Lars Bergman. Third version 26 January 2017. (Second version sent to Brad February 2014.)

Some remarks on the Worsley log, version 3.0, 25Jan2017

Before 24 April

2nd line "46'W of Wallis" shall probably be "27'W of Wallis". 27 appears a couple of times later and corresponds better with the given longitude of 39°0'W.

26 April

The four rows at the left, starting with 2.23.29 and ending with 19.46 still puzzles me. The "Fast 29" is also strange, is he using another watch here?

The five rows at the right, starting with 16°28' and ending with 59 47.44 seems to be the noon sight:

16°28'	observed altitude sun's lower limb
16 37	corrected geocentric altitude sun's center
73.20 x	I would like to have this the zenith distance, 90° - 16°37' = 73°23', then x=0
13 32 x	Must be the declination, and to fit the next row, x=16". But 16" doesn't fit really to the time of the observation. And why bother with seconds of arc here?
59 47.44	The latitude, = zenith distance – declination. But to correspond with the given noon latitude of 59°46' then there is an error somewhere.

The longitude resulting from the am time sight, 50°32'30" should have been reduced by the easterly dlong between the sight and noon, to become noon longitude. Instead, 16' have been added. These 16' corresponds to 1^m4^s of time "more slow" mentioned April 24th. Maybe these 16' are added at a later stage of the voyage.

28 April

Also here are those 1^m4^s of time mentioned.

29 April

Top left, 6°43', I cannot explain. Below seems to be the noon observation:

16.52.30	Corrected noon altitude
3.7.30	See below
14.29.45	Sun's declination at noon
58.37.45	Noon latitude, = 90° - (altitude + declination)

Now, 3.7.30 should maybe read $3^h17^m30^s$ chronometer time at observation. This day it was estimated to be 12^m20^s slow, thus GMT $3^h29^m50^s$, let us say 3.5^h. The NA gives declination variation as 46.65" per hour which we round off to 47". 3.5 multiplied by 47 gives 165" which is added to the Greenwich noon declination given as 14°26'53.9". If we round the NA value to 14°27' and then add 165" we get the answer 14°29'45". Not a very stringent math, but seems plausible.

The interpolation calculations for departure (to "27 miles W Wallis") may look like this:

4.8	difference between the departure values for a dlong of 330' for 56°and 57° latitudes
2.6	I would like to see 1.6 here, being 1/3 of 4.8, the proper value for 56°20' latitude
183.4	here my guess is 182.9, the departure value corresponding to 56°20' latitude. Multiplied by 2 this gives the total departure of 365.8 . Obvioulsly Worsley's tables did not go as far as 660 minutes of dlong, and thus he used half the number.

29 April continued

The longitude from the am observation, 50°31'34" shall read 50°31'30" This longitude should be reduced by 13' to get the noon longitude. These 13' is the dlong shown in the expression "12 9.8 6.9 =13" which I interpret as 12 miles sailed distance between time sight and noon observation, with the same course, N35°E, as the day's run. However, Worsley seems to have subtracted 31'30" to get his noon longitude. Maybe he wanted a round neat figure to facilitate the distance calculation towards Wallis?

1 May

23+19=35 shall probably read 23.0 19.3=35 where 23 is the dlat and 19.3 the departure, with 35 dlong.

4 May

The local apparent time 27.23. 8 shall read 22.23. 8. The resulting longitude 44°50'13" shall read 44°50'15". The fourth row at the right, N36E 52 41, is still to be explained.

The rows in the middle is probably a calculation for pre-setting the sextant for the noon sight, with guessed latitude 55°23', declination 15°59'16", their sum 71°22'16", true altitude = 90°-(latitude+declination) = 18°37'44". From this Worsley subtracted 10'44" to arrive at the pre-set-value of 18°27'. The subtracted part consists of altitude corrections and some small extra to get a whole-minute answer slightly below the expected noon altitude. The declination value may have been calculated as follows:

Guessed noon longitude 44°30', or 2^h58^m, let's say 3^h Greenwich time. The declination variation per hour is given by the NA as 43.50", let's say 44". Now 3^h times 44" per hour gives us 132", or 2'12" to be added to the almanac value for declination at Greenwich apparent noon, 15°57'4", resulting in 15°59'16".

5 May

DR N50° E90^m shall read DR N50°E 95^m in order to correspond to the dlat and dlong used when calculation this day's DR

6 May

At the right, below 42°36, the figure 52 shall be 1°52', the dlong to correspond to the departure of 65.1E calculated on the last row.

7 May

The numbers 16.1 36.7 to the right of "Slow …" shall read 3.1 36.7. This is the sum of the dlat and dep sailed since previous noon, dlat=6.5'S +9.6'N=3.1'N, dep=10.4'E+26.3'E=36.7'E. The dlat figure of 6.5' should actually be 6.0' but Worsley seems to have read that figure from the line below in his tables, for a distance of 13 instead of 12 miles. Below the pm time sight, resulting in a pm longitude of 39°11', the figure 25 shall be 23, being the dlong sailed since noon, as is shown in the top row of the pm observation. Then the noon longitude result "39.34 Noon" is obtained.

The noon longitude, stated as 39°3'6 at near the top right, shall accordingly be 39°34', but I have a faint memory that somewhere in the 2009 postings you emphasized that 39°3'6 was correctly transcribed.

One interesting finding in the pm sight is that log cos 85°41' is given as 876.62 instead of the correct 5-figure value of (8).87661(-10). This indicates that Worsley is using a 6-figure table, and when the 6th decimal equals 5, he rounds the 5th decimal one unit up. In a proper 5-figure table the logarithm is shown as 8.87661, but in a 6-figure table it is shown as 8.876615. But in this case the 6th decimal is already rounded up, from 8.876614952….