Correction of convergence errors

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Enter the data from EZNEC or TANT in cells F11 thru F13 and M11 thru M13 (Simply type over the example data)
Excel will automatically compute the true gain, G and the true G/T

ZERO Loss:			**With Loss:**		
Gain (Go)	24,58	dBi	Gain (Gl)	24,53	dBi
Average gain (Ko)	1,002		Average gain (Kl)	0,989	
Pattern temp. (T_Pattern), (Tpo)	24,3	K	Pattern temp. (T_Pattern), (Tpl)	24,3	K

Corrrected numbers:

Ta, antenna temp (T_total)	27,75	**K**			
Gain	24,51	**dBi**	or	22,36	**dBD**
G/T	10,08	**dB**			
T_loss	3,76	**K**			

Convergence Error Correction Algorithm **2012-03-11**

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In order to evaluate antenna performance for space communications, it is necessary to compute antenna temperature, Ta, and the ratio of gain to antenna temperature; G/Ta. NEC is usually the simulation engine, and YT1NT's "TANT" software is used to compute the antenna temperature and G/T.

Unfortunately NEC, in either NEC2 or NEC4 versions suffers from convergence problems that can lead to erroneous results. The most common problem is the use of insufficient segmentation density. This can normally be corrected of course by increasing the number of segments. But in the case where element diameters are large, errors still occur if we increase the density beyond a point at which it becomes too high compared with the diameter of the element. Another problem occurs when elements of different diameter are joined together, as might occur with elements made of telescoping tubing. Another more serious problem occurs when elements of equal or different diameter are joined at an acute angle. Folded dipoles and T-matches can suffer from this effect.

The convergence errors show up as a value of Average Gain (AG) that is not at or very close to unity (in *EZNEC* the AG is displayed below the control console). The AG compares the total power radiated over all angles with the input power. If the elements have zero loss, the returned AG should of course be 1.000. The number 1.000 equals 100 percent of fed power to be found in the sum of power radiated over all angles of the 3D pattern. For this, the simulated gain is correct. When element loss is included, the AG should always be <1.000. The effect of an AG >1.000 is to give apparent higher gain, lower loss temperature and higher G/T than one that is perfectly converged.

The KF2YN convergence error correction algorithm uses modeled data from an antenna having zero loss elements to correct the gain and antenna temperatures of the same antenna with real-world lossy elements. It corrects poor convergence by first running the antenna with zero loss elements. Gain and temperature data are entered in the spreadsheet attached. Second, the antenna is run with actual loss resistance and data are again entered in the spreadsheet. The spreadsheet calculates the true antenna performance in terms of gain, temperature and G/T.

Note that the algorithm does not correct the SWR data,
which for a badly converged antenna may have very significant errors.