Amateur RADIO Society News

Newsletter of The Amateur Radio Society of India (Member of IARU) English / Hindi Quarterly

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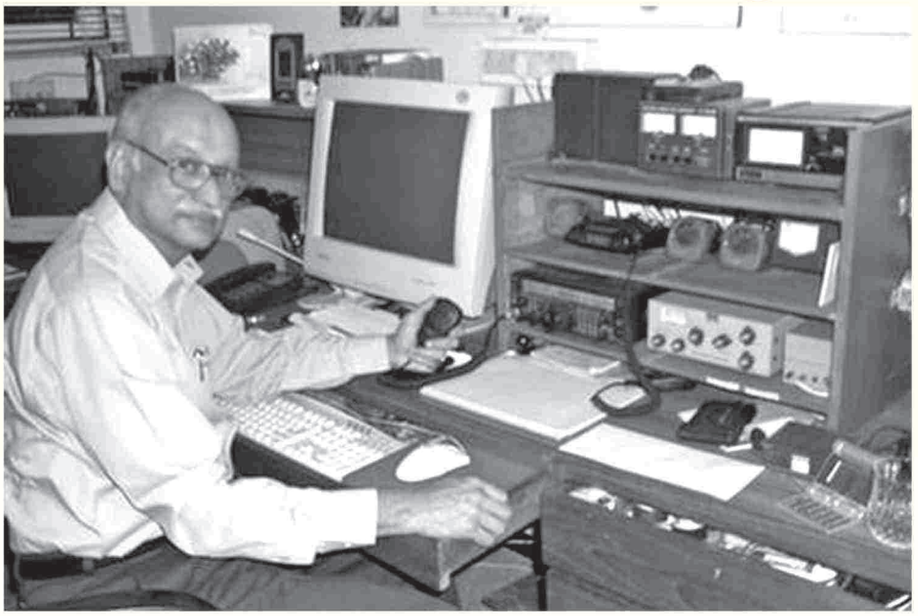
President's message



Dear members

As our editor has mentioned elsewhere, we are on a drive to increase the membership of ARSI, which is the only official society recognized by IARU to represent the issues that affect amateur radio in India.

Every licensed radio amateur should be a member of the local society where he/she resides and ALSO be a member of the national society, which in India is ARSI. The local society is the backbone of radio activities- they should be training new amateurs, conducting field days, conducting antenna workshops and arrange for regular meetings so that an eyeball is possible between local hams.

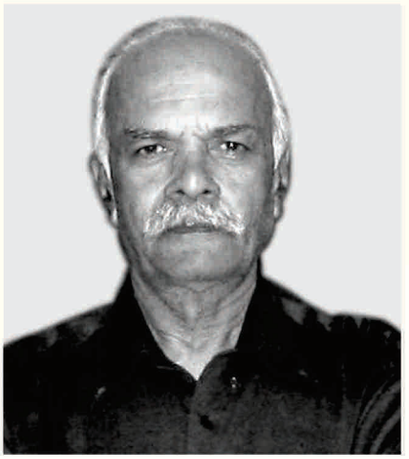
The job of ARSI is to take up issues with the national administrator which is WPC in India, to resolve issues that affect radio amateurs, negotiate for frequency allocations and work with WPC to modify or change rules that need changing. This is a long process and ARSI is constantly working on the various issues. Visits to Delhi are required on a regular basis and that is being done.

We will be shortly addressing every active radio amateur who we see checking into nets whether it be HF, VHF or even via Echolink into VHF nets to get their support for the national society.

We will be meeting most of you at the Hamfest scheduled for early December in Kochi. It looks like it is going to be a mammoth affair judging by the registrations already received. Do attend as it is a great opportunity to meet face to face those who you normally only hear on the air.

Gopal, VU2GMN

From the Editor's desk



Your society is now on a *membership drive*. Membership is the lifeblood of any organization. Attracting and retaining members can be a very challenging task**.** Have members of your club/group try to recruit new members from among friends. Clubs as well as licenced amateurs who are still not members are invited to enroll; visit **www.arsi.info** / *for details.*

The band conditions have been poor in spite of the increased sunspot activity.

