



# SOUTHEASTERN DX CLUB W4NT

HEADQUARTERED IN ATLANTA, GEORGIA

**DX ALERT FREQUENCIES:**

147.500      SIMPLEX  
147.195/R    K4SMX REPEATER  
147.795/T

**RAGCHEW FREQUENCIES:**

147.470; 147.520; 147.540

JUNE  
1986

**NEXT MEETING: JUNE 28, 1986 AT THE N4RJ RANCH FOR FIELD DAY AND PICNIC.  
TIME: ALL DAY???????**      **SEE LAST MONTHS NEWSLETTER FOR MAP**

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**JUNE MEETING:**

The June meeting will be the annual picnic held out at Val's, N4RJ, and will be combined with the clubs operation of Field Day. A map was included in last months newsletter, however, if you threw it away ---- no one would do that!!! Would you? Well, if you did then call Val for instructions. Come early and get set up and put in a full days operating and eat lots of good food with the yellow stuff that has foam on the top to wash if down with.

Tell your wives to wear jeans, leather jackets and gloves as they will most likely be called on to climb trees and soforth to put up the antennas. HA-HA I know what mine will tell me to do! No kidding, everyone show up and have a really good time.

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**>>>>>>>      IMPORTANT      <<<<<<<<<**

DUE TO THE RECENT COURT DECISIONS THE CLUB WILL NOT BE SUPPLYING ANY ALCOHOLIC DRINKS AT THE PICNIC. IT IS NOT THAT WE DO NOT WANT THEM BUT RATHER THAT IF SOMEONE SHOULD HAVE AN ACCIDENT ON THE WAY HOME IT COULD BE THAT THE CLUB AND ALL IT'S MEMBERS WOULD BE HELD LIABLE. THEREFORE, IF YOU WANT TO HAVE A DRINK YOU MUST SUPPLY YOUR OWN. LET'S HOPE THESE LAWS ARE CLEARED UP SOON SO WE WILL KNOW WHERE WE STAND. WE DON'T WANT TO PUT THE CLUB OR VAL IN ANY JEOPARDY.

SO BRING YOUR OWN DRINKS AND THE CLUB WILL SUPPLY THE ICE.



Now, *high angles* must mean big values of X, the take-off and arrival angle of the signal at the earth's surface. We already have a calibration on what's high: The path into St. Loo is about 500 miles and it's supposed to only get there by *high angles* ... you know it's so, you *heard* it on phony radio!

THE FOLLOWING TABLE VALUES TELL THE STORY:

| TX - RX |  | E-LAYER  | F-LAYER  | TX - RX |  | E-LAYER  | F-LAYER  |
|---------|--|----------|----------|---------|--|----------|----------|
| DX      |  | 1-HOP    | 1-HOP    | DX      |  | 1-HOP    | 1-HOP    |
| (MILES) |  | (X=DEGS) | (X=DEGS) | (MILES) |  | (X=DEGS) | (X=DEGS) |
| 10      |  | 85.6     | 88.5     | 1100    |  | 2.8      | 15.5     |
| 25      |  | 79.1     | 86.3     | 1200    |  | 1.9      | 13.6     |
| 50      |  | 68.9     | 82.5     | 1300    |  | 1.0      | 12.0     |
| 75      |  | 59.9     | 78.8     | 1400    |  | 0.3      | 10.5     |
| 100     |  | 52.3     | 75.3     | 1500    |  | XXX      | 9.1      |
| 150     |  | 40.6     | 68.4     | 1600    |  | XXX      | 7.9      |
| 200     |  | 32.5     | 62.1     | 1700    |  | XXX      | 6.7      |
| 250     |  | 26.7     | 56.4     | 1800    |  | XXX      | 5.7      |
| 300     |  | 22.5     | 51.4     | 1900    |  | XXX      | 4.7      |
| 400     |  | 16.7     | 42.8     | 2000    |  | XXX      | 3.7      |
| 500     |  | 12.9     | 36.1     | 2100    |  | XXX      | 2.9      |
| 600     |  | 10.1     | 30.8     | 2200    |  | XXX      | 2.0      |
| 700     |  | 8.1      | 26.6     | 2300    |  | XXX      | 1.2      |
| 800     |  | 6.4      | 23.1     | 2400    |  | XXX      | 0.5      |
| 900     |  | 5.0      | 20.2     | 2500    |  | XXX      | XXX      |
| 1000    |  | 3.8      | 17.7     |         |  |          |          |

