

SCARC News October 2009

Opinions expressed in this publication are not necessarily those of the SCARC Committee. Any comments should be addressed to the secretary@scarc.org.au

Tower Safety Tips [adapted from QST magazine Sept 2009]

- Always have at least one person as a ground crew for all tower work.
- Ground crew to call 000 in an emergency.
- Never climb a tower in high winds or when metal is wet.
- Get off the tower if you hear thunder.
- Never throw things from the tower.
- Never climb the tower when tired.
- Use your leg muscles to push you up – not your arm muscles to pull you up.
- Have an emergency plan: “*he was working on his tower behind the shed*” won’t help.

A D-Star in Space [from QST Sept. 2009]

Belgian amateurs are looking forward to the launch of OUFTI-1, the world’s first D-Star satellite. OUFTI = Orbital Utility For Telecommunication Innovation.

This tiny 1 kilogram CubeSat is being designed and built by students at the University of Liege. The satellite will function as an orbiting D-Star repeater with UHF uplink and VHF downlink. OUFTI-1 will be travelling in a relatively low orbit and should give hams about 10 minutes of access time each pass.

OUFTI-1 is scheduled to be launched aboard the maiden light of the *Vega* launch vehicle from Kourou, French Guyana in the Australian autumn. The Belgian organisers are anticipating that *Vega* will deploy OUFTI-1 in an orbit that should give the satellite at least a 1 year lifespan before re-entering Earth’s atmosphere. See www.leodium.ulg.ac.be/cmsms/.

SONOGRAMS OF THE SUN EXPLAIN MYSTERY OF THE MISSING SUNSPOTS

Boulder, Colorado -- Scientists from the National Solar Observatory (NSO) in Tucson, Arizona, have discovered that a solar jet stream deep inside the Sun is migrating slower than usual through the star's interior, giving rise to the current lack of sunspots and low solar activity, according to work being presented this week at the meeting of the Solar Physics Division of the American Astronomical Society (AAS/SPD).

The Sun normally undergoes an eleven-year cycle of magnetic activity related to sunspots, solar flares, and the interplanetary storms called "CMEs". The current "solar minimum" quiet period has been unusually long and deep, confounding scientists who hope to understand the origins of space weather and the Sun's magnetic field.

Drs. Rachel Howe and Frank Hill, both of the NSO, used long-term observations from the NSO's Global Oscillation Network Group (GONG) facility to detect and track an east-to-west jet stream, known as the "torsional oscillation", at depths of ~1,000 to 7,000 km below the surface of the Sun. The Sun generates new jet streams near its poles every 11 years; the streams migrate slowly, over a period of 17 years, to the equator, and are associated with the production of sunspots once they reach a critical latitude of 22 degrees.

Howe and Hill found that the stream associated with the new solar cycle has moved sluggishly, taking three years to cover a 10 degree range in latitude compared to two years for the last solar cycle, but has now reached the critical latitude. The current solar minimum has

become so long and deep, some scientists have speculated the Sun might enter a long period with no sunspot activity at all. The new result both shows that the Sun's internal magnetic dynamo continues to operate, and heralds the beginning of a new cycle of solar activity.

"It is exciting to see", said Dr. Hill, "that just as this sluggish stream reaches the usual active latitude of 22 degrees, a year late, we finally begin to see new groups of sunspots emerging at the new active latitude." Since the current minimum is now one year longer than usual, Howe and Hill conclude that the extended solar minimum phase may have resulted from the slower migration of the flow.

GONG and its sister instrument SOHO/MDI measure sound waves on the surface of the Sun. Scientists can then use the sound waves to probe structures deep in the interior of the star, in a process analogous to a sonogram in a medical office. "Using the global sound wave inversions, we have been able to reveal the intimate connection between subtle changes in the Sun's interior and the sunspot cycle on its surface," said Hill.

"This is an important piece of the solar activity puzzle," said Dr. Dean Pesnell, of NASA's Goddard Space Flight Center. "It shows how flows inside the Sun are related to the creation of solar activity and how the timing of the solar cycle might be produced. None of the forecasting research groups predicted the current long extended delay in the new cycle. There is a lot more to learn in order to understand how the Sun creates magnetic fields."

The new science of helioseismology, enabled by instruments such as the ground-based GONG, the Michelson Doppler Imager aboard the SOHO spacecraft, and NASA's planned Solar Dynamics Observatory, has revolutionized understanding of the solar interior. "While the surface effects of the Sun's torsional oscillations have been observed for some time, understanding of the dynamo and the origin of sunspots depend on measurements of the solar interior that are only possible with helioseismic techniques", said Hill.

JOTA: We are still in desperate need of some helpers for this event 17-18 October. In particular for setting up on the Saturday morning and taking down Sunday afternoon. If you can spare some time please let me know ASAP.

The Worry and Apprehension of VHF Antenna Polarization

By John Wendt, WA6BFH

While this article will primarily address the bands of 10 and 6 Meters, I will add some thoughts on other VHF and UHF wavelengths as we get into the meat of the issue.

