

Antenna Plots



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If the generic antenna radiation pattern forms included with **Radio Mobile** do not meet your needs, there are three spreadsheets available which enable you to enter your own radiation patterns for specific antennas.

Radio Mobile reads an antenna definition text file with an extension of *****.ant** which is contained in the **'Antenna'** folder of **RM**. The file format is a list of gain values for an antenna at 1° intervals, but shown from a maximum gain of 0dB. Thus the list shows the antenna gain as -ve dB's relative to the maximum antenna gain.

The first two spreadsheets, ['AntDiag.xls'](#) and ['Antenna Pattern Creator with FCC relative.xls'](#), allow antenna data to be entered at 10° intervals but require the data to be converted to -dB's before entry. The program then performs linear interpolation between the 10° points and generates the 1° list for import into **RM**. These spreadsheets are available via the links, my [Downloads page](#), or from the Group Files section.

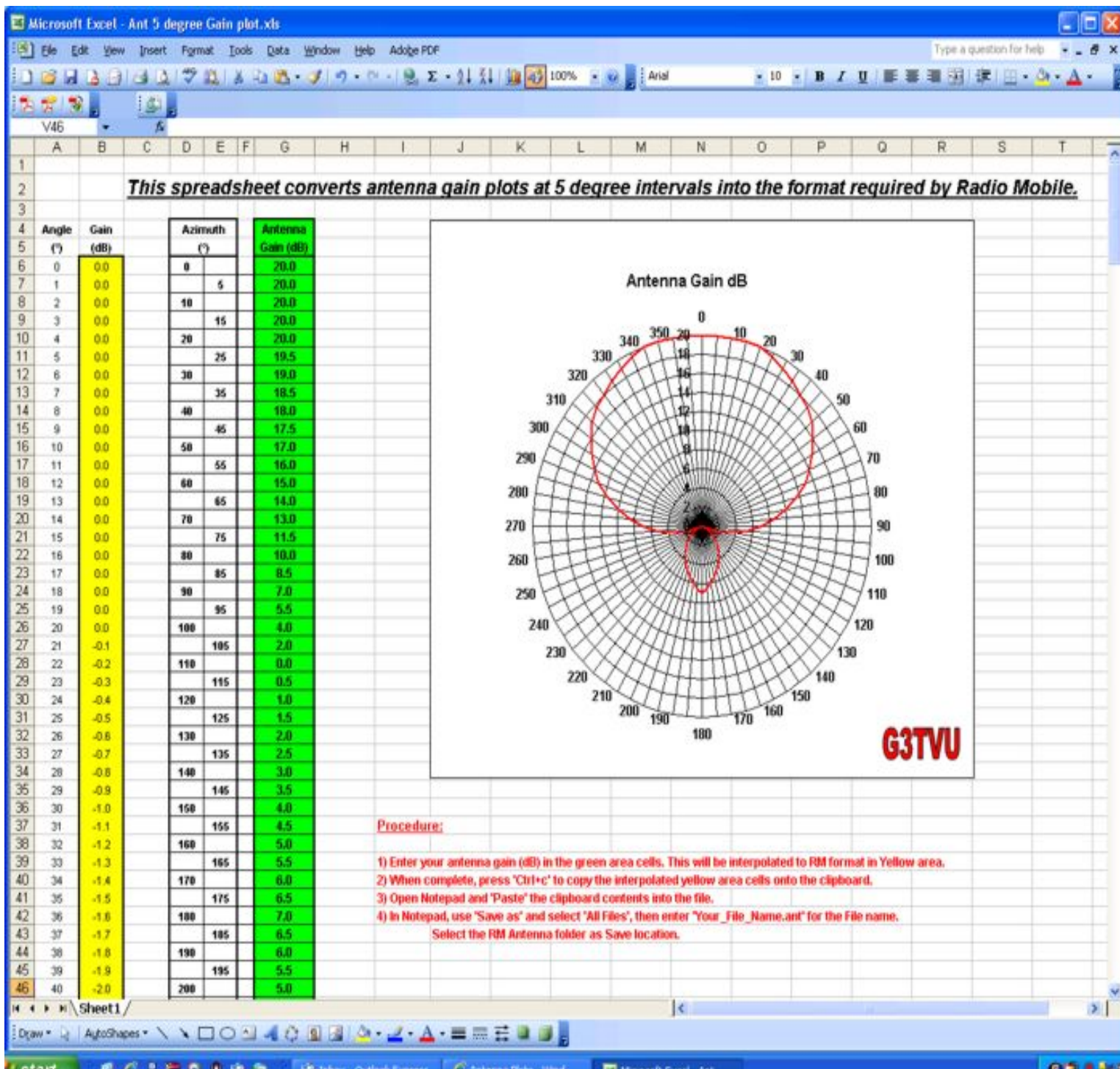
I have produced another version of the Excel spreadsheet called ['Ant 5 degree gain plot'](#), where the actual antenna gain in dB can be entered at 5° intervals, and the resulting 1° -ve dB values for entry into RM generated by interpolation, then copied to the clipboard using 'Ctrl+c' which activates a small macro.

