **Our Rich Ham Radio Heritage (Number 1 of a series)**

**By Woody Woodward, K3VSA**

If you're a dedicated CW op, don't ever let one of those old-time landline telegraphers hear you say that you communicate using Morse Code; not unless you want to start an argument. Yes, there are still a few of those folks around, and they'll quickly point out that the code you send over the radio is twice removed from Samuel F. B. Morse.

In the first place, it was Morse's associate Alfred Vail who came up with the code, not Morse. But Morse had an agreement that all his fellow laborers had to sign that credited Morse with any and all creations that they made. Vail also created the first telegraph key, too, but that's another story. Morse had the idea of using a code book with prefigured number sequences that would stand for specific messages. He also thought that the receiving end should print out the dots and dashes on paper, which would then be decoded by eye.

It didn't take long for the operators to start decoding incoming messages in their heads, from the sound. Some time had to pass before supervisors would accept sounded copy as valid, but it was inevitable. Thus was born one of the first data processing professionals--the telegrapher. (Telegraphers might just be tied as the first data processors with the people

who punched the cards that ran the Jacquard looms, but that would be another story, too.) In a strangely reminiscent parallel with our modern “personal computer” age, it was often the very young who were able to grasp these advanced skills most quickly, but that is also another story.

The second degree of separation from Mr. Morse came about when the transatlantic telegraph cables came into use. You can imagine that hundreds and hundreds of miles of wire under water surrounded by gutta percha (the original coaxial cable!) might exhibit some electrical reactances in addition to resistance, and you’d be correct! Some of the timing sequences in American Morse were tricky, and when they were sent over the wire they tended to get slurred together, and something had to be done. That “something” was a modification of the original “Morse” code to make it more comprehensible at the distant end. The new, improved version became popular on the European continent, and thus came to be called the “Continental” code as opposed to the original, American code. We now refer to the “Continental” code as the “International Morse Code.” But as you now know, Morse himself had little or nothing to do with it.

All this came back to me on Sunday, April 1<sup>st</sup> when I saw some original landline telegraph sounders for sale at the RARSFest. Believe it or not, there are still a few of the old telegraphers who use these things to communicate with each other over the phone lines. They use modified 300 baud modems to send and receive the clicks and clacks. You can Google “landline telegraphy” and find out all about it and maybe even get in on the fun!

But how does all this relate to Amateur Radio? Well, did you ever wonder how some of those prosigns we use came about? Take “AR” for example: “A” is “didah” and “R” is “didahdit.” You run them both together without any space in between and you have the “AR” prosign: “didahdidahdit.” “AR” is one possibility of how to break up this particular combination of dits and dahs, but of course, there are others. For example, you could also do “R” (didadit) and “N” (dahdit). Now, in the International Morse Code, R is “didahdit.” But in the old American Morse Code, the same “didahdit” is an “F.” So what you’re actually sending is not “AR,” but “FN,” the old American Morse Code abbreviation for “finished.”

Isn’t it fascinating that our avocation reaches back over a hundred and fifty years in some of our traditions? More next time.

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## Understanding Batteries and Charging Systems

By Dan Eddleman, KR4UB

**Introduction:** My interest in this subject came from the desire to build my own emergency power back up system for use with my amateur radio setup. This article is a summary of the information learned from the reference sources below and was written to share with other interested folks in my local amateur radio club. This information has also helped me better understand the performance and limitations of the battery and charging system in my vehicle.

To understand battery charging systems, a few definitions are in order to explain the charging phases that are used. Not all battery charging systems use all the modes explained below.

Modern lead acid batteries will last longer and charge faster if they are charged in a particular sequence known as a three step charge. A fourth sequence known as equalization charge, which can be triggered by the user, exists only in more sophisticated charging systems.

**Bulk Charge:** The first step, known as bulk charge, delivers a constant current rate (at or near the rated capacity of the charger) until the battery voltage approaches its gassing voltage typically around 14.4 volts. Depending on the ratio of the charging current to the ampere hour capacity of the battery, the battery will be charged anywhere from 75 - 95% of the battery's capacity. (See paragraph below on charging rate for more detail.)

**Absorption Charge:** The second step, known as the absorption charge, holds the voltage constant, typically at the above mentioned 14.4V, with the current dropping on a slowly decaying exponential curve. Most of the relatively inexpensive chargers that have the absorption charge mode hold the voltage at this state until the charging current has dropped to approximately 10% of the rated capacity of the charger. This charge mode is needed to assure the last 15 - 20% of the



battery capacity is fully charged.

