

OCEC/RACES SIGNALS

For the support of County Government during emergencies



Oswego County Emergency
Communicators/RACES
200 North 2nd Street
Fulton, NY 13069

Oswego County Repeaters

147.150 mHz PL not req'd
146.850 mHz PL not req'd
442.350 mHz 103.5 PL

Other repeaters of interest

146.670 mHz PL 151.4 Syracuse
147.345 mHz No PL Phoenix

Packet FlexDigi User Ports

EOC Fulotn 145.090 mHz K2QQY
Scriba 145.690 mHz KA2AON
Hannibal 145.770 mHzK1YHR

NETS

OCEC/RACES The 1st and 3rd Sunday
of the month at 2000 Hrs. 147.150 mHz

NYS RACES Net Every Sunday Morn-
ing at 0900 local on 3993.50 kHz

WEB SITES

OCEC/RACES
www.oswegoraces.org

Fulton Amateur Radio Club
www.fultonhamradioclub.org

Go to our web page for more links to
interesting places.

*A monthly meeting is held in the
lower level of the County Building
on Route 481 North, Fulton,
across from Mimi's restaurant.
Access is through the west door
until the meeting starts. Door is
secured after that. Use the after
hours button if late. Someone will
come up and let you in. Meeting
sign in is at 1850 hours local.*

Meeting Agenda for Wednesday, September 17

1850 - 1900 Sign In
1900 - 1930 Report on Table
Top exercise held on Sept. 4
1930 - 2000 Participation
measurements
2000 - 2010 Chat
2010 -2030 Cross band re-
peating, application and the
FCC.
2030 - 2100 Upcoming
events, future programming
and general information.

OFFICERS

John K2QQY Radio Officer
Keith, WB2NVY ARO Admin
Jim N2MGU ARO Comms
Mark KC2JNI ARO Logistics
Bob WA2AFF ARO Ops & Plan,
Tom W2TQF ARO ARRL EC
John N2MKH Unit Ldr Packet
Steve KC2QXE Unit Ldr IT
Brien KA2AON Unit Ldr Skywarn

INSIDE

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Web sites to visit for more arti-
cles about ham radio and em-
mcom.

Navymars.org/reg4/region

Navymars.org/central/area

Hamuniverse.com

A “tricked out” van

We’ve seen all kinds of tricked out vehicles on TV and the term is being applied to a lot of other objects, but here is the real deal of how a communications tricked van looks. Thanks to Jim Otis, N2MGU for use of his van

Antennas. An important asset to the project for answering the question, “how do I get rf out of this box”?



Ah, the rest of the story.



But, you need some rf generators to feed the antennas.

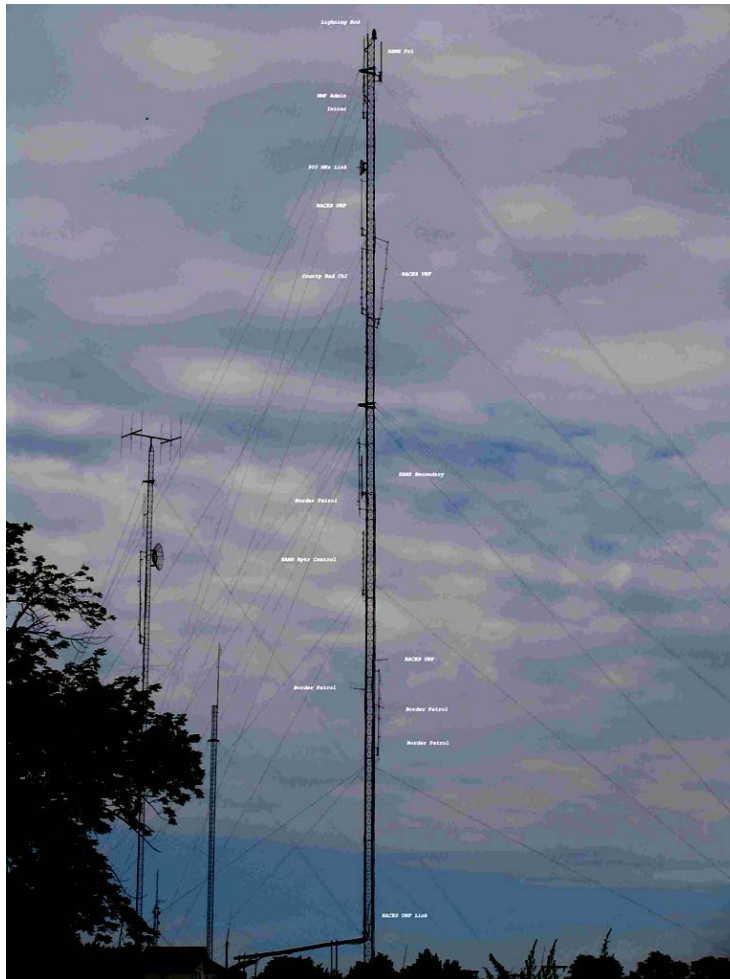


For being sure that the spectrum receives equal chance for signals to enter it, a good collection of radios is required.