[But see new 3D version here!](#)

Downloading and opening **'Ant 5 degree Gain Plot'**,

(You will need to 'enable macros' when opening this file!)

the following screen will be seen:



Antenna gain values have to be entered in the **Green** cells at 5° intervals, resulting in the displayed diagram being updated and the the entries being interpolated to 1°, -ve dB values as required by **RM** in the **Yellow** area.

After completing your entries use '**Ctrl+c**', this selects the whole of the **yellow** column area data, and places it on the clipboard.

Open Notepad, and Paste the clipboard entries into it. You need to save the file **under your own name**, but use **'Save as'** and select **'All Files'** for 'Save as Type', not forgetting to add the suffix .ant to the file name, (i.e. 'Your_Name.ant'). This file can be saved into the **RM Antenna** folder for use.

(Alternatively, type in the **"Your_name.ant"** in quotes as shown, and save).




Following the addition of 3D antenna patterns with V9.2.1 of RM, I have produced

Version 2 of a new spreadsheet **'3D Antenna 5 degree plot'** shown below:

(You will need to 'enable macros' when opening this file!)

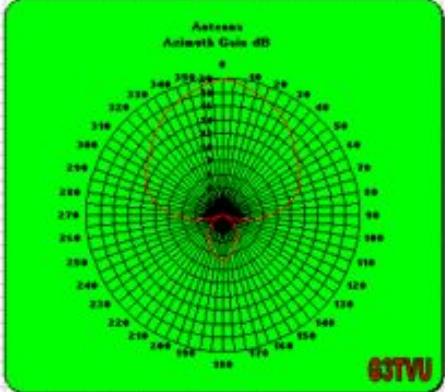
This spreadsheet converts antenna gain plots at 5° or 10° intervals into the format required by Radio Mobile for 2D and 3D plots.