I am including a second article by Jayaraman VU2JN in this issue; this time it is an antenna tuner with an SWR meter, a must for any shack.

I continue to request members to send in articles, news of club activities and photos for including in future issues.

Ganesh VU2TS

Near-earth asteroid fly-by receiving opportunity

zThe 400 meter diameter near-Earth asteroid **2005 YU55** will be making a 0.85 lunar distance flyby of Earth on November 8.

Michael Busch at the UCLA Department of Earth and Space Sciences notes this may an opportunity for amateur satellite operators to observe the fly-by.

UCLA will be conducting an extensive campaign of radar observations with the Arecibo Observatory, the Deep Space Network Goldstone facility, and the Green Bank Telescope and the Very Long Baseline Array.

Because YU55 will be so close to Earth, its radar echo will be detectable with even small antennas (~1 m^2). YU55's echo will be a slowly drifting signal with a bandwidth of ~1 Hz within a few kHz of 2380 MHz or 8560 MHz.

This will present amateur radio operators an opportunity to receive the radar reflections off of the asteroid because of the big dish, big signals originating from Arecibo and Goldstone.

On November 8, 2011, 19:15 - 19:30 UTC, Arecibo will be transmitting a continuous wave tuned to put the asteroid's echo at a constant 2380.000000 MHz at the Green Bank Telescope. Observers elsewhere on Earth will see the echo within 2 kHz of 2380 MHz, Doppler-shifted by the Earth's rotation. It will be slowly drifting in frequency and have a bandwidth of ~0.6 Hz.

On November 9, 2011, 01:30 - 02:00 UTC, the Goldstone Deep Space Network facility will be be transmitting a continuous wave tuned to put the asteroid's echo a constant 8560.000000 MHz at a second antenna at the Goldstone site. Other observers may see the echo shifted by as much as 6 kHz, and it will have a bandwidth of ~2 Hz.

Initial information can be found on-line at:

http://echo.jpl.nasa.gov/asteroids/2005YU55/2005YU55_planning.html

More details will be announced on the ARSI reflector as the fly-by date approaches.

ATU with REFLECTOMETER

by R. Jayaraman (VU2JN)

This article is a sequel to the article "A Compact ATU handles 100 watts" that was published in the previous issue. It describes a Norcal-type Antenna Tuning Unit with an in-line Stockton-bridge-type Reflected-power Indicator that I built recently (April 2011). This ATU is also capable of handling the full output of a 100-watt HF transceiver.

The ATU circuit is that of the well-known Norcal BLT ATU, with minor modifications. A Reflectometer, ie. reflected-power indicator, forms part of this ATU and makes it self-contained, obviating the need for a SWR bridge. It is based on the Stockton SWR bridge, an interesting bridge circuit using 2 toroidal RF pick-up coils. This circuit deserves to be used more commonly by hams. For those who are interested, additional details of the Norcal BLT ATU and the Stockton SWR Bridge are available on the internet.

