# Clock data files guidelines

**(see also clockform.pdf )**

Data must be in ASCII format with Carriage return and new line (chr$(13) chr$(10)) as end of line marker (no MS-word HTML format…)

Use space bar instead of tab key to create space between a set of data.

To avoid the inconveniences that wrong data interpretation might bring, do not include in the file the clock code for dates without data. It is also not necessary to leave space when laboratory has no atomic time.

Clock steps if any, should be included in the clock data file immediately after the last line of the last date of the clock data.

## Format of clock data files

A clock file will be composed of the clock data from a laboratory (and possibly from clocks in a remote location) for the standard dates at 0h UTC, and of the clock step data. Clock step data should be given under the form
(NEW[clock value] - OLD[clock value]) but
not (NEW[UTC(k)-clock] - OLD[UTC(k)-clock]).
Clock data from the 1 January 2003 should be submitted in the following way:

**For UTC contribution** : Files contain monthly clock data for a laboratory. Each file contains for each standard date, one or several lines in the 'clock format'.
**For rapid UTC contribution** : Daily files contain daily clock data for a laboratory. Each file contains for this date, one or several lines in the 'clock format'.

All measurements (including master clock if any) are reported at 0 h UTC. Immediately after the last line of the last date of the clock data, one or several lines in the 'step format' follow, if necessary (see 3.c,3.d).

**1 The clock format is :**

```
0000000001111111111222222222233333333334444444445
1234567890123456789012345678901234567890123456---
XXXXX 100YY 00200YY aaaaaaa.a CCCCCCC ccccccc.c---
```

Description of a line containing clock data:

- field 01 to 05 : XXXXX is MJD on 5 digits
- field 06 : blank character
- field 07 to 11 : 100YY is the laboratory code
- field 12 : blank character
- field 13 to 19 : 00200YY is the TA code of the lab if exists
- field 20 : blank character
- field 21 to 29 : aaaaaaa.a is [UTC(lab) - TA(lab)] in format F9.1, in ns
- field 30 : blank character
- field 31 to 37 : CCCCCCC is the code of one clock on 7 digits
- field 38 : blank character
- field 39 to 47 : ccccccc.c is [UTC(lab) – clock] in format F9.1, in ns

follow other 18-digit fields, as required;
each line may contain up to five 18-digit fields (101 characters maximum) are accepted for the TA and/or clock data

Notes:

- Codes for laboratories and clocks are provided by the Time Department under request.
- For those laboratories which do not calculate TA(lab) fields 13 to 19 and 21 to 29 can be filled with clock code and clock data respectively.

**2 The step format is :**

```
000000000111111111122222222223333333333444444444 5
123456789012345678901234567890123456789012345678901234567---
XXXXX.XX CCCCCCC ccccccc.c bbbbb.bbb    AAAA 100YY
```

Description of a line containing clock step data:

- field 01 to 08 : XXXXX.XX is MJD on 5 digits and the fraction of day of the step
- field 09 : blank character
- field 10 to 16 : CCCCCCC is the code of the clock on 7 digits
- field 17 : blank character
- field 18 to 26 : ccccccc.c is the amount of the time step in format F9.1, in ns
- field 27 : blank character
- field 28 to 36 : bbbbb.bbb is the amount of the frequency step in format F9.3, in ns/d
- field 37 to 40 : blank characters
- field 41 to 44 : AAAA is the laboratory acronym, up to 4 characters, left aligned
- field 45 : blank character
- field 46 to 50 : 100YY is the laboratory code on 5 digits

**3 Examples :**

Examples below are illustrating data submitted by a fictitious laboratory (code 10092, acronym LABO, master clock 1351120).

