Suppose I want a 15 km x 15 km grid of DIPOLE.EXE results with the origin at 47°N, -117°W in a grid of 100 rows and 100 columns. Here's how to think through it and get a reasonable approximation:

Start DIPOLE.EXE in a CMD.EXE DOS window.

Output file name: mytest.grd
ncol, nrow = 100, 100

x0 = -117.0

!!DIPOLE.EXE switches dx and dy!! dx is really dy (d_latitude), and dy is really dx (d_longitude). I will carry on like they are OK but **you have to switch them** when you run the program

Now, what is dx? We want our grid to be 15 kilometers wide so we need to know how many kilometers per degree longitude there are at 47°N latitude. Remember, longitude degrees are only great circle degrees (GCD) at the equator.

At the equator: (2 * pi *6,371 km / 360°) = 111.1949 km/GCD assuming a spherical Earth of equal volume.

We need to adjust the km/GCD to our latitude of 47°N to calculate the longitudinal width of our grid. We specified our grid to be 15 km x 15 km. The center latitude is:

$$47^{o} + (7.5 \text{ km} * 1^{o}/111.1949 \text{ km}) = 47.009^{o}.$$

Now multiply 111.1949 km/GCD by the cosine of the average latitude {111.1949*COS(47.009)} to get 75.822 km/degree. This is the approximate kilometers per degree (not GCD) at 47.009° N.

We want to span 15 kilometers in the east-west direction. Thus we need to divide 15 kilometers by 75.822 km/deg to yield: {15 km / 75.822 km/deg = 0.1978 degrees and we have to distribute this over 100 columns (as decided above). Thus,

dx = .001978 (in great circle degrees) **Enter for dy**…

We also want our grid to span 15 kilometers in the north-south direction. Thus, we need to divide 15 km by 111.1949 km/GCD to get 0.13498 degrees of latitude. Thus our grid should end at 47.135°N. In one line:

dx°= (grid with in km) / (111.1949 km/GCD * COS (average latitude) / (number of columns)

y0 = 47° N

dy is simpler than dx because degrees of latitude are great circle degrees (GCD). Here, 15 km/111.1949 km/GCD = 0.1349 degrees, or, in one line:

dy° = (grid height in km) / (111.1949 km/GCD) / (number of rows)

dy = .0013 **Enter for dx…**

Now the buried sphere's parameters – NOTE, radius and depth have to be in 'degrees' here too!:

x = -117 + dy * ncols/2 = -116.9 NOTE, due to DIPOLE.EXE's mistake I use dy, not dx!

y = 47 + dx * nrows/2 = 47.06 NOTE, due to DIPOLE.EXE's mistake I use dx, not dy!

z = 2 km /111.1949 km/deg = .018

radius = .75 km /111.1949 km/deg = .0067

Inc = 70

Dec = 14

Be = 56,000

susceptibility = .01

remanence = 0 (or whatever you are thinking it is…)