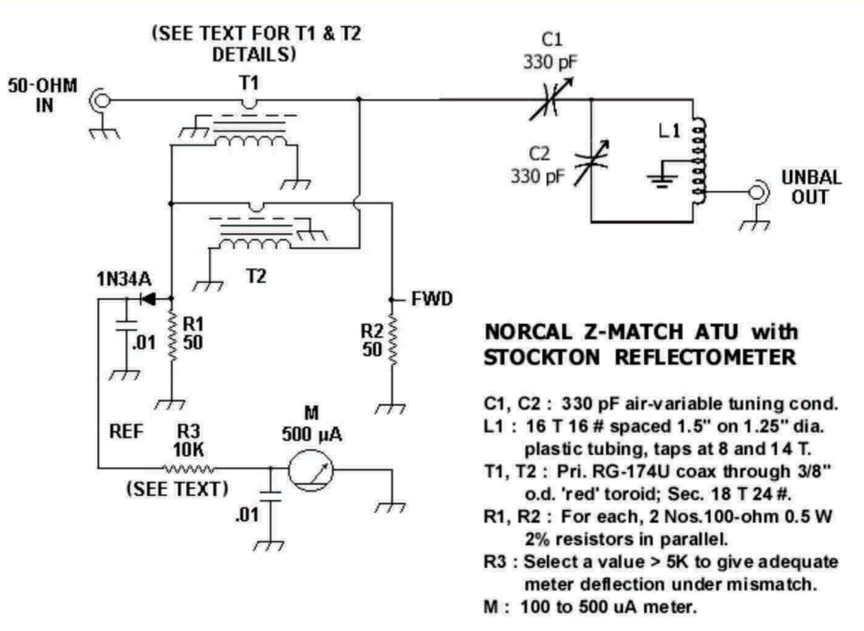


Fig.1. Circuit diagram of the ATU with Reflectometer

The toroidal coil of the Norcal ATU has been replaced with an open air-core coil since this unit is meant as a prototype suitable for duplication by budding hams who might find it difficult to procure large-sized toroids. The two BC-type 330 pF air-variable tuning condensers were salvaged from old discarded radios. They were tested at 230 V AC to make sure that there was no arcing. If air-variable tuning condensers are not available, polyster-variable tuning condensers may be used, but the maximum RF power may have to be restricted to about 50 W.