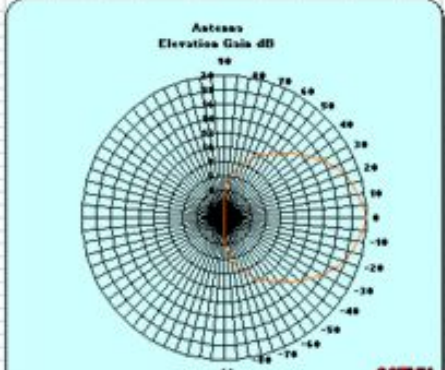


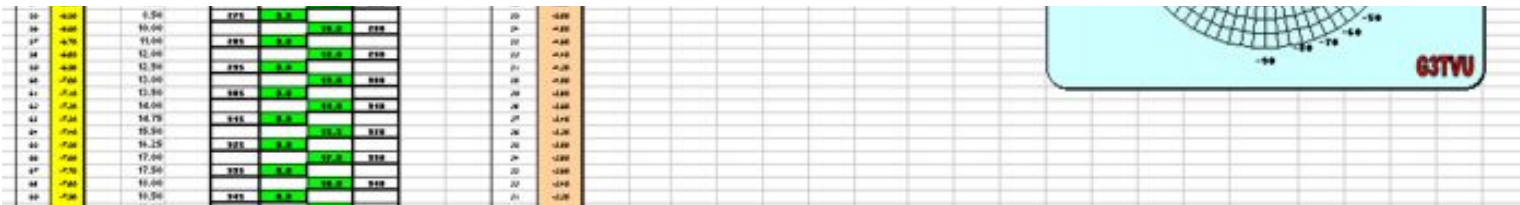
- 1) Azimuth and Elevation data can be entered at 10° intervals by ignoring the 5° columns and leaving them at '0' - the 10° values will be interpolated.
- 2) Enter Azimuth data in the Green area with the plot being displayed on the Green chart.
- 3) Enter Elevation data in the Blue area with the plot being displayed on the Blue chart.
- 4) To save the Azimuth data only use 'Ctrl+C' to copy the yellow interpolated data area to the clipboard - paste into Notepad, and save as 'your_name.txt' using 'All Files' option.
- 5) To save Azimuth and Elevation data use 'Ctrl+C' to copy the 'yellow + tan' data area to the clipboard - paste into Notepad, and save as "your_name2.txt", using 'All Files' option.
- 6) To generate an Omni Azimuth pattern, copy and paste the same gain into all Green area cells - values pasted into the white areas will be ignored.

Note that only +30° to -30° data can be used by RM for Elevation plots.

Antenna Azimuth gain dB				Antenna Elevation gain dB			
Antenna Azimuth angle	Gain	Antenna Elevation angle	Gain	Antenna Azimuth angle	Gain	Antenna Elevation angle	Gain
0	0.0	0.0	0.0	0	0.0	0.0	0.0
1	0.0	0.0	0.0	0	0.0	0.0	0.0
2	0.0	0.0	0.0	0	0.0	0.0	0.0
3	0.0	0.0	0.0	0	0.0	0.0	0.0
4	0.0	0.0	0.0	0	0.0	0.0	0.0
5	0.0	0.0	0.0	0	0.0	0.0	0.0
6	0.0	0.0	0.0	0	0.0	0.0	0.0
7	0.0	0.0	0.0	0	0.0	0.0	0.0
8	0.0	0.0	0.0	0	0.0	0.0	0.0
9	0.0	0.0	0.0	0	0.0	0.0	0.0
10	0.0	0.0	0.0	0	0.0	0.0	0.0
11	0.0	0.0	0.0	0	0.0	0.0	0.0
12	0.0	0.0	0.0	0	0.0	0.0	0.0
13	0.0	0.0	0.0	0	0.0	0.0	0.0
14	0.0	0.0	0.0	0	0.0	0.0	0.0
15	0.0	0.0	0.0	0	0.0	0.0	0.0
16	0.0	0.0	0.0	0	0.0	0.0	0.0
17	0.0	0.0	0.0	0	0.0	0.0	0.0
18	0.0	0.0	0.0	0	0.0	0.0	0.0
19	0.0	0.0	0.0	0	0.0	0.0	0.0
20	0.0	0.0	0.0	0	0.0	0.0	0.0
21	0.0	0.0	0.0	0	0.0	0.0	0.0
22	0.0	0.0	0.0	0	0.0	0.0	0.0
23	0.0	0.0	0.0	0	0.0	0.0	0.0
24	0.0	0.0	0.0	0	0.0	0.0	0.0
25	0.0	0.0	0.0	0	0.0	0.0	0.0
26	0.0	0.0	0.0	0	0.0	0.0	0.0
27	0.0	0.0	0.0	0	0.0	0.0	0.0
28	0.0	0.0	0.0	0	0.0	0.0	0.0
29	0.0	0.0	0.0	0	0.0	0.0	0.0
30	0.0	0.0	0.0	0	0.0	0.0	0.0
31	0.0	0.0	0.0	0	0.0	0.0	0.0
32	0.0	0.0	0.0	0	0.0	0.0	0.0
33	0.0	0.0	0.0	0	0.0	0.0	0.0
34	0.0	0.0	0.0	0	0.0	0.0	0.0
35	0.0	0.0	0.0	0	0.0	0.0	0.0
36	0.0	0.0	0.0	0	0.0	0.0	0.0
37	0.0	0.0	0.0	0	0.0	0.0	0.0
38	0.0	0.0	0.0	0	0.0	0.0	0.0
39	0.0	0.0	0.0	0	0.0	0.0	0.0
40	0.0	0.0	0.0	0	0.0	0.0	0.0
41	0.0	0.0	0.0	0	0.0	0.0	0.0
42	0.0	0.0	0.0	0	0.0	0.0	0.0
43	0.0	0.0	0.0	0	0.0	0.0	0.0
44	0.0	0.0	0.0	0	0.0	0.0	0.0
45	0.0	0.0	0.0	0	0.0	0.0	0.0
46	0.0	0.0	0.0	0	0.0	0.0	0.0
47	0.0	0.0	0.0	0	0.0	0.0	0.0
48	0.0	0.0	0.0	0	0.0	0.0	0.0
49	0.0	0.0	0.0	0	0.0	0.0	0.0
50	0.0	0.0	0.0	0	0.0	0.0	0.0
51	0.0	0.0	0.0	0	0.0	0.0	0.0
52	0.0	0.0	0.0	0	0.0	0.0	0.0
53	0.0	0.0	0.0	0	0.0	0.0	0.0
54	0.0	0.0	0.0	0	0.0	0.0	0.0
55	0.0	0.0	0.0	0	0.0	0.0	0.0
56	0.0	0.0	0.0	0	0.0	0.0	0.0
57	0.0	0.0	0.0	0	0.0	0.0	0.0
58	0.0	0.0	0.0	0	0.0	0.0	0.0
59	0.0	0.0	0.0	0	0.0	0.0	0.0
60	0.0	0.0	0.0	0	0.0	0.0	0.0