Probably the first wavelength band that I need to address is in reference to my mention of 10 Meters! You see 6 Meters is often referred to as the "Magic Wavelength Band"; and this is because it often works like an HF wavelength band, when it is in fact a VHF band. Well 10 Meters, an HF band, often works like a VHF band in terms of its signal propagation. So I guess some of that magical pixie dust has just sprinkled on down frequency almost one octave! Now with this next band, 6 Meters, I have lots of experience, about 38 years worth! It is a truly magic band, although I feel the same way about several bands above it! Anyway, 6 Meters will avail itself of all of these below listed forms of distant (DX) communication:

F-layer skip every 11 years at or near the Solar peak-- along with the HF spectrum.

E-layer skip, regularly at the Spring of every year, and other times; also seen on 10 Meters

Meteor Scatter (skip) several times each and every year (at regularly noted meteor showers.

Auroral Skip, at times when major solar events ionize the D-layer of the ionosphere.

Tropospheric Ducting, at weather plus maybe E, or F layer events.

Knife Edge Refraction over mountain tops, not too great for distance, but fun!

These are the physical elements that make the Magic! You see when you have bands of frequencies that can be propagated by ducts of differential air temperature, that's pretty magic. When you can have bands of frequencies where signal propagation can be facilitated by the exhaust gasses of jet aircraft, that's Magic, and of course I don't mean that in a literal sense. My point is that it is fun and interesting to exploit these methods of signal propagation, and learn about them. The counterpoint of this is when we run into people who will tell us that this is not important, fun, or that there are only certain ways that WE MUST PROCEED in these endeavors. Noted fables that I have heard through the years are:

- 1) You must use horizontally polarized antennas!
- 2) Cubical Quads don't work on VHF!
- 3) Vertical omni-directional antennas will not work on 6 Meters for DX!
- 4) "J" or J-pole antennas are less efficient than Ground Plane antennas!

I think that part of the fun is to de-bunk such ideas! It is also fun to learn the perspective of any amount or shred of truth that might be contained in such broad statements! Let's take a look at each one of these; and see what might have been meant by any negative aspersion, and lets see if we can benefit from the contrasting truths. Why must you use a horizontal antenna? This is often done so as to improve "Signal to Noise Ratio". It is true that much, or maybe even most, electrical noise has a vertical component. This is "pulse noise" generated by ignition sparkplugs, or other arc bursts of energy. Remember though that pulse noise is the easiest sort of electrical noise to effectively cancel!

In any case, while this noise is most notable, in larger cities, where overhead power lines are prevalent, horizontal noise will be the most obvious! It will be so predominant that it will virtually make a blanket of noise at relatively high signal levels. When this S3, S4, S5 or higher noise level exists, many radio signals or VHF band openings may get lost in the noise.

I know of many practical instances over the years when I with either a vertical quarter wavelength Ground Plane, or a home-made copper "J" antenna -- both of which don't work on 6 Meters -- was able to work either E-layer openings, Meteor Scatter, Auroral, or F-layer skip, before many 'big gun' horizontal Ham's could hear the DX signals. Why was this?

A vertical antenna has a lower angle of radiation than does a horizontal antenna. That is in fact why horizontal Yagi's etc must be raised to appropriate height to provide an optimum launch

angle. Most 6 Meter Ham's who are serious about working DX will have an antenna tower of some 60 feet or better, and one or more Yagi beam antennas of at least 1.5 wavelength booms. Or, perhaps better to say, they will try to at least provide a good 10 dBd of antenna gain. A 25-foot boom Yagi will do that, as will two 4 element Yagi's on 12-foot booms. So if a simple unity gain, or less than unity gain (the Ground Plane) antenna will work quite nicely for 6 Meter DX, after all, I worked 50 states and several countries with such verticals, what would be the best beam antenna configuration.

You can stack multiple beams on a tower and improve radiation angle. If you want to keep things simpler though, put two Yagi's up vertically polarized. Two 4 element Yagi's as I mentioned before will yield 11.2 dBd of gain. Subtract about 1 dB for transmission line loss, and you still have better than 10 dB's at a very nice low angle of radiation. This also works with even shorter tower heights. A short tower will kill horizontal antenna performance but not when they are vertical!

How about that statement that Cubical Quads don't work on VHF! This was said in all seriousness once at a VHF/UHF conference in the California town of Santa Maria. This conference even sponsored "an Antenna Gain Contest" on Sunday near the close of the conference. After the statement had been made, Saturday, a hasty visit to the local hardware store garnered some 12-gauge wire, some wooden furring strips, and an S-239 coax connector was obtained from somewhere. After a few fevered hours of sawing, drilling, assembling and testing, the 4 element Quad was produced that you will see in the web posted article below. The winning entrant is that antenna that has the greatest gain, for the shortest boom length. That is the advantage of quads, they produce much higher gain, over relatively short boom lengths. They do unfortunately develop "I squared R" losses pretty quickly as well, such that after the 5th or 6th element, further gain is minimal. Yagi's by contrast can be as long as is mechanically practical, and they will just keep developing gain! This quad did win the contest by the way! The next best antenna a "KLM Band-pass Log Fed Yagi" produce 13 dB's of gain but it was more than twice as long!