More sophisticated charging systems use a microprocessor to monitor the history of the rate of current drop to determine when to exit this phase. In addition, they will have temperature compensating circuit that alters the charging voltage during this phase. High performance charging systems will also contain remote sensing of the battery temperatures. These features are necessary to avoid a thermal runaway condition, which under the mildest of failure modes cause loss of electrolyte out of the battery and generally shorting the life of the battery due to internal heating. Rare but worse case failure modes include battery fires. More discussion of this topic follows later.

**Float Charge:** The third step, known as float charge, holds the voltage approximately at 13.2 - 13.5 volts, enough to maintain the batteries charge without losing electrolyte through gassing. At this voltage the charge can be left connected to the battery indefinitely without risk of overcharging. It is interesting to note that most automotive charging systems are set to have a maximum charging voltage of about 14.2 volts tapering down to about 13.5 volts. These systems also need to have temperature compensation; otherwise, either under charging or overcharging will occur depending upon the temperature of the battery.

**Equalization Charge:** The fourth step, found only on the most sophisticated systems is known as the equalization charge. An equalization charge is needed generally only on flooded or wet cell batteries (not gel cells) as often as recommended by the battery manufacturer. The purpose of this charge is to equalize the capacity of the individual cells of the battery, reverse electrolyte stratification (the separation of the liquid electrolyte into layers of different acid concentrations) and break up any residual sulfate which may remain after normal charging. The charge cycle is in essence a controlled overcharge that tends to restore the battery back to its original charge capacity. Typically the charge mode involves taking the charge voltage to at minimum about 15.3V and in some cases as high as 16.2V. Needless to say this is not something to be done with out close monitoring or a charging system designed for this purpose, given the thermal runaway condition that could develop. Also this is not something to be done with sensitive electronics attached, whether it be your amateur radio equipment or with the battery installed in a vehicle, given the numerous computer chips found in today's cars.

Commercially available, large chargers usually found at service stations can apply this high a voltage, not something to be done with in the battery in the car for two reasons; the risk of damage to the a fore mentioned computers and electronic devices and, battery "slobbering" (gassing at a high rate that deposits acid droplets) on top of the battery and adjacent metal, paint and other components near your battery.

**What kind of charger do you have?** There are 1-Mode, 2-Mode and 3-Mode chargers.

**1-Mode:** This charger operates only in float mode. This charger can charge a battery to the 100% level, but it can take days due the lower voltage, and subsequent low charge current used).

**2-Mode:** A 2-mode charges makes uses of the previously discussed bulk mode and float mode.

**3-Mode:** This type of charger is designed to recharge a battery to 100% more quickly than a 2-mode type. It uses bulk, absorption and float modes.

**Charging Rates, Drawing power from the battery while charging**

**What if you want to draw power from the battery while it is being charged?** It can be done, but you need to know the modes used by your charger and some problems to be avoided.

If the charger is a 2-mode, the charger should be large enough to supply the leakage current of the battery plus any draw from the external circuit (assuming it is a long term sustained loaded as opposed to an intermittent load. This is to avoid having the external load from over discharging the battery.

If the charger is a 3-mode, you need to read the reference material below to avoid getting into a situation where the charger locks up in absorption mode and either overcharges the battery or initiates a thermal run away condition previously discussed.

**Charging Rate:** The fundamental question here is how big a charger do you need for your particular size (ampere rating) of your battery.

The maximum battery charging rate is often specified by manufactures for example as C/5, where C refers to the ampere hour rating of the battery. C/5 for a 100ah battery would be and optimum charge current (in bulk mode) of 20 amps. The size of an off the shelf charger should be generally chosen so that the C/5 rate is not exceeded

This summary was compiled from a number of sources on the world wide WEB. Thanks and techncial credits go to these sources for enlightening us all. Further reading is recommended to understand in greater detail the topics covered.

## **The \$1,200 Upgrade**

**by Bruce Meier, N1LN**

OK - so, perhaps you don't have the \$1,200.00 right now to totally comply with the title of my article, but I did get your attention.

