

GPS calibration of IMBH equipment with respect to PTB G1 (1011-2019)

Summary

Over January to June 2019, the Physikalisch-Technische Bundesanstalt, Germany (PTB) conducted a trip to calibrate GNSS equipment owned by the Institute of Metrology of Bosnia