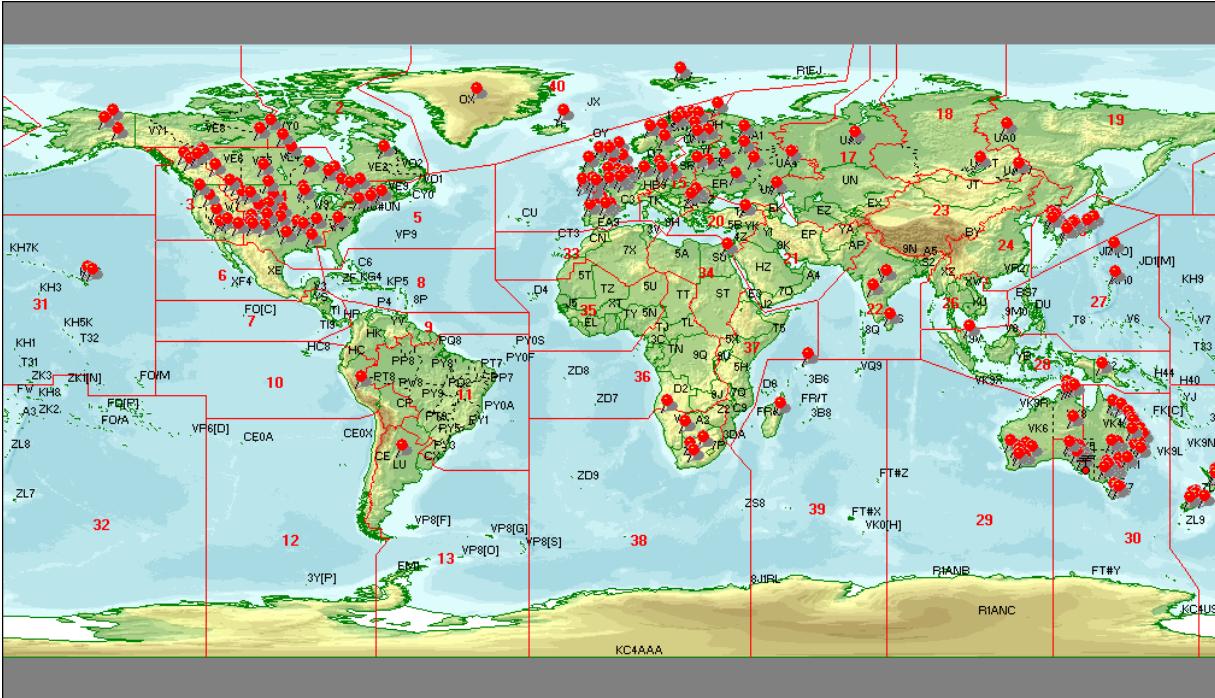
<http://www.geocities.com/SiliconValley/2775/quad.html>

'No Show' HF Antenna that WORKS!

[David Joseph \(W7AMX\)](#) September 26, 2009

If you live in an antenna restricted environment there is still a way to get on the air. I just read an article by someone who lives in a mobile home and the park didn't allow him to erect a wire antenna. Now, in my park, I can have a wire antenna; but, as a back up, I decided to tap into the roof flashing so I could have an auxiliary antenna, if needed. As it turned out, after falling palm fronds chopped my wire down for the third time, and multiple questions of..."what's THAT for?...and, "Wonder if you're the one messing up my TV...", I just said to myself, forget this. Took down the wire and have been on the roof flashing ever since. Sure I'm down a couple of dB but now when one of the local antenna gestapo says..."so...you quit radio?...I say..."you don't see an antenna do you?". I ran some coax under my place to an air vent on the back wall of my place. Drove a ground rod for the coax braid just outside and ran a small wire from the center conductor up the back wall and tapped into the roof flashing. I wound a 6 inch diameter coil of about six turns of coax at each end of the cable, hooked it to an off the shelf T-tuner sitting on the top of the radio. I load the flashing on all HF bands, plus six meters also. Works well.

If you need a radiator that 1) works and 2) lets the rest of those around you think you just gave up on getting on the air, this one will fill the bill. Another note/tip. I know you know that 50 watts is only a half an S unit down from 100 watts...right? (6dB per S unit...so half power = 3dB). So...run 50 watts, be a half S unit down on peaks. The stations that have missed you on the round tables and nets won't care. Be happy...get on the air!



The map above is an indicative record of where our Antenna Analyser kits have been sold.

RF Sniffers

There are four [4] only working RF sniffers available to buy which are left over from the Club project build. The parts cost the Club \$32.00 and we are selling these at \$35.00 on a first-come-first-served basis.

Graham Thomas VK5GCT SCARC Secretary