The Monitor

October 2001

From the Prez:

Summer is finally winding down, and as we start to look for the ice scrapers to remove the previous nights deposit from the windshield of our vehicles, we start to wonder what this new antenna season might bring...

I know from my personal view, this summer has absolutely flown past, not leaving much radio time at all. I am certain that all of us have made our own little accomplishments, and now is a time to sit back and reflect a bit about what we actually have done versus what we set out to do this summer.

As the leaves change it is important to note that we as a club have moved well into the lead as far as taking a Public Service aspect and amplifying it twofold. We have had very visible presences at several events, as well as been mentioned on several radio stations and in the newspapers. This fall we need to continue this aspect of leadership by getting as many members as we can to these Public Service events and lending a hand wherever and whenever possible.

The October meeting will be held at Lyman Point Park, please check this newsletter for the exact time. Mike N1MS and Joe KB1FDA have some fantastic food in store, please feel free to bring whatever you can as far as a salad or drink to share with others.

The recent Hosstraders Hamfest was a huge success as far as I was concerned, the hamfest is now conveniently located only 45 minutes from the Upper Valley, so there should be no reason whatsoever that we couldn't have a much larger club sponsored outing in the spring to show off all our wonderful assets. Might even be a good spot to help raise some money with a 50/50 raffle.

As always, keep the volume on the radio up and the squelch turned down...

Micky Corrow - K1XH

Upcoming Events

TSRC Picnic/Meeting	October 13th, 11:00am Lyman Point Park, WRJ, VT

Disclaimer

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TSRC End-of-Summer Picnic

The October TSRC meeting is being replaced by a picnic to celebrate the end of summer!

Oct. 13th – 11 am til 3 pm

Lyman Point Park, White River Jct. VT (behind the municipal building on Bridge St.)

Chicken, hamburgers and hot dogs provided. Bring your favorite drinks as well as a salad, desert, chips, or something else to share. Alcohol-free facility; don't bring booze!

RSVP to N1MS at n1ms@earthlink.net if you haven't already responded.

This is going to be a lot of fun! See you there!

"Near Vertical Incident Skywave" Antennas

Dave Colter WA1ZCN

The Near Vertical Incident Skywave (NVIS) antenna is a little known emergency communication tool. The US military has used this technique for many years, yet relatively few hams know of it.

HF nets for short-haul disaster communication are primarily on the 40 and 80 meter bands. Most hams attempt to use vertical antennas, or conventional dipoles hung high in trees. Both provide mixed results since they rely on ground wave propagation, which is adversely affected by terrain and weather conditions.

The NVIS antenna relies on sky wave propagation, as the name implies. Installing a dipole at less than 1/8th wavelength from the ground causes the signal to be reflected directly upward, where it is reflected back to earth by the ionosphere at roughly the same angle. The resulting coverage pattern is a large circle around the sending station. Most NVIS antennas are hung between 4 and 10 feet depending on available supports.

The most popular NVIS antenna is a 40/80 meter "fan" or trapped dipole. This allows the operator to switch bands seamlessly when conditions change. Most often, 40 is used during the day, and 80 at night. Foreign broadcast interference at night makes 40 almost unusable. The antenna should have a coaxial cable feed rather than open wire for safety reasons and ease of installation. If the antenna is lower than 7', precautions must be taken to prevent anyone from walking into or touching the antenna.

