

SOLID COPY™



Autumn 2003

The Bulletin of the
Richmond Amateur Telecommunications Society
P. O. Box 14828 - Richmond, Virginia 23221



Virginia—Telephone Service—Electrical Dependability— Repeaters—Isabel and the Upcoming Winter

OR: A Case for NVIS

Mike Gabbert, K4AUR

NVIS is a mode of HF operations that has been in use since WWII by the German army. The U.S. Army extensively researched and utilized this concept in the late 1960's during the Vietnam War when trying to communicate through dense jungle foliage, or when line-of-sight relays on hills or mountain tops were not reliably available. Though it hasn't always been known by that acronym, this mode of propagation even dates back to 1925 when used by Breit and Tuve as a vertical ionospheric sounder. NVIS—Near Vertical Incidence Skywave—propagation is when you intentionally communicate using HF radio into what the DX'er would call the skip zone. Your signal is directed at as high an angle as possible up to 90-degrees.

Ignorance

I hope everyone isn't as ignorant as I am, but did you ever notice military vehicles with those extremely long whip antennas bent down over and across the length of the vehicle with the end tethered so most of the antenna is horizontal to the vehicle? Well, horizontal to the vehicle is also horizontal to the ground. They're not tied down to keep them from snagging trees or power lines. That's the normal way they

work, though they do perform better when extended out over ground rather than the vehicle itself. They're using a near *vertical* incidence skywave.

EmComm

This is an ideal tactical or EmComm mode of communications that allows the two or more stations to maintain reliable communications without the requirement of a third party or device, e.g., a repeater, to intervene.

For EmComm it allows you to contact people who are not several states away or half a globe away. It allows you to talk to people who are five or ten or 20 miles away—50 miles away—even 100 miles away—people who are close enough to do you some good in an emergency. The effective range for NVIS approaches 200 miles regardless of intervening terrain, i.e., dense foliage, mountains or curvature of the earth.

Surprisingly, there are many HF'ers who unknowingly—certainly unintentionally—utilize this mode when they operate on the longer bands. They do it out of practicality if not intent when they are unable to achieve heights equal to ½-wave up. They shrug off a QSO to a nearby town as ground wave propagation when it is

more likely a skywave because their dipole is only 30 feet up.

The DX'ers credo, at least for wire antennas, is to get them up as high as possible to achieve the lowest angle of radiation. The standard 80-meter dipole is cut to one-half wavelength and is ideally hung at least one-half wavelength above the ground. Not many amateurs can stretch a dipole up 125 feet or more (or even 60 to 65 feet up for quarter-wave height). When you put your antenna lower than this you begin compromising on your low angle of radiation.

Instead of having two well-defined lobes of signal extending, broadside away from your wire with a null directly overhead, the lobes begin to merge into one. Rather than having somewhere around a 30-degree take-off angle, the take-off angle increases. As the antenna is lowered to about one-eighth wave the angle approaches 90-degrees, and the two distinct lobes have merged into an almost rounded oval. The radiation pattern has been described as if you had a fire hose pointed straight up with the nozzle adjusted to "fog" spray. Your signal goes up and back down in a well-defined coverage area proximate to its source.

How Low?

With a wire this low—now we are talking about eight to 15 feet from the ground—the signal to noise ratio is greatly improved. The nearby QRM and QRN is projected above you. How low is too low? Well, NVIS has been successfully performed with a wire lying on the ground and also about 18-inches up, mounted on traffic cones. Signals to antennas this low do suffer quite a bit of attenuation—as much as 10dB compared to a wire only six feet up. So the lowest antennas you might want to attempt would be in the seven to eight foot height, mainly out of safety considerations—wouldn't want kids or neighbors be walking across your yard and get "clothes-lined," as it were, by your antenna or its RF hazards.

An antenna above the ground by 1/8-wave or higher can have a second wire below it by 0.15 wave and cut 5% longer. This would be the reflector to the driven element of the dipole itself, and increase the verticality of the signal.

Orientation is unimportant since, at these heights, the dipole is essentially omnidirectional.

Propagation Basics

A lowered antenna is required for NVIS, but the most important facet is that of basic radio propagation. Knowing which bands to use and when will be the difference between failure and success.

The longer bands will be required due to something called the maximum usable frequency or MUF. Higher frequencies like 20-meters and 15-meters, etc., will punch on through the ionosphere and not be returned to earth at these radiation angles. 80-meters will often suffice, day or night, but may fail during the day due to D-Layer absorption. When 80-meters is dead to DX, it may be open for NVIS. Usually 40-meters is used in the day and 80-meters at night. 160-meters can also be used. At night 40-meters

may well be above the MUF since the F-Layer is then not quite so ionized as it was in the day. So NVIS is something like threading a needle in using a frequency high enough to break through the D-Layer in the day, yet low enough to be reflected back to earth at these high angles of radiation. That is to say, as close to the MUF as possible without exceeding it.