For the moment, let's assume you have your General Class ticket (at least) and you have a HF transceiver and some type of antenna. If you don't yet have the rig, well - read Mark's article that is also in the newsletter. If you already have your HF rig and are wondering how to make that signal stronger - read on. Here is the scenario - you have the rig, you hear the station you want to work, you continue to call and call - using excellent Ham operating procedures, of course - but you just can't seem to be heard. How to fix that??? LIFE IS TOO SHORT FOR QRP - is one way. The other way is THINK ANTENNA MODS !!!!!

QRP or QRO: Well, if you are like many Hams that have some type of multi-band dipole up in the air, chances are it is not too far away from your house and, probably not too high. If you decide to purchase that used legal limit amplifier (that, by the way typically costs about \$1,200.00 for a few of the most popular ones), you will indeed be louder. However, your signal on the ham bands will be louder, but your signal into the television, telephone, stereo, intercom, well.... you get the picture.....will also be louder. If you are truly unlucky, your neighbors might also be fortunate enough to hear you. NOT GOOD. Oh, by the way, when you add that amp to your station configuration and connect it to that multi-band dipole, don't forget that additional expense of the legal limit antenna tuner.

ANTENNA MODS: Here, I am assuming you are still one of those Hams with the starter dipole. If not and you have some other type of antenna, say a vertical, keep reading. You still need forward gain and front to back ratio. If you have the dipole or the vertical, chances are you are relatively CC&R safe. (NOTE: For more information on CC&Rs, please refer to the May issue of QST - page 44) OK, ready to move forward and SPEND THE \$\$ ON A NEW ANTENNA SYSTEM? Well, a couple of suggestions - First the \$1,200.00 suggestion.

1. THE \$1,200.00 solution: The end goal is to have a tower, beam, rotor and associated hardware. With some careful shopping using the resources available to us all - hamfests, on-line auction sites, on-line ham radio classified ads, friends with extra equipment - you should be able to piece together a used tower (Rohn 25 at roughly 40' - 50' with all guy materials), a used 3 element tri-band yagi (20-15-10 meters), and a used rotor with cable. This solution will give you just about the same gain in signal strength that the amp would deliver - BUT... focus it all in one direction. Additionally, it would provide roughly 20db of front-to-back to get some of that troublesome QRM down and...eliminate the need for the antenna tuner by being resonant on 10, 15 and 20 meters. That last part is key. You would still be running 100w, using a resonant antenna, focusing your signal in the desired direction and, at the same time, reduce or eliminate the interference to your house and your neighbors , and -- work that DX

2. THE LESS THAN \$1,200.00 solution: Well, the goal is just about the same but you don't have the \$1,200.00. How do you get that beam in the air? Well, think Field Day. You can purchase a 40' or 50' push-up pole, appropriate guy material, the same used tri-band yagi and be ready to go. What is the difference? Well - for one thing, YOU are the rotor. Simply tie a rope to the back of the boom that is long enough to easily touch the ground and tie to some type of weight. When you want to turn the antenna - move the weight!!!! Simple and effective. NO, not remote control, but you still have your directional, resonant, interference reducing, DX catching yagi IN THE AIR for LOTS less. My estimate is you could implement this solution for roughly \$ 250.00 MAX ! ! ! Then, when you have more funds, you can use the same yagi, sell the push-up pole, and invest in the tower and rotor. NOTHING lost.

What did I do? Well, when we lived in Massachusetts, I bought that legal limit amp. My DX count went up, but I interfered with EVERYTHING. Ask Laurie sometime about the garage door and alarm system. When we moved to Texas, the amp got sold, and my first tower went up. With 100 watts and my beam, I worked more than I did in Massachusetts

with 1,500 watts and my multi-band dipole. I did eventually get that 1,500w amp to add to the new tower and antenna...but, I could work everything I could hear in the meantime.

Happy Dxing!

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## **NC ARES Hams meet in Raleigh** by Gary Pearce, KN4AQ, Wake Co. ARES PIO

Here's a quick review and a few comments on the statewide NC ARES meeting held at the State EOC in Raleigh on March 31, the Saturday before the RARS Hamfest. Several dozen EC's and other ARES appointees and guests attended the meeting. Most came from the eastern 2/3 of the state. The meeting was chaired by **NC SEC Bernie Nobles, WA4MOK**. Bernie introduced several speakers who made presentations.