Pictured on this page are a Uniden BC-996 Scanner tuned to radio amateur frequencies; a Kenwood TS-50 with antenna tuner, an Icom Commercial grade VHF transceiver, an AD I 220 Mhz transceiver, another Icom commercial grade UHF transceiver and finally a Radio Shack 40 channel CB rig. All in one neat, accessible package.

Here is a picture of the population of the tower at Scriba where the 147.15 and the 442.35 repeaters are located. The 4 bay antenna leaning to the right is for the 147.15. This may answer the question of why coverage is so good.



From the bottom, labels at left:
 Border Patrol
 SAMS Repeater Control
 County RAD Team Ch 2
 RACES UHF
 900 Mhz link
 INTR C
 NMPA Admin

From the bottom, labels at right:
 RACES UHF Packet Link
 Border Patrol
 Border Patrol
 RACES UHF link to Remsen
 SAMS Secondary
 RACES VHF
 SAMS Primary

Lightning Rod (top)

Grounding in RF Environments
By William D. Chesney, N8SA
Director of Communication
Michigan Wing, CAP
Dec. 2003

Proper grounding of radio stations is probably one of the least understood aspects of ham radio. It almost has a certain aura of mystique or magic about it instead of being the pure science it should be. This is a very important aspect of any radio installation. There are two major criteria we need to consider when doing the planning for this installation. The primary reason has to be safety, both for ourselves as the operator who will be seated at the controls, but also for our equipment and possibly the structure....probably our home. The second of course has to do with the performance of our antenna system and it's ability to radiate an efficient signal. Let's treat these separately for now and they will combine into a total plan at the end.

Surge (or Safety) grounding.

We need to protect our installation and ourselves from lightning.

There is no protection against a direct lightning hit!

It has way more power than we can shunt to ground safely or our budget can handle. That is what insurance is for. We CAN however make our installation an unattractive target to lightning. We can also take care of any secondary surges and static build up that can destroy equipment and give healthy zaps enough to more than get your attention. There is nothing more frustrating than trying to talk on a radio and you keep getting zapped on the chin while doing so! I speak of personal experience here. Let's let it go at that. The Safety ground has to consist of enough ground contact surface area to safely dissipate the surges into the soil safely. Multiple ground rods connected with solid 1/4" ground wire is best. You should have one rod where your antenna support structure is whether it be a tower or mast or roof tripod, etc. It must have at least 4 gauge bare or insulated, NOT stranded wire. These surges can easily be hundreds of amps. DO NOT scrimp on the wire. This is your life you are dealing with. If stranded wire is used it should be no more than 8 conductors. Heavy bolt type connectors should be used for all connections. You should also employ a non corrosive type coating. All of these connectors and grease are available at your good home supplies or electrical supply houses. All grounds for the installation should be bonded together at the ground. NEVER daisy chain grounds. ALL connections from devices should go DIRECTLY to closest ground point. Use eight foot copper ground rods for all. Bond the rods with single 1/4" solid bare copper wire. Drive a ground rod for electrical supply to house if you do not already have one. Bond it to others with aforementioned wire. If you have overhead service to house, run wire direct to neutral wire at feed point and use split bolt connections with grease for corrosion. If you have underground service, ground at meter box. If your power company objects, run it to your service panel. You need a minimum of one eight foot ground rod for every protected structure, ie, every mast, tripod, vertical antenna, etc. These must all be connected together AT THE GROUND. Run bare copper between the separate ground rods to form a ground system. The bare copper provides additional surface contact area for the ground system. It should be underground, but does not need to be deep for any engineering reasons. Make sure you make yourself a map of the runs for future projects to avoid hitting and digging up the system in the future. Use heavy duty bolted connectors designed for this service. If you have access to a ground megger or ground tester the system should be less than 15 ohms. In sandy soil this can take several rods to achieve. I have had to put down 3, 32 foot rods (consisting of four 8 foot rods with couplers and driven in with a power driver) in sand to get the measurement needed. This should take care of our safety grounds.

RF Grounding.