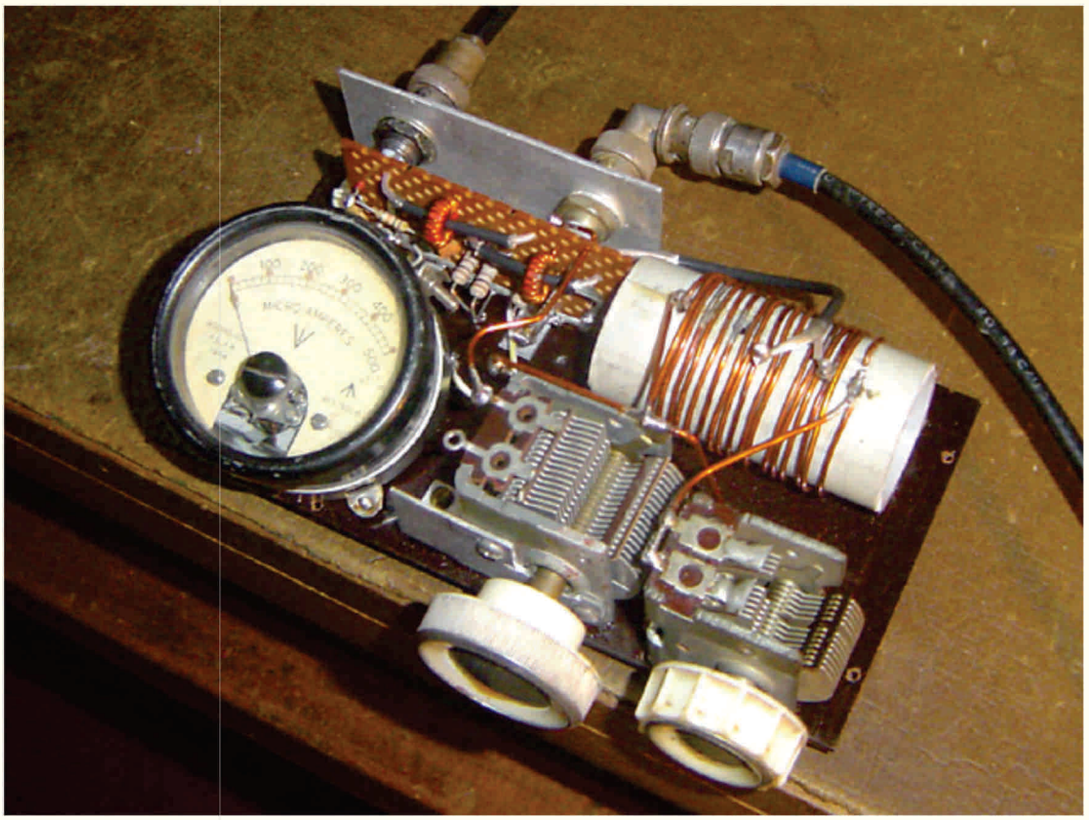


Fig.2. Photo of the ATU with Reflectometer

The entire ATU-cum-Reflectometer is assembled on a bakelite sheet 6.25" by 3.5" that was available with me. Hams wishing to build this unit are advised to use a slightly broader sheet. The main coil is wound with 16-gauge copper wire on a short length of 1.25" dia. plastic water-pipe tubing. The coil has 16 turns spaced to a length of 1.5" with taps at 8 and 14 turns. The centre of the winding is the earth point. In the Norcal ATU, the RF output is taken through a 6-turn link winding, but in this unit, the messy link is dispensed with and the output is taken from a tap 6 turns from the earth point. Even with this simplification, the ATU works satisfactorily.

The open coil will produce a weak RF field in the shack. If the builder wishes so, the unit can be put in an aluminium box, but then (1) leave a minimum space of one diameter around the coil, (2) since the body of the tuning condensers is not at ground potential, leave a small gap between the shafts of the condensers and the front panel, and (3) use knobs with pointers for the tuning condensers (to indicate their position).

The toroids are 0.38 in. o.d. through which runs a short length of RG-174U coax. The centre conductor of the coax forms the primary of the winding, and the outer braid is used as a Faraday shield by grounding at one end only. The secondary windings of the toroidal pick-up coils consist of 18 turns of 24-gauge copper wire. The 1N34A rectifier circuit is used only on the reflected-power side. If the builder wishes so, this indicator can be easily upgraded to a full-fledged SWR bridge.

The visual indicator is a robust disposal-type 500 uA meter that was available in my junk-box. The resistor that comes in series with the meter should be not less than 5 K, and is selected so that there is a substantial reflected-power indication with a mismatched antenna. Since modern transceivers have built-in SWR protection circuitry, there is some sort of automatic control on the reflected power reading. Therefore no sensitivity control is needed.

With the transceiver and antenna connected to the unit, RF power is applied, and the two condensers are adjusted for zero reflected-power indication. Since no reduction drives are used, the condensers need to be tuned very carefully. A very slight hand-capacitance effect is present, but is not bothersome. The ATU-cum-Reflectometer is performing very well, and is able to tune my coax-fed 40-metre dipole on 80 metres, and bring down the reflected power to zero. To sum up, this is a simple and satisfying homebrew project.

PS: The photo reveals the need for some finishing touches on coil L1 that were initially postponed and then forgotten!

-- VU2JN.

SOLAR STORMS

After 280 spotless days in 2009 and 51 days in 2010, the sun is entering a period of increased activity, and massive solar eruptions are beginning to wreak havoc on modern technology. A recent solar eruption disrupted radio communication in China, and there is concern that further eruptions could disrupt daily life on a wider scale.

Scientists have long predicted that solar storms could disrupt global communications and affect telephone and power networks. A powerful solar eruption known as the Carrington Event struck in 1859, causing fires and shorting out telegraph wires. Imagine how much more powerful this disruption would be with modern infrastructure; with communications and power shorted out, global chaos would ensue. The U.S. National Academy of Sciences estimates that the disruptions and destruction caused by such storms could exceed $2 trillion and require years to rebuild all affected infrastructure and systems.

According to NASA, the Carrington Event was a solar storm of such magnitude that the skies were filled with red auroras, compass needles pointed in the wrong direction, and electric current passed through the Earth's topsoil. The storm was caused by a coronal mass ejection that hit the Earth's magnetic field with such intensity that it created vibrations and sent currents through both the ground and atmosphere. Luckily, solar storms of this magnitude are rare events.

