

General rules of operation for GNSS calibrations

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The BIPM Time department is operating a GNSS calibration scheme as described in the “Guidelines for GNSS equipment calibration” available at <ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/>. This TM describes the general rules of operation which, as of Version 1, are only defined for GPS.

- Each calibration exercise is identified by a calibration identifier (Cal-Id, see section 1).
- The calibration web page <http://www.bipm.org/jsp/en/TimeCalibrations.jsp> allows accessing all calibration results through the tab “Current files” which lists all Cal-Ids. Results are also available through the Time department database at <http://webtai.bipm.org/database>, see section 2.
- The ftp site <ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/> hosts all files associated with calibrations. See section 3.
- New calibration exercises are handled as described in section 4.
- Changes affecting systems between calibrations are handled as described in section 5.

1. The calibration identifier

The Cal-Id format is znnn-YYYY where

- z identifies the type of calibration;
- nnn is a number assigned by the BIPM;
- YYYY indicates the year (typically the start of the calibration exercise).

The types of calibration z can be (non-GNSS types are not included here):

- z = 1: For GNSS systems, with GNSS calibration campaigns referenced a system in the BIPM scheme, under the supervision of the BIPM; nnn then identifies a report corresponding to a calibration exercise
 - 000 to 009 for Group 1 trips
 - 011 to 099 for Group 2 trips
 - 101 to 199 for “Golden system calibration” without closure by RMOs/labs/BIPM
 - 201 to 999 for other exercises by RMOs/labs/BIPM
- z = 2: For GNSS systems, calibrated with other techniques or other references (e.g. manufacturer calibration, absolute calibration); nnn then identifies a report and is a sequential number within the year.

Once a GNSS system has been calibrated, the calibration results should be included in the CGGTTS data files and the Cal-Id identifying the calibration exercise should be reported with the data. If changes occur to a calibrated system, see section 5.

2. Organization of the web page <http://www.bipm.org/jsp/en/TimeCalibrations.jsp>

After validation of the results of a calibration exercise, the web page should be updated by adding a pdf file in the proper directory corresponding to “Current files” on the BIPM servers¹. The name of the pdf file is Cal-Id_TTT_Other-info_Vx-y where

¹ Precise information on the servers is not included here as it may be updated by the BIPM IT team.

- Cal-Id is the calibration identifier as described in section 1
- TTT is the Type of calibration (free format, suggested examples are GPSP3, GPSP3C1, GPSC1)
- Other-info is free format; It is recommended to indicate the list of the labs involved.
- Vx-y is a version number to keep track of updates in the calibration report.

The pdf file contains a short (typically 1-page) summary report written by the BIPM to summarize the results. It contains at least:

- the list of the calibrated systems and the numerical results
- the standard uncertainty U_{CAL0} that is to be assigned to UTC links with the calibrated systems
- hypertext links to the file(s) which contain more detailed information (typically the full report written by the party in charge of the calibration exercise).
- an “introduction date” agreed with the participants to use the results in producing the data files.

See examples of such reports in the web page. Before being posted on the web these summary reports are hosted in the Time department internal server G:\calib\Results\Summary-reports.

3. Organization of the ftp <ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/>

The directory structure :

readme.pdf	: This file
calib_planned.pdf	: List of calibration trips and their status ²
Group1	: Group1 trips (by the BIPM)
1001-2014	: Files associated to initial Group1 trip
1001-2016	
... ..	
Group2	: Trips for Group 2 labs (by RMOs and other)
2014	: results for 2014
2015	: results for 2015
1101-2015	: Files associated with calibration 1101-2015
... ..	
... ..	
Other	: Other calibrations (Cal-Id starting with 2)
2014	: results for 2014
2015	: results for 2015
... ..	
... ..	
Guidelines	: Latest version of the Guidelines
Archive	: Earlier versions
Doc-Soft	: Software and other documentation for calibrations

² Starting August 2018, this file redirects to <http://webtai.bipm.org/database/calid.html>

Pending the validation of the results by the BIPM and the installation of the files in the public ftp structure, the files are hosted on the Time department internal server G:\calib\Results in a similar directory structure as indicated above.

4. Procedure for handling new calibrations

The typical procedure is as follows:

- The organizers of a calibration exercise should notice the BIPM Time department (gpetit@bipm.org with copy to tai@bipm.org), indicating at least: A responsible person and lab, the type of calibration, the list of labs, the planned time period of the exercise.
- The BIPM assigns a Cal-Id and enters the a priori information in the Time department database. The information is then visible at <http://webtai.bipm.org/database/calid.html>
- The BIPM creates the directories in the ftp and on G:\calib\.
- After reception of the report, the BIPM checks it for general consistency with the expected content as described in the Guidelines Annex 4.
- After validation of the report, the BIPM will
 - Write the 1-page summary (section 2) and agree with the participants of an “introduction date” for the results ;
 - Update the Calibrations web page (section 2), the ftp site (section 3) and the Time department database;
 - Inform the participants
 - that the results are published;
 - that they should use the results and include the Cal-Id in the reported data files at the agreed “introduction date”.

5. Changes affecting systems between calibrations

The procedure in case of changes is described in the latest version of the Guidelines, available at <ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/>, section A.3.6.

A brief summary:

If the calibration results are expressed as INTDLY or SYSDLY and if the changes only affect the REFDLY value, no change is required to the Cal-id and associated reports. It is expected that the REFDLY measurement uncertainty is accounted for in the standard calibration uncertainty.

All other cases are considered as ‘transfer of calibration’. This corresponds either to changes in receiver (e.g. firmware) or in the antenna or antenna cable implying a new determination of INTDLY or SYSDLY values, or to a true transfer of calibration from a previously calibrated system to a new system. In all such cases, a report of operations should be transmitted to the BIPM. The BIPM will validate the report and update the summary page of the corresponding Cal-Id to include the new results (see last bullet of section 4).