Before the speakers began, **John Gurriero, KG4HDT, EC for NCEM**, welcomed everyone to the newly revamped State EOC in Raleigh. The room has been upgraded with plenty of audio/visual display capability, and the "fishbowl" communications center has been moved out to another part of the basement to make more room. But the biggest change hams familiar with the EOC would notice is that the huge map of North Carolina is gone, replaced by projection screens.

First up was **Jeff Orrock, KI4KKX, NWS Raleigh Warning Coordinator**. Jeff noted that the 2006 Hurricane season was quieter than expected because of a surprise "El Niño" in the Pacific that calmed activity in the Atlantic, and kept hurricanes that did develop away from the coast. This year, the la Niña is back in effect in the Pacific, and more hurricane activity is expected in the Atlantic, along with a sustained Bermuda High that could make the climate warmer and drier across the southeast. Jeff also said that spotter reports are useful for more than immediate watches and warnings – they are part of the statistics that the NWS uses to show how accurate the system is. Not surprisingly, the severe weather forecasts are better in areas of denser population where more reports are received.

Next up, **NC Section Manager Tim Slay, N4IB**, commented on the ARRL NERPC Committee's recently released report on Amateur Radio's ability to respond to widespread or national emergency situations. The committee's full report is available on the ARRL web site. Tim's highlights included the need for hams to be able to respond faster to fill the immediate need, before the various communication utilities restore their service (and they're getting faster!). The committee also noted that ARES, and Emergency Management in general, is decentralized and organized from the "bottom up." That's good most of the time, but it doesn't scale up well in widespread or national disasters. The committee recommended creating some higher level ARES positions, including one at Headquarters, to oversee wider area situations.

**Bob Conder, K4RLC, AEC Wake County ARES**, spoke on the Red Cross background checks issue, and also gave some background on the possible Avian Flu Pandemic. Some hams have been concerned following the announcement that the Red Cross would require fairly invasive background checks on all volunteers, apparently including hams. Bob said that the RC has revised their policy in a couple ways. First, a "spontaneous" volunteer doesn't need background check (that's a volunteer who assists with a specific event for no more than 7 days). And volunteers associated with a "Partner" organization, like ARES, don't need background checks if they are only wearing ID of their organization, and not a Red Cross ID. Those volunteers would be limited in what jobs they can perform for the Red Cross, and Bob also noted that a Red Cross ID is widely recognized and will get volunteers into affected areas more easily than IDs from some other organizations.

A flu pandemic (a worldwide outbreak with significant loss of life) could last for months and affect the communications grid as technicians are unavailable to maintain the systems. No one has immunity to the Avian Flu, and there are no vaccines. Everyone, hams included, can take precautions such as obtaining a two-week supply of N95 Particle Respirators (masks). And washing your hands really well.

**David Williams, KF4CQS, the New Hanover Co. EC**, discussed the NC ARES Digital Plan. David is leading a new

committee to try to make some progress on a long-stalled effort to supplement the voice/cw nets with a digital system. He said that the ARRL recommends Winlink 2000 for digital communications, though he didn't go into detail on what the capabilities were. There were some negative comments about the fact that the Pactor III element of Winlink 2000 is supported by only one manufacturer and is fairly expensive. NC Emergency Management has been asking for a digital system from ham radio for years, but has declined to fund it.

My comment is that NC ARES has never achieved the "critical mass" of hams interested and equipped for effective data operations. Not enough hams are interested, a few actively oppose it, and those who are interested are split among a variety of incompatible modes. Evidence of the last point appeared at the meeting as discussion spun into the technical details of one mode vs. another until WA4MOK brought things back on track (to a scattering of applause). This has held back what could be an extremely effective tool in emergency communications. I hope the new effort is successful.

**Dave Roy, W4DNA, NC Traffic Manager**, also referred to the NERPC report, noting that hams have to get better at handling traffic. With a nod to the digital plan, he admitted that "what our customers want today is to be able to get into the Internet when the lines go down," but added that until that gets all built, we still need NTS radiograms. Dave said that the biggest challenge NTS has in North Carolina is traffic delivery into some, mostly rural parts of the state.

Dave also said that the #1 reason hams don't want to get involved in NTS was the redundant traffic – the "don't forget to renew your license" stuff that originates from a few stations and fills the traffic nets. A few hams in the meeting complained about that traffic, but Dave noted that NTS still can't deliver even that simple traffic in some parts of the state. Dave would like to see a SET style NTS training event.