Solar Storms Explained

We all know that the sun has an activity cycle that spans eleven years. Solar eruptions vary in strength depending on the point in the sun's cycle, and its activity has been steadily increasing. Experts believe the cycle's peak may occur in 2013 or 2014, with stronger storms and more potent effects expected during that time.

The sun produces two types of solar storms: solar flares and coronal mass ejections (CMEs). Both types of storms are caused by disruptions of the sun's magnetic field. Solar flares and CMEs are both capable of causing massive problems for the high-tech systems that our modern civilization depends on.

Solar flares send bursts of radiation in the form of waves of photons into space. They are categorized with three different strength levels: Class C, Class M, and Class X. If these erupt toward Earth, they can have a powerful effect on communications, as seen by the event in China. The eruption that affected Chinese radio waves was a Class X, one of the most powerful solar flares possible.

As the sun is close to us in stellar terms, particles from solar flares can reach the Earth in a matter of minutes. No warning is possible if this type of eruption is detected. Flares can also cause technical difficulties for satellite systems, which can disrupt global services such as communications and GPS along with high-frequency radio waves.

Coronal mass ejections are fiercer storms. The ejections send giant clouds of plasma billowing into space along the path of the eruption, and this can cause more severe consequences for us on Earth. The particles take longer to travel from the sun to the Earth – typically three days, but they react more forcefully with our planet than solar flares do.

The Carrington Event is a prime example of a CME. The storm was so powerful that it caused the Earth's magnetic field to shake, sending geo-magnetically induced currents through the soil and atmosphere. Stronger current such as these have the potential to overload circuits and short out transformers.

A more recent example of this type of storm hit Canada's province of Quebec on March 13, 1989. The storm was not as severe as the Carrington Event was, but it disrupted the province's power grid for more than nine hours. The storm also damaged transformers in three countries and caused numerous power anomalies across the United States. A series of milder CMEs that hit in October 2003 caused a blackout in Sweden and damaged transformers in another country.

As this type of eruption can directly affect the earth's magnetic field, CMEs have the potential to disrupt planetary communications and power grids. While issues such as disrupted communications are difficult to prepare for, it is possible to stock up and be ready for widespread power outages and other damage.

Solar storms are a serious and continuing problem for everyone, in every country on Earth. Staying informed about the solar cycle and expected storms will allow you to prepare and stock up on necessary items before storms hit, thus minimizing their effects on your household.

Scientists have just learned that some flares are many times stronger than previously thought, says University of Colorado physicist Tom Woods who led the research team. "Solar flares were already the biggest explosions in the solar system—and this discovery makes them even bigger."

NASA's Solar Dynamics Observatory (SDO), launched in February 2010, made the finding: About 1 in 7 flares experience an "aftershock." About ninety minutes after the flare dies down, it springs to life again, producing an extra surge of extreme ultraviolet radiation. SDO monitors the sun's extreme UV output in high resolution nearly 24 hours a day, 7 days a week.

This is known as the 'late phase flare,'" according to Woods. "The energy in the late phase can exceed the energy of the primary flare by as much as a factor of four."

What causes the late phase? Solar flares happen when the magnetic fields of sunspots erupt—a process called "magnetic reconnection." The late phase is thought to result when some of the sunspot's magnetic loops re-form. A diagram prepared by team member Rachel Hock of the University of Colorado shows how it works.

http://www.nasa.gov/images/content/584807main_10-Hock-Diagram.jpg

The extra energy from the late phase can have a huge effect on Earth. Extreme ultraviolet wavelengths are particularly good at heating and ionizing Earth's upper atmosphere. When our planet's atmosphere is heated by extreme UV radiation, it puffs up, accelerating the decay of low-orbiting satellites. Furthermore, the ionizing action of extreme UV can bend radio signals and disrupt the normal operation of GPS.

[Tnx *Spaceweather.com]*

Jamboree on the Air 2011

The 54th Jamboree On The Air will take place on 15 and 16 October 2011.