With this new spreadsheet Azimuth and Elevation data may be entered in 5° or 10° increments as desired. Where 10° entries are used, the 5° data points should be left at 0dB, and then the 10° points will be interpolated into the 1° steps required by **RM** .ant files.

The Azimuth antenna gain entries should be entered into the **Green data area** - with the corresponding **Green chart** showing the pattern entered.

Elevation antenna gain entries should be entered into the **Blue data area** - with the corresponding **Blue chart** showing the pattern entered.

Note that for Elevation, only values for +90° to -90° can be entered, whilst the display in the **RM Antenna viewer** will produce a simulated rear pattern calculated from the Azimuth gain.

This sheet contains macros to perform the **'data copy'** function:

'Ctrl+a' copies the **Azimuth (Yellow)** data to the clipboard, whilst

'Ctrl+f' copies the **Full Azimuth plus Elevation (Yellow plus Tan)** data to the clipboard.

In either case, the data needs to be pasted into Notepad, and then using **'Save as'** select **'File type'** to be **'All Files'**, and enter **'Your_name.ant'** as the file name. The file can be saved in the **RM Antenna** folder for use.

These are Roger's notes referring to the 3D patterns:-

V9.2.1 of Radio Mobile introduces a vertical antenna pattern.

At the end of the usual 360 entries of the antenna files (those files are in rmwcore.zip), you will find 181 new entries corresponding to the elevation angles +90 to -90 (in 1 degree steps).

The following equation is used to calculate the relative gain.

$$\text{Gain(dB)} = \text{HorizGain(azt)} * (1 - \text{abs(elv)/90}) + \text{VertiGain(elv)}$$

where *azt* and *elv* are the azimuth and elevation angle relatives to the antenna front lobe.

That approximation should give realistic values near the front lobe, but may diverge from reality elsewhere depending on the type of antenna (A perfect rendering of the 3D antenna pattern would require one vertical profile for each azimuth).

The gain relative to the front lobe is used in Radio link and the various Radio coverage plotss, and is backward compatible with the old antenna files and your old studies.

The program uses that gain in the link budget. However, the antenna pattern is not taken into account by the propagation model itself, where the front wave is still seen as of an infinite height.

Cross polarization effects are also ignored in that implementation.

A 3D viewing capability has been added to the antenna pattern tool for a better visualisation of the resulting patterns.

Roger

VE2DBE



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