**Pat Gorman, KE4WZY, DEC for Areas 3&4** made a pitch for using 10 meter SSB for local emergency communications. All hams can now use 10 meter SSB, and Pat claims that he can achieve far beyond county-wide coverage with 100 watts and a vertical antenna – 70 miles from base to mobile. Carteret County ARES is building a 10 meter system to supplement HF and VHF in that area. (My comment: I'd like some of the magic beans used to grow the antennas they're using down there. My experience with 10 meter SSB, home and mobile, doesn't come close to the distances Pat claims for daily communications. But I haven't watched his system in action. Show us, Pat!)

**Tarheel Emergency Net manager Dave Fleming, KE4JHJ**, was unable to make the meeting. Bernie reminded everyone that the primary frequency for THEN is 3923 kHz, and the net meets nightly at 7:30 PM. He'd like to see more activity. I'll add that during emergencies when the net operates around the clock, it moves to 3927 kHz in the morning to join the NC Morning Traffic Net, while 3923 is used by a ragchew group that's been holding forth on that channel for decades. That switch doesn't make sense to me, but tradition can be hard to fight. In the daytime, when 75 meters usually fades well below statewide coverage, the net may move to 40 meters. The published frequency is 7232 kHz, but since THEN has no routine presence there, it may have to move up or down the band a bit to avoid other activity. I asked about 60 meters, and Bernie noted that he's done a bit of operating there and daytime coverage is usually good. But NC ARES has no formal plans for using that band.

Finally Bernie noted that he's looking for a statewide Training Officer to plan, staff and implement operator training across the NC Section. Anyone interested should contact Bernie or SM Tim Slay, N4IB.

The NC Section web site is [www.ncarrl.org](http://www.ncarrl.org).

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**Amateur Radio “On the Cheap” – Getting on HF bands for under \$200**  
by Mark Lunday, WD4ELG

OK – you upgraded and you’re ready to start operation on the HF bands. When we look at some of the gear at websites like Ham Radio Outlet (<http://www.hamradio.com>), it’s overwhelming. And the prices! The Yaesu FT-DX 9000 “THE RADIO” is \$10K. The ICOM 7800 is even more expensive. You want an HF rig, not a car. How do you make sense of it all?

1. **Determine your budget** – be realistic. You CAN get on the bands for under \$200, I’ll show you an example below.
2. **Identify your goals** – do you want SSB and CW? Digital modes? Are you willing to build from a kit? DO you need low or high power? What type of antenna?
3. **Start simple** – nobody builds the best station at the start, because each person’s needs are different. There is no way to know what you like until you have time to identify preferences.
4. **Do research** – talk to others in the club, read product reviews on <http://www.eham.net> Next time you’re in Atlanta or Manassas or Orlando or Miami or any other city with a retail equipment store, stop in and do a test drive.

Here’s one example that a friend of mine, Jeff\* (name changed to protect the innocent) went through, to show you it CAN be done:

1. Jeff set his budget at \$200
2. Jeff’s goal was to use SSB and CW
3. Jeff wanted an HF transceiver in one box WITH a power supply included, not a separate receiver. Age was not as important as keeping the price under \$200. So Jeff knew it would not be a new rig. That’s OK, he’s starting simple.
4. Jeff did some research, and he likes the Kenwood radios. TS520 series looks interesting, good reviews, and I have one at my shack. I promised to help him if he got one. I let him try mine, and he liked the feel of it.

What does Jeff need?

- o Radio – we have a model selected, now we just have to search for it
- o Antenna system with ground – we can buy or build a dipole for \$25
- o Keying device – simple key is \$10, or we can build one. Microphones depend on the rig, but Kenwood 520 compatibles are around \$25 at ham fests or online

Where do we find the radio?

- o EBAY – this can be tricky, work with someone who knows online auctioning. However, there are LOTS of GREAT deals out there
- o Ham fests – good way to get equipment
- o Buy from another ham locally – spread the word that you’re looking for some gear to set up your station

I helped Jeff look on eBay, and we picked up a TS520S in good shape and a 4-pin handheld microphone for **\$150!!!** Jeff then bought a key and copper wire with insulators and a ground rod from Radio Shack for **\$50**. I had an extra 50 ft of RG8 coax I loaned him. For \$200, Jeff is ON THE AIR!

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