This year's theme is: **Peace, Environment and Natural Disasters.**

An exciting activity that focuses on the strength of Scouting: to act and support in unforeseen circumstances. Scouts are prepared.

Bose,VU2AMB, Founder and Hon. General Secretary of OCARS reports:

"The Orange Cities Amateur Radio Society (OCARS) which is Eastern Maharashtra and Chattisgarh's first and only active Amateur Radio Society organised a training program for persons interested in Amateur Radio.

Three out of the four candidates passed the ASOC Restricted Grade exam. This was the revival of Amateur Radio in Central India after the sad demise of my long time friend-Late Dr Srikhant Jichkar in a car accident in 2004."

An excellent introduction to the theme is a short youth course developed by the ITU. It is an on-line course that can be followed in English, French, Spanish, Russian, and Arabic. Not surprisingly, the course introduction starts with the Scout motto: "Be Prepared". Highly recommended for staff preparing the JOTA weekend as well as for Scouts to enjoy.

The course can be downloaded from:

http://scout.org/en/information_events/events/jota/the_54th_jota_2011/itu_emcom_course

This logo was designed by Felipe Trejo Malpica who won the contest organised around the theme : "Peace, Environment and Natural Disasters"

Stations taking part in the JOTA: Involve local emergency services: consult e.g. with your local fire brigade, the closest first-response medical unit, local authorities who handle emergencies from a central locatyion. They may be more than willing to demonstrate their capabilities, support you with your exciting JOTA activity, look and see what your Scout group can do for the local community and even have a link to you lasting longer than just the JOTA weekend.

Jayu VU2JAU and Khetan VU2IG JOTA 2010 talk to the Girl Guides about ham radio

THE QUEEN OF ARABIAN SEA WELCOMES YOU!

HAMFEST INDIA 2011 is scheduled to take place at Gokulam Park Convention Center, Kochi (Kerala) on December 10 & 11, 2011. Visit their website (very attractive) **http://www.hamfestindia2011.com/** for full details.

Amateur Radio CubeSat to use 5.8 GHz and optical communications

The Amateur Radio CubeSat **FITSAT-1** plans to transmit 115.2 kbps digital data in the Amateur Satellite Service 5.8 GHz band and will also carry an Optical Communications experiment.

FITSAT-1 (aka NIWAKA) is a 1U CubeSat (10*10*10cm) that will be deployed from the International Space Station by robot arm in late 2012. It will generate about 2W RF output using a 16W DC input.

The main mission will be to demonstrate high speed data transfer from a satellite, it can transmit a VGA-size (640x480 pixel) JPEG photograph in only 5 to 6 seconds.

The second mission is to determine if a satellite can be made to appear as an "artificial star" using high-output LEDs in flash mode. The light from this flash will be received by the ground station, which has a telescope with photo-multiplier linked to a 5.8GHz parabola antenna. This is a basic experiment to investigate the possibility of optical communication with satellites.

A UHF AX25 1k2baud transceiver will also be carried for telemetry and tele-command purposes and a UHF CW beacon will also be provided. It will be deployed along with the satellites RAIKO and WEWISH into a 350x350km 51.6deg inclination orbit.

The following downlink frequencies have been coordinated by the IARU Satellite Frequency Coordination Panel: CW 437.250 MHz, FM 437.445 MHz, High speed data 5840.00 MHz.

FITSAT-1 information, pictures and deployment movie http://www.fit.ac.jp/~tanaka/fitsat.shtml

[from *Southgate ARC news]*

Amateur balloonist hit record 40,575m above East Anglia (U.K.)

An Australian PhD student has pulled of a bit of a blinder by hitting 40,575 metres (133,120 ft) with a helium-filled meteorological balloon - a UK record and pretty close to the all-time international amateur altitude maximum.

University of Adelaide electronic engineering alumnus Mark Jessop normally does his High Altitude Ballooning (HAB) in the Lucky Country, but popped over to Blighty to participate in the UKube-1 satellite project with the University of Bath.