If 500 mile DX is supposed to be high angle path, then by E-layer all angles from about 13 degrees off the horizon and up are "HIGH". Now if you spend time in the textbooks staring at all those vertical reflection coefficient vs height above reflecting ground plane graphs, then you'll quickly see that everyone is trying to get low angles to work all that DX! The most popular graph is the vertical pattern for a horizontally polarized antenna a half-wave above ground, it has a single lobe sitting at 30 degrees, so lets go for one! Well, when your on E-layer, your maximum signal is going to be big DX at 250 miles and by F-layer it's 600 miles! That's DX? That's low angles? HUH?!?

A coupla more interesting facts: for horizontally polarized antenna, most dipole, beams, etc., over "real" or "perfect" earth/ground ( who noze what those are?!?) there is zero (=none!=zipp!=zerooo=0.00000) signal at X=0, that is along the ground! And if you measure the signal upward in elevation (take off/arrival angle, X) to 5-7 degrees, there isn't any signal to get excited about either!!! Vertically polarized antennas don't do any better over "real" earth, the signal loss in the first 5-7 degs. is very large. So, no matter what antenna system you are using, you sho ain't got no signal at *real low* angles. NO WAY! You wanna *believe* there is? Be my guest! ( *MOTHER CHUCKLES* )

Bell Labs and RCA too, way back in aught-3 did good work at measuring the angle of arrival (X) on HF band signals. [this is very very difficult to do-- no ham antenna system is gonna do it, so don't draw *any* conclusions *ever* about which way the signal is coming from; like the direction your beam peaks on the signal???) ( *Another Mother Chuckle!* ) These data are of consider-



able value here: With out massive compilation, the bottom line comes out like this-- the vast majority of DX signals arriving at your QTH come in at angles that *do not* conform to the table above; *the values of X are HIGHER!!!* (most mean more hops to get here!?!). The facts are that the average angle of arrival is also *dependent on frequency!* The lower the frequency, the higher the angle of arrival! At 80M the average value is somewhere around 30-40 degrees and it goes down to about 15 degrees on 10M. (So who wants *real low angle* antenna systems?!?)

So what we've got is no signal would come in/go out anyway between, say ground level, 0, and 10 degrees due to both ground losses and reflection physics, and on 10, 15, and 20 meters signals typically arrive between 15 and 25 degrees, or higher and on 40 and 80 between 25 and 35 degrees or higher.

What this means in terms of the table above is that for that model to be correct, the 1-hop maximum DX per layer is *less* than the numbers given above. If we say those angles less than, say, 8 degrees are actually unusable due to the physics of electromagnetic propagation, then the max DX per hops become: 700 miles for E-layer and 1600 miles for F-layer.

The next table will have all the above taken into account: The distances will now go out beyond the 1-hop condition, "REAL" DX distances, all the way up to 25,000 miles (for those of you who "*believe*" in *long path!*).