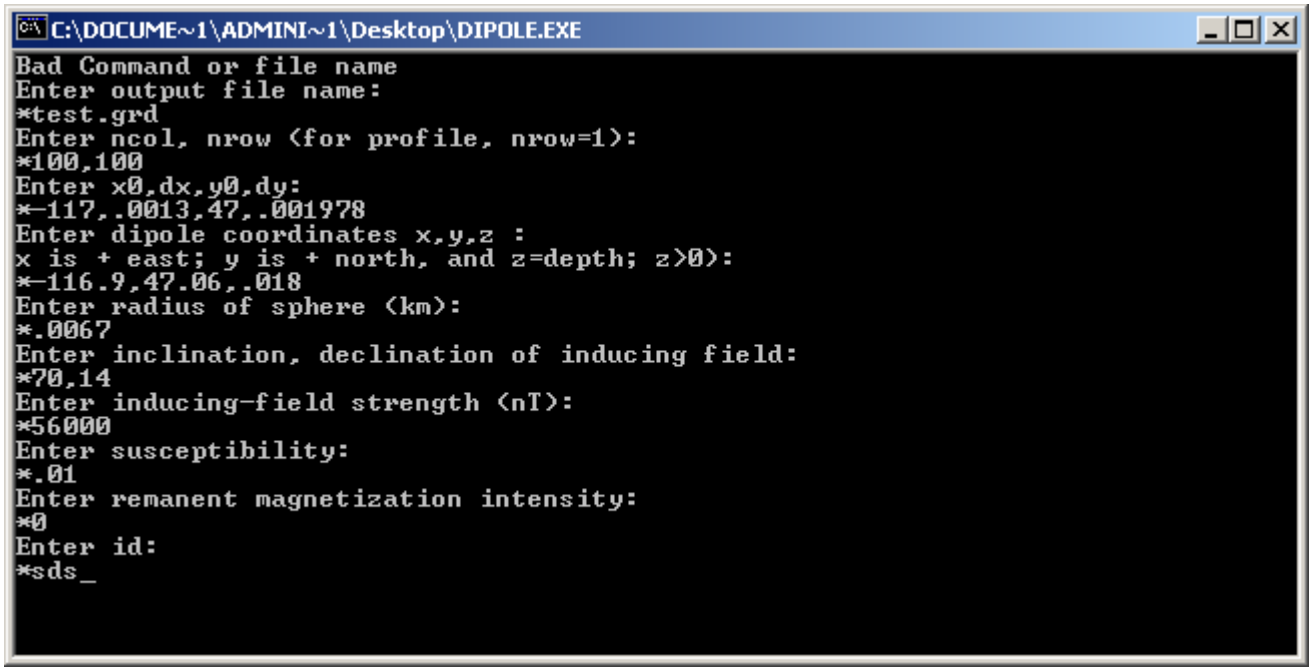
id = your initials

These are the known problems with DIPOLE.EXE

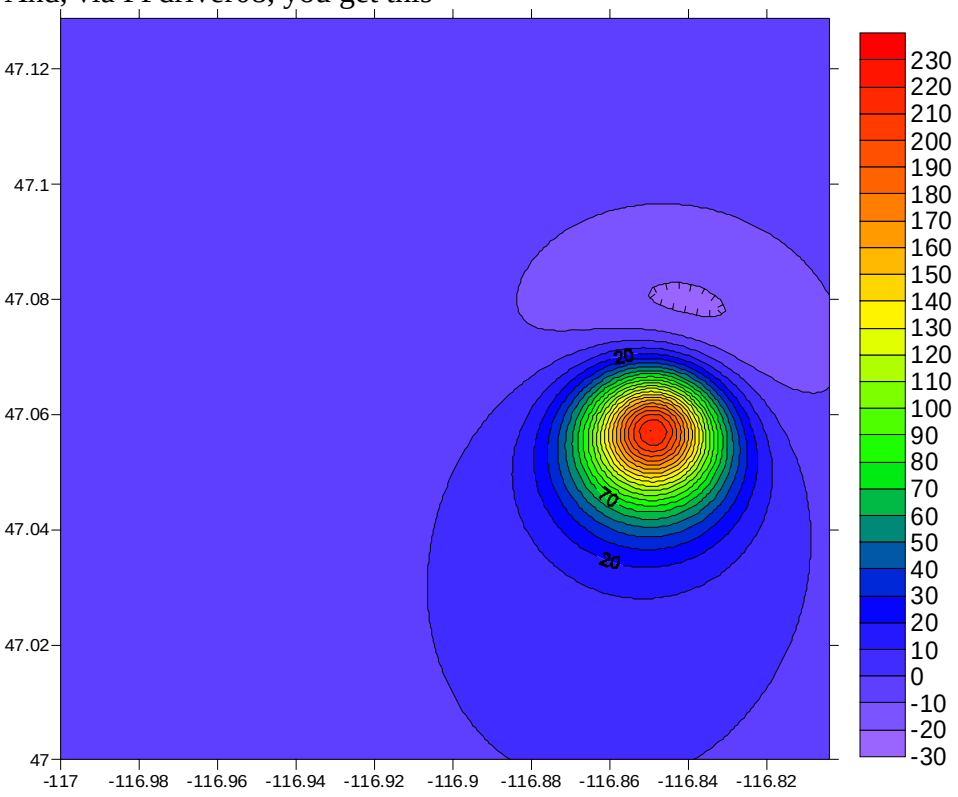
1. it swaps the dx and dy values you input, so you swap them first.

2. Look at the DOS input below and the contoured output and you see that it also adds some constant to the x-position of the buried sphere. Thus, the result is displaced east of where it should be. This is with negative coordinates, so perhaps the programmer just got mixed up with something in negative numbers.

Enter them like this:



And, via PFdriver08, you get this



Note that the map is shifted east of where it should be given the input x-coordinate of the body. This is an error in DIPOLE.EXE as is the swapping of dx and dy.