He hooked up with Cambridge University Spaceflight (CUSF) to launch the "Horus 15.5",

Mark told El Reg: "The payload contained a telemetry beacon called 'MiniNut' - This was it's first test flight. MiniNut is a very small PCB (5x5cm) which collects data from a GPS, temperature sensors, and a pressure sensor, and transmits it via a 434.650MHz radio module at 300 baud. MiniNut was powered from 4 Energizer Lithium AA batteries - these batteries work very well down to -40 degrees C, and lower! The total payload weight was 142 grams."

He added: "The original aim of the launch was to test the MiniNut's pressure sensor at extremely high altitudes. Breaking the UK altitude record was just a bonus!

[courtesy: theregister.co.uk]

OFFICE BEARERS

LATEST IN ANTENNAS:
Body Wearable Antennas To Help Lighten The Load For Soldiers

BAE Systems of Chelmsford, U.K. has developed a series of Body Wearable Antennas which will reduce the load that soldiers have to carry whilst providing them with a high level of battlefield information and connectivity.

The Body Wearable Antenna (BWA) allows soldiers to communicate with their colleagues on the front line without the need for conventional radio whip-antennas which can be cumbersome and conspicuous. By weaving the antennas into the fibres of the uniform the technology allows effective communication whilst helping improve agility. A concept demonstrator has been developed to showcase the capability of this technology which transmits voice, video data (from a helmet-mounted camera) and GPS location via the same antenna.

A major advantage of the wearable antenna system is that it is unaffected by the position of the wearer. With conventional whip-antenna systems, if a soldier has to lie on the ground, the communication between them and that of someone who is standing up can be severely compromised or even lost. Similarly, the signal from the short antenna on a portable radio can be masked by the user's body. A BWA system can be designed to give continuous 360° coverage.

I don't mind a jacket with a dual-bander built-in!!

DO YOU KNOW
Near Vertical Incidence Skywave

Near Vertical Incidence Skywave, or NVIS, is a radio-wave propagation method that provides usable signals in the range *between* ground-wave and skywave distances (usually 50 to 650 km). It is used mainly for military and paramilitary communications and by radio amateurs. The radio waves travel upwards into the ionosphere, where they are refracted back down and can be received within a circular region up to ~650 km from the transmitter. If the frequency is too high, refraction fails to occur and if it is too low absorption reduces the signal strength.

The usable frequencies for NVIS communications are between 1.8 MHz and 15 MHz. The most common bands used in amateur radio are 3.5 MHz and 7 MHz, with experimental use of 5 MHz (60 meters) frequencies. Military NVIS communications mostly take place on 2-4 MHz at night and on 5-7 MHz during daylight. The lowest layer of the ionosphere, called the D layer, causes attenuation of low frequencies during the day. This layer disappears at night enabling improved communications at the lower frequencies during this time.

An NVIS antenna configuration is a horizontally polarized (parallel with the surface of the earth) radiating element that is from 1/20th wavelength (λ) to 1/8 wavelength above the ground. That proximity to the ground forces the majority of the radiation to go straight up. Overall efficiency of the antenna can be increased by placing a ground wire (a radial) slightly longer than the antenna parallel to and directly underneath the antenna. While the ground wire is not necessary under good to excellent propagation conditions, antenna gain in the 3 dB to 6 dB range are common when the ground wire is used.

Significant increases in communication will be realized when both the transmitting station and the receiving station use NVIS configuration for their antennas.

NVIS is most useful in mountainous areas where line-of-sight propagation at VHF or UHF frequencies is ineffective or when the communication distance is beyond ground wave (more than 50 miles, 80 km) and less than sky-wave (300 to 1500 miles, 500 to 2500 km).

Needless to mention, this antenna is *not for DX*. Maybe especially useful for 40 and 80 meters these days as conditions are very poor. Feedback welcome from anyone who tries this.. This antenna is basically nothing more than a unbalanced, 1/4 wavelength, horizontal wire, using a vehicle as the other half of the “dipole” if mounted over a vehicle, instead of a radial wire..

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