Parallax of Venus and Mars

H_a HP	.1'	.2'	.3	.4'	.5'	.6'
10°	0.1	0.2	0.3	0.4	0.5	0.6
20°	0.1	0.2	0.3	0.4	0.5	0.6
30°	0.1	0.2	0.3	0.3	0.4	0.5
40°	0.1	0.2	0.2	0.3	0.4	0.5
50°	0.1	0.1	0.2	0.3	0.3	0.4
60°	0.1	0.1	0.2	0.2	0.3	0.3
70°	0.0	0.1	0.1	0.1	0.2	0.2
80°	0.0	0.0	0.1	0.1	0.1	0.1

About these tables

The preceding static tables are independent from the year. They differ from the tables found in the official paper versions of the Nautical almanac in to important considerations.

- My tables are not arranged as /textitcritical tables. So chose the value that fits best to your value and interpolate in the rare cases where this should be necessary.
- My tables do not combine multiple corrections as some tables in the paper Nautical Almanac do. Each correction has to be applied separately.

All tables that are specific for a year are contained in the Nautical Almanac daily pages for the corresponding year.

increments

The large increment table is is nothing but a linear interpolation between the tabulated values in the daily pages of the Nautical almanac. This table is basically identical with the official one.

DIP

The DIP table corrects for hight of eye over the surface. This value has to be subtracted from the sextant altitude (H_s). The correction in degrees for hight of eye in meters is given by the following formula:

$$d = 0.0293\sqrt{m}$$

This is the first correction (apart from index error) that has to be applied to the measured altitude.

Refraction

The next correction is for refraction in the earths atmosphere. As usual this table is correct for 10°C and a pressure of 1010hPa. This correction has to be applied to apparent altitude (H_a). The exat values can be calculated by the following formula.

$$R_0 = \cot\left(H_a + \frac{7.31}{H_a + 4.4}\right)$$

For other than standard conditions calculate a correction factor for R_0 by:

$$f = \frac{0.28P}{T + 273}$$

where P is the pressure in hectopascal and T is the temperature in °C. No table is given for this correction so far.

Parallax

For moon sight and if necessary for Mars and Venus a parallax correction is necessary. For Mars and Venus the horizontal parallax (HP) is never more than 0.5' and can be omitted if this kind of precision is not necessary. The parallax (P) can be calculated from horizontal parallax (HP) and observed altitude H_o with the following formula:

$$P = \cos HP$$

The table for the moon gives the parallax for a horizontal parallax of 54' which is the lowest value for the moon. For all other values the value in the lower half of the table has to be added. Note that this table is only for parallax and does not correct for refraction and semidiameter. For all moon and sun sights semidiameter has to be added for lower limb sight and subtracted for upper limb sights. The value for HP and semidiameter is tabulated in the daily pages. The smaler parallax table is for parallax of Venus and Mars.

Altitude correction

To correct your sextant altitude H_s do the following: Calculate H_a by

$$H_a = H_s + I - dip$$

Where I is the sextants index error. Than calculate the observed altitude H_o by

$$H_o = H_a - R + P \pm SD$$

where R is refraction, P is parallax and SD is the semidiameter.

Sight reduktion

Sight reduction tables can be downloaded for the US governments internet pages. Search for HO-229 or HO-249. These values can also be calculated with to, relatively simple, formulas

$$\sin H_c = \sin L \sin d + \cos L \cos d \cos LHA$$

and

$$\cos A = \frac{\sin d - \sin L \sin H_c}{\cos L \cos H_c}$$

where A is the azimuth angle, L is the latitude, d is the declination and LHA is the local hour angle. The azimuth (Z_n) is given by the following rule:

- if the LHA is greater than 180°, $Z_n = A$
- if the LHA is less than 180°, $Z_n = 360° - A$