**3.a General case :**

```
52644 10092 0020092 -000837.5 1350441 0000234.3 1351120 0000000.0 1351660 0000204.2 1350761 -001335.7
52644 10092 1351746 -000662.1 1351748 0000138.9 1351800 0002331.0 1351861 -000529.4 1360255  002542.1
52644 10092 1360333  000999.7
52649 10092 0020092 -000856.4 1350441 0000199.1 1351120 0000000.0 1351660 0000189.5 1350761 -001320.3
52649 10092 1351746 -000666.6 1351748 0000156.2 1351800 0002426.5 1351861 -000600.2 1360255  002698.3
52649 10092 1360333  001023.6
52654 10092 0020092 -000829.5 1350441 0000203.4 1351120 0000000.0 1351660 0000195.3 1350761 -001314.5
52654 10092 1351746 -000689.2 1351748 0000189.1 1351800 0002547.8 1351861 -000598.1 1360255  002721.9
52654 10092 1360333  001036.4
52659 10092 0020092 -000808.3 1350441 0000242.8 1351120 0000000.0 1351660 0000210.0 1350761 -001300.0
52659 10092 1351746 -000701.6 1351748 0000102.9 1351800 0002598.3 1351861 -000614.3 1360255  002756.3
52659 10092 1360333  001145.3
52664 10092 0020092 -000898.1 1350441 0000254.9 1351120 0000000.0 1351660 0000218.3 1350761 -001323.6
52664 10092 1351746 -000698.6 1351748 0000129.4 1351800 0002369.4 1351861 -000549.2 1360255  002654.2
52664 10092 1360333  001111.1
52669 10092 0020092 -000822.0 1350441 0000271.1 1351120 0000000.0 1351660 0000200.7 1350761 -001356.1
52669 10092 1351746 -000654.2 1351748 0000123.1 1351800 0002333.3 1360255 0002555.5 1360333  001369.1
```

**3.b Laboratory running only one master clock directly corresponding to UTC(LABO) :**

```
56994 10092 1351120       0.0
56999 10092 1351120       0.0
57004 10092 1351120       0.0
57009 10092 1351120       0.0
57014 10092 1351120       0.0
57019 10092 1351120       0.0
```

**3.c Physical UTC(LABO) step:**

This step of UTC(LABO) appears in [UTC(LABO)-clock] values so that the difference [UTC(LABO)-UTC(REF)]( from time transfer) - [UTC(LABO)-clock] corresponding to clock-UTC(REF) used for clock characterization will show the real clock behavior without being affected by UTC(LABO) step.
Concerning the master clock report (default value 0.0), the UTC(LABO) step should be compensated by adding a clock step line referring to master clock with the same step sign than UTC(LABO) step (see 2. ).

## 4 Data submission from remotely located clocks

NMI clocks remotely located (outside the main NMI site), or belonging to other organizations and linked to the NMI time scale by local time transfer systems, can contributes to UTC provided the following

All the clock data follows the same policy for the BIPM data contribution:

- The UTC(k) laboratory takes full responsibilities to report timely the data to the BIPM with the agreed format and ensuring the good metrological quality of the data.
- The remote clocks are completely described to the BIPM as in this table , https://webtai.bipm.org/database/clocklab.html, including clock model and its location. The case of France (F), for example, shows the case of remotely located clock. The information is promptly updated by the Time department in case of any change, when receiving email to inform about the changes.
- In case the remote clocks are corrected by a voluntary time or frequency jumps, this is timely reported to the BIPM in the clock file, in the agreed format, as for all the other clocks.
- In case the BIPM finds issues on the clocks, the UTC(k) lab is able to promptly give information as for its internal clock.

In addition, the fact that the clocks are remotely located has to be completely transparent for the BIPM, this means that:

- If the time transfer techniques used to compare the remote clocks versus UTC(k) suffers from anomalies, jumps, or missing data, the remote clock data are either excluded from the BIPM file, or compensated in case of a well know jump. The clock data needs to be instantaneous measurement at the BIPM standard date, and not smoothed or interpolated values that could affect the long-term behavior of the clock.
- when the time transfer techniques used to compare the remote clocks is calibrated, the UTC(k) lab should take care to ensure the continuity of the remote clock behavior by appropriately compensating the time jump due to calibration, or by declaring it in the BIPM clock file.