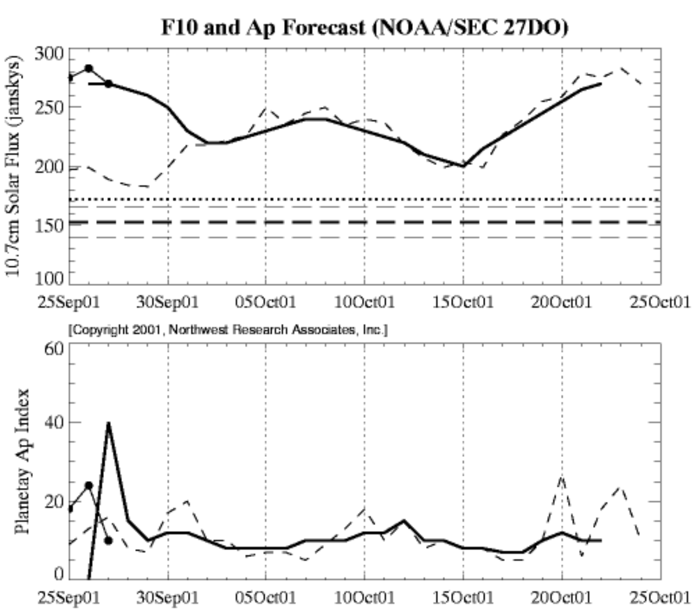
October Propagation Outlook

by AD5Q, edited by K1IB

Ten meters is already in the peak of its season. This peak only lasts a couple of months, so it is wise to make the best use of it. Though most propagation forecasters claim the ten-meter season peaks in November, this one prefers October. The grey line path has much to do with this. This path currently leads into the Middle East in the early morning, and to Southeast Asia at sunset. Every DX Hog prefers this DX to Europeans and JAs, which is where the grey line leads us in November. Those working on 5 band WAZ should concentrate on 10 meters this month, because these Asian openings only occur at certain times of the day, in certain months, and only near the peak of the sunspot cycle. The CQ World Wide SSB contest is this month, and there is no better opportunity to work a lot of exotic countries in a hurry. Don't miss it.

The situation on 15 meters is less critical, but the band is very good. Polar openings are much more common and available throughout the year. The fall season brings an increase in activity on all bands, and a greater variety of workable countries. To maximize the number of exotic calls in your log, spend most of your time listening. Tune carefully and methodically across all open bands, and don't just listen for pileups. In many cases, the reason a country is rare is because there are no operators that work large numbers of stations pileup style. They prefer their DXing at a more leisurely rate, away from prime DX frequencies or at times when the arrogant American hordes are asleep.

Twenty and 40 meters will be very good this fall as nighttime bands. On 20, the Antarctic paths will be in season through next spring. The morning short path to the Far East is not in season, but this exotic part of the world is accessible in late afternoon via long path.



October Propagation Forecast

These plots show forecasts for the 10.7cm solar radio flux (F10) and the planetary geomagnetic activity index (Ap) for the next 27 days (heavy solid lines). The light solid lines and filled circles at the start of each plot are the observed F10 and Ap for the past few days, and the light dashed lines show the observed F10 and Ap from the previous solar rotation. The three horizontal long-dash lines on the F10 plot indicate the mean (heavy line) and expected range (light lines below and above the heavy line) of F10 from the NOAA SEC long-range prediction for Solar Cycle 23. The single horizontal dotted line is the 90-day mean F10 flux for the preceding 90-day period.

Why was it so Difficult ?

Ken Tentarelli AC1H

Following last month's meeting several TSRC members made a valiant attempt to erect Rex's new 70-foot Glen Martin tower. The challenge of raising the tower turned out to be somewhat greater than we anticipated. Here is a look at the problem that reveals why the task was so difficult.