Rf grounding is considerably different than surge grounding. First thing is you are working with RF. Since it is an AC signal it has impedance. The length of the ground runs has much more to do with the fraction of a wavelength at the frequency involved than the DC resistance of the wire. While the DC resistance of a ground wire may be only a fraction of an ohm, the impedance (or the AC resistance at RF frequency) can easily be hundreds or thousands of ohms on the same wire. This can make it pretty difficult to get an effective RF ground. Remember an RF ground wire is just a short antenna! We want to make it as LOUSY an antenna as possible! We really don't need it radiating extra RF inside our shack. It is supposed to remove this stuff not cause it. An effective RF ground needs to be less than a quarter wave length at the highest frequency used. As you can see there is no such thing as an effective ground for VHF or UHF. We will concentrate our efforts to 10 meters and above. This means our ground wire from radio to ground must be about 9 feet or less! This is still pretty difficult. All radios, tuners, meters, etc in radio system should be grounded in a star ground configuration. The common point should be at the tuner if one is used, otherwise a ground bus bar can be purchased at an electrical house. All Connections to radios should be with either insulated or bare wire with as few strands as possible. RF likes smooth surfaces best. DO NOT USE braid for RF connections. This is an old wives tale! Your ground run should go directly to the ground where you should have a ground rod for the connection point, (which will be connected to all your other ground rods

in the system as discussed above). This run must be less than nine feet to be effective. If you are on the second floor this will make this length impossible. Use of a shielded ground* wire can stop radiation of the ground wire but you will still have a lousy ground. Nothing can change this. Ground wire tuners only turn your ground wire into a counterpoise for your antenna, meaning it WILL radiate. This will only ensure that the low voltage point of your antenna will be at your radio. Next we need to form our RF counterpoise outside at our ground system. You will next need to add some bare copper wire at the RF feedpoint where your shack ground wire connects to. I prefer to use bare 8 gauge copper ground wire here. It is single conductor, bare copper and easily bent and run around house. Single strand is best but it should definitely be bare even if you have to strip insulation off wire. Run it around the house or anywhere it will stay out of the way of lawn equipment but not buried deeper than 1/2 inches. This is CRITICAL. RF will not penetrate soil deeper than this at these frequencies. Those bonding wires you have between ground rods and ground rods do not exist to the RF! Burying this wire under wood chips or similar non conductive landscaping, etc is the way to go. This counterpoise should be as long as the wire antennas you have in the air. For most hams this will be about 130 feet. Longer is better. I run all the way around my house. I have found the eight gauge will push into the spacing used between driveway and foundation when persuaded with the proper tool, (READ HAMMER). You can connect the loop back on itself at the feed point. This can add several S units to the receive signal and dramatically reduce noise on the signal, though nothing will help all the noise on 80 or 160 meters. Years ago I installed a long wire antenna that was about 250 feet long and about 50 feet in the air. This should work fantastic you say. I had three ground rods outside window of shack with single solid copper ground wire direct to tuner. Ground wire length was only six feet. All three rods were spaced about eight feet apart with connecting bare wire interconnecting them....in other words, a really good surge ground. What I did not realize at that time was how lousy my RF ground was. We could not tune the antenna on most frequencies and we kept getting zapped from the radio or microphone when we transmitted. Also, our signal reports were lousy. SO, after consulting some experts, I added 250 feet of counterpoise around the building consisting of some bare 6 gauge copper wire I had. The radio was on while I rolled it out and a friend was listening to the broadcast on 40 meters, (OK it was night time---best time to do antenna work right!) Anyway he reported the broadcast was only about S 4-5 on meter. As I rolled out the counterpoise it rose to 40 over S9 and came in much clearer. We were able to tune everything easily now and SWR was rock stable. When we did a signal test, the station we had talked to before accused us of running a contest amplifier. We could not convince them it was only 100 watts, same as before and the same antenna!

SUMMARY.

Don't underestimate the importance of a good ground system.

Include it into the planning of that ultimate shack you are working on. Don't scrimp on good copper wire and connectors. Aluminum can be used above ground but never in ground. Add one size to aluminum to achieve same current capability. Ground everything to the system. A ground run to ductwork in house can alleviate a lot of noise. A run to water pipes should go direct to ground....NEVER to radios, NEVER connect radios to ANYTHING inside the house for ground purposes. Always run all grounds from everything to ground directly. In other words, your furnace ducts will get one run, your water pipes will get one, etc. Don't daisy chain to save wire. If you have a chain link fence in back yard, run a bonding wire underground from ground system to it and bond well. A solid aluminum or copper wire run along bottom of fence as a bonding device will make it a great addition to the system. Weave it through the bottom fence fabric and bond every few feet with a split bolt connector. The power company does this with all their fences around their power stations.

* A shielded ground can be made using RG 8 or similar coax to replace the ground wire. Connect both inner and outer shields to the Ground rod and connect the center only to the radio. Add a .1uf 1000 volt cap between ground and shield at this end.

73 Bill - N8SA

Questions? Email Bill Here

Editors note:

Many thanks to Bill for sharing this fine article with all of us!

It's Hams like Bill who are willing to take their time and share their experience and knowledge with others that make this "hobby" so great!.....N4UJW

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