| TX-RX<br>DX<br>(MILES) | E-LAYER |       | F-LAYER |       | TX-RX<br>DX<br>(MILES) | E-LAYER |       | F-LAYER |       |
|------------------------|---------|-------|---------|-------|------------------------|---------|-------|---------|-------|
|                        | X=DEGS  | #HOPS | X=DEGS  | #HOPS |                        | X=DEGS  | #HOPS | X=DEGS  | #HOPS |
| 100                    | 52.2    | 1     | 75.2    | 1     | 10500                  | 8.8     | 16    | 9.1     | 7     |
| 200                    | 32.4    | 1     | 62.1    | 1     | 11000                  | 8.2     | 16    | 8.2     | 7     |
| 300                    | 22.4    | 1     | 51.3    | 1     | 11500                  | 8.4     | 17    | 9.9     | 8     |
| 400                    | 16.6    | 1     | 42.8    | 1     | 12000                  | 8.6     | 18    | 9.1     | 8     |
| 500                    | 12.8    | 1     | 36.1    | 1     | 12500                  | 8.1     | 18    | 8.3     | 8     |
| 600                    | 10.1    | 1     | 30.8    | 1     | 13000                  | 8.3     | 19    | 9.8     | 9     |
| 700                    | 19.2    | 2     | 26.5    | 1     | 13500                  | 8.5     | 20    | 9.1     | 9     |
| 800                    | 16.6    | 2     | 23.8    | 1     | 14000                  | 8.6     | 21    | 8.4     | 9     |
| 900                    | 14.5    | 2     | 20.1    | 1     | 14500                  | 8.2     | 21    | 9.7     | 10    |
| 1000                   | 12.8    | 2     | 17.6    | 1     | 15000                  | 8.3     | 22    | 9.1     | 10    |
| 1250                   | 9.5     | 2     | 12.7    | 1     | 15500                  | 8.5     | 23    | 8.4     | 10    |
| 1500                   | 12.8    | 3     | 9.1     | 1     | 16000                  | 8.1     | 23    | 9.7     | 11    |
| 1750                   | 10.5    | 3     | 20.8    | 2     | 16500                  | 8.2     | 24    | 9.1     | 11    |
| 2000                   | 8.6     | 3     | 17.6    | 2     | 17000                  | 8.4     | 25    | 8.5     | 11    |
| 2500                   | 9.5     | 4     | 12.7    | 2     | 17500                  | 8.5     | 26    | 7.9     | 11    |
| 3000                   | 10.1    | 5     | 9.1     | 2     | 18000                  | 8.1     | 26    | 9.1     | 12    |
| 3500                   | 10.5    | 6     | 14.2    | 3     | 18500                  | 8.3     | 27    | 8.5     | 12    |
| 4000                   | 8.6     | 6     | 11.4    | 3     | 19000                  | 8.4     | 28    | 8.8     | 12    |
| 4500                   | 9.1     | 7     | 9.1     | 3     | 19500                  | 8.1     | 28    | 9.1     | 13    |
| 5000                   | 9.5     | 8     | 12.7    | 4     | 20000                  | 8.2     | 29    | 8.6     | 13    |
| 5500                   | 8.2     | 8     | 10.8    | 4     | 20500                  | 8.3     | 30    | 8.1     | 13    |
| 6000                   | 8.6     | 9     | 9.1     | 4     | 21000                  | 8.4     | 31    | 9.1     | 14    |
| 6500                   | 9.0     | 10    | 11.9    | 5     | 21500                  | 8.1     | 31    | 8.6     | 14    |
| 7000                   | 9.3     | 11    | 10.4    | 5     | 22000                  | 8.2     | 32    | 8.2     | 14    |
| 7500                   | 8.3     | 11    | 9.1     | 5     | 22500                  | 8.3     | 33    | 9.1     | 15    |
| 8000                   | 8.6     | 12    | 11.4    | 6     | 23000                  | 8.1     | 33    | 8.6     | 15    |
| 8500                   | 8.9     | 13    | 10.2    | 6     | 23500                  | 8.2     | 34    | 8.2     | 15    |
| 9000                   | 8.1     | 13    | 9.1     | 6     | 24000                  | 8.3     | 35    | 9.1     | 16    |
| 9500                   | 8.4     | 14    | 8.8     | 6     | 24500                  | 8.4     | 36    | 8.7     | 16    |
| 10000                  | 8.6     | 15    | 10.0    | 7     | 25000                  | 8.1     | 36    | 8.3     | 16    |