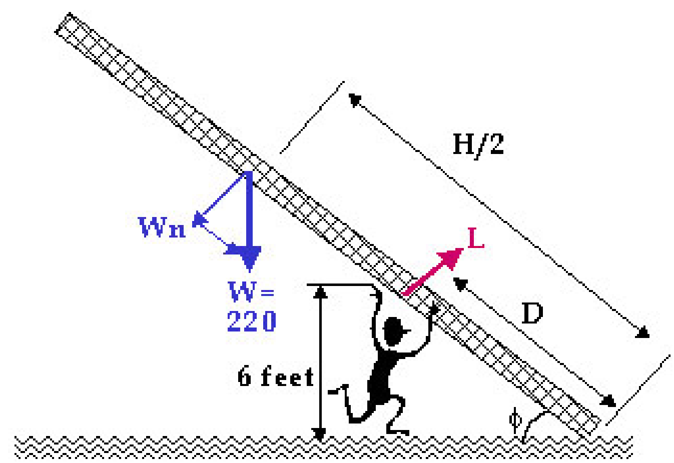
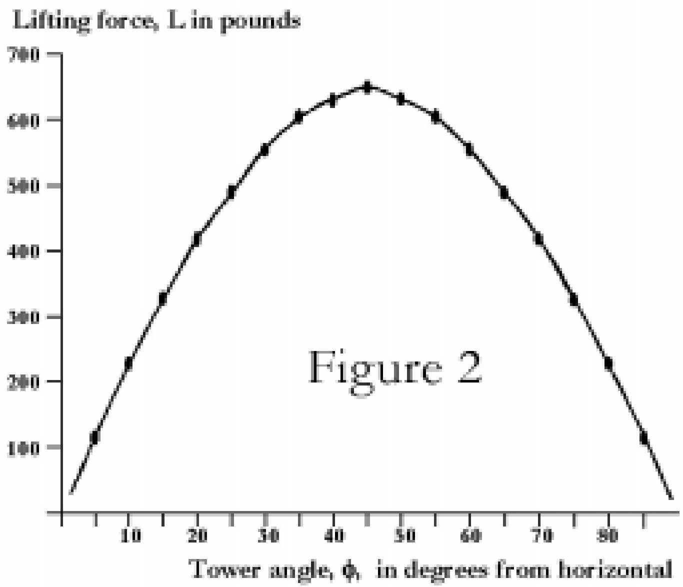


Figure 1

Figure 1 shows the first attempt of our able-bodied crew trying to raise the tower to a vertical position. As the lifters push upward they position the tower just above their heads so we can begin by assuming that the point where the lifting force is applied is always at height of 6 feet above ground. As the lifters raise the tower they stand near the far end of the tower and walk toward the base of the tower as it is raised. Let the variable D be the distance in feet that the lifters are from the base of the tower at any time. D starts out as a large number when the tower is on the ground and D gets smaller as people walk toward the base to raise the tower. The other important force is the weight of the tower. For the purpose of our calculations the weight (220 pounds) can be represented by a single force (W) located at the tower mid-point (a distance H / 2 feet from the tower base where H = 70 feet).

Now here is where things get tricky. First, the weight needs to be separated into its normal and tangential vector components because, as shown in the figure, the normal component, Wn, is the portion that directly opposes the lifting force.

Even more tricky is that the physics of the problem doesn't depend on the forces alone, but rather requires that the moments be equal. Moment is the force multiplied by its distance from the base of the tower. The moment due to weight is Wn times H / 2, and the moment due to lift is L times D. To raise the tower the lifting moment must equal the moment due to weight.



The math is given below for anyone interested, but for now lets just look at the bottom line numbers in figure 2 which show the necessary lifting force in pounds at each angle as the tower is rotated upward from horizontal (0 degrees) to vertical (90 degrees). As you can see, everyone's intuition was right in predicting that maximum force would be needed when the tower is at a 45-degree angle. But it may be somewhat surprising to realize that raising a 220-pound tower requires a maximum lifting force of 641 pounds.