If anyone would like to try this, let me know, and we'll set up a sked. Contact me at 804-347-3754 or: k4aur@comcast.net.

The logistics of setting up a system like this appears relatively simple. No big towers or tall trees need apply. Perhaps three telescoping painter's poles—one for each end and one for the center connector and feedline support so there isn't excessive sag. Some sag is good, though as then ends should be slightly higher than the feedpoint. The end poles will likely need some guying to support the wire strung between them. A less expensive alternative would be two-inch PVC pipe around 10 feet in length. The antenna could even be mounted atop a fence of appropriate length.

ELECTION RESULTS

All nominees running for office were elected into the office or directorship they were seeking. They are:

Jerry Williams, KJ4IT, President
Marie Long, K4KML, Vice-President
Guy Carlsen, K4CNF, Director
Robert Orndorff, W4BNO, Director
J.Parke Slater, N4KFT, Director

VE EXAMS

Exams for licensing or upgrading are as follows. There are two locations, the W5YI VEC sessions in Chester and the ARRL VEC testing in Richmond. Bring \$12.00 cash (exact change) and two forms of ID, one of which must be a photo ID. If you are upgrading, you must bring the original

of your current license *and* a photocopy of it.

If you have credit for previously passed element(s) bring your original CSCE *and* a photocopy of it unless your current license reflects these endorsements. Arrive 15 minutes early. Preregistration is preferred, but not required (unless you are taking the CW element in Chester, then required). Walk-ins are welcome if seating and materials are available.

The first exam is October 11th at 9:00 AM at J. Sargeant Reynolds Community College, 1651 E. Parham Road, Richmond, Building B. For more info contact Patrick Wilson, W4PW, (804) 932-9424 or go to:

<http://www.w4pw.org/hamtests.htm>

The second testing will be on November 3rd at 7:30 PM at Pietro's Restaurant at the corner of Jeff Davis Highway and Osborne Road in Chester. For more info call (804) 768-2255 or visit:

http://www.kr4uq.org/V_E_EXAM_S/v_e_exams.html

The final test session of the year will be at the J. Sargeant Reynolds location on December 13th at 9:00 AM.

CQ, CQ, *SEEK YOU!* AT THE NEXT RATS MEETING

The Richmond Amateur Telecommunications Society meets the third Friday of the month at 7:30 PM at the West End Volunteer Rescue Squad building at 1802 Chantilly Street, Richmond.

From Broad Street, Chantilly is the first block east of Staples Mill Road. The WEVRS building is 1/2 block south of Broad on Chantilly.

RATS ONLINE:

<http://www.rats.net/>
<http://membership.rats.net/>
<http://www.rats.net/forums/>

It's Time to Renew Your Membership!

Memberships were due and payable in September as indicated in the last issue of *Solid Copy*. However, if you were like me at the end of September when I should have been thinking about paying my RATS dues, I was occupied with other distractions. Namely Isabel. My concerns weren't dues, but electricity, phone service and uncontaminated water. When are the kids going back to school? What about the insurance claims? If you didn't get your RATS dues paid in time, we all understand.

Next year the membership renewal will be on its normal date of payable by September 30th. This year due to the storms we are getting a one-month extension. Please cut off and fill out the form below and enclose a check for the appropriate amount and return to:

Richmond Amateur Telecommunications Society, Inc.
P. O. Box 14828
Richmond, Virginia 23221-0828

2003-2004 RATS Yearly Dues Notification

Present with Check (Do Not Send Cash in the Mail).

CHECK ONE: \$20 Regular Membership \$10 Senior \$10 Student \$5 Initiation Fee

**A \$5 Initiation Fee is assessed for any new member or delinquent renewal.
All dues are payable now and considered delinquent as of November 1, 2003.**

FIRST NAME: _____ MI: _____ LAST NAME: _____ CALL SIGN: _____

HANDLE (Nickname): _____ Send me *Solid Copy* by Email US Mail

MAILING ADDRESS: _____

CITY: _____ STATE: _____ ZIP: _____

WORK PHONE: _____ HOME PHONE: _____

ARRL Member: YES NO BIRTHDATE ____/____/____ LICENSE CLASS: _____

OCCUPATION: _____ PREVIOUS CALLS: _____

TOTAL AMOUNT ENCLOSED: _____

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The board may also be contacted, as a whole, at board@rats.net.
Please feel free to contact any of us regarding RATS business, information, and ideas.

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