

Contents of the data repository for the 2021 update to the CIPM list “Recommended values of standard frequencies”

Input and output data files from a MATLAB® implementation of the least-squares algorithm described in [1], in ASCII format. Their contents follow the notation of [1] and [2].

Input data files:

- (i) ClockInputData2020_7.dat
- (ii) ClockInputData2020_7_NoCorr.dat

Line 1 contains the number of independently adjusted frequency ratios (14 in the case of the 2021 adjustment).

Lines 2 – 15 contain the starting values of these adjusted frequency values, labelled s1 to s14.

Line 16 contains the number of input frequency ratio measurements (106 in the case of the 2021 adjustment).

Lines 17 – 122 contain these input frequency ratio measurements:

Column 1	Unique label used to identify the measurement.
Column 2	Identifier for the type of measurement, e.g. nu1 for an absolute frequency measurement of ν_1 , nu_3_over_nu12 for an optical frequency ratio measurement ν_3/ν_{12} , using the notation of Table 1 in [2].
Column 3	Value of the measured absolute frequency or frequency ratio.
Column 4	Uncertainty of the measured absolute frequency or frequency ratio.
Column 5	Reference in which the measurement result was reported (further details provided in [2]).

Line 123 contains the number of correlation coefficients included (483 for input file (i), 0 for input file (ii)).

Lines 124 – 606 (in input file (i) only) contain the correlation coefficients:

Column 1	Label specifying the correlation coefficient concerned, using the unique measurement labels.
Column 2	Value of the correlation coefficient.

Output data files:

- (i) ClockOutputData2020_7.dat
- (ii) ClockOutputData2020_7_NoCorr.dat

Lines 1 and 2 contain information about the software used to generate the output file, the date and time at which the analysis was carried out and by whom.

The remainder of the file is structured with labels to aid human readability, into the following sections:

- The input data used, as in the input data file
- The output data:
 - Number of iterations required in the least-squares adjustment for the solution to converge
 - Final values of the adjusted frequency ratios
 - Final values of all other possible frequency ratios
 - Final values of absolute frequencies
 - Normalised residuals for the input data, explicitly identifying > 1 sigma outliers
 - The Birge ratio for the adjustment
 - The date and time that the data analysis was completed.

ROCIT guidelines on correlations

Guidelines on the evaluation and reporting of correlation coefficients between frequency ratio measurements, including a recommended reporting template and worked examples.

Details of the comparisons involved in q73 and q98 (PTB absolute frequency measurements)

YbE3vsCSF_2017-2019.txt

References

- [1] H. S. Margolis and P. Gill, Least-squares analysis of clock frequency comparison data to deduce optimized frequency and frequency ratio values, *Metrologia* 52, 628 – 634 (2015).
- [2] H. S. Margolis, G. Panfilo, G. Petit, C. Oates, T. Ido and S. Bize, The CIPM list “Recommended values of standard frequencies”: 2021 update, submitted to *Metrologia* (2023).