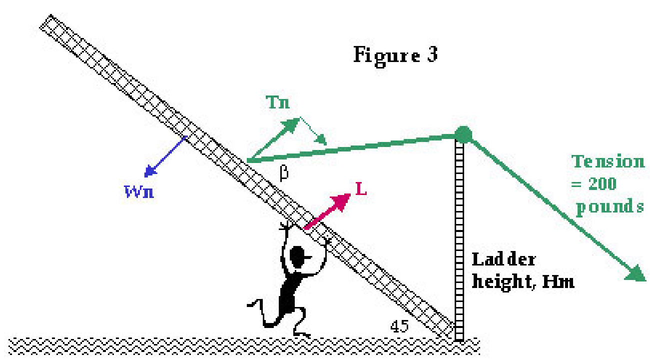
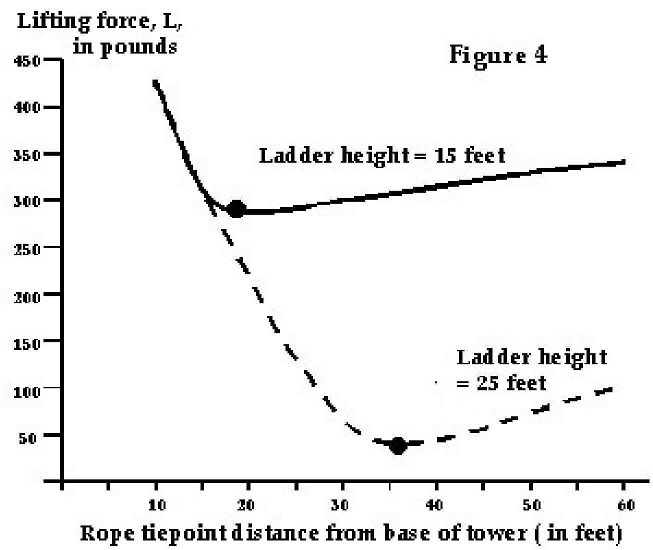


Figure 3 shows our second attempt where we added a rope passing over a guyed ladder to help pull up the tower. For simplicity let's assume that the people pulling on the rope really put their backs into it and exert a constant tension of 200 pounds. Again, as you can see, it is the normal component of the tension force, Tn, that is important because this is the component of the tension force that is in the same direction as the lifting force and therefore helps to raise the tower.



One interesting question is how far from the base of the tower should the rope be tied to be of maximum help? The math is this case is somewhat messy (see below) so lets skip it for now and just look at the answer in figure 4. The solid line represents our actual situation with the ladder being about 15 feet high. In this case if the rope is tied 20 feet from the tower base then the people doing the lifting would only need to lift with a maximum force of 285 pounds, instead of the 641 pounds needed when there was no rope (when the tower is at a 45 degree angle). Notice that the shape of the curve in figure 4 is not symmetrical. If the rope is tied higher than 20 feet the required lifting force increases but it doesn't change significantly. Intuition might say that the rope should be tied near the top of the tower but in this case intuition is not correct.

A real surprise is what happens if we use a taller ladder as shown by the dashed curve in the figure. If a 25-foot ladder is used then the optimum point to tie the rope is 35 feet from the base of the tower, and now the people lifting the tower need only exert a lifting force of 41 pounds. Wow, quite a difference - bigger certainly is better.

Do the calculated values really apply in practice? Well, I did a similar set of calculations before raising my 70-foot Rohn25 complete with rotor and antennas. Using a judiciously placed tall tree instead of ladder, and a block-and-tackle, we were able to raise the tower with just two people. The biggest discrepancy I found was that friction of the rope passing over the ladder (or in my case the tree limb) can easily add 100 pounds or more to the tension needed.

At least one other factor deserves consideration. The downward compression force on the ladder is about 1 1/2 times the rope tension force. My sturdy maple tree limb was able to take the heavy compression force but a ladder might start to complain when bearing a load of 400 pounds.

The math for anyone interested

For figure 1:

Normal vector component of weight: $Wn = W * \cos(f)$

Moment due to weight = moment due to lifting: $Wn * H / 2 = L * D$

Placement of lifting force: $D = 6 / \sin(f)$

Substitute and solve for L: $L = 70 * 220 * \sin(f) * \cos(f) / (2 * 6)$

For figure 3:

Moment due to weight = moment due to lifting + moment due to tension:

$$Wn * H / 2 = L * D + Tn$$

Moment due to tension: $Tn = T * \sin(b) * Dt$, where Dt is distance from base of tower to point where rope is tied.

Substitution gives (1): $W * \cos(f) * H / 2 = 6 * L / \sin(f) + T * \sin(b) * Dt$

Using the law of sines (2): $Hm / \sin(b) = Dt / \sin(180 - b - 45)$

Equations (1) and (2) can be solved numerically to find L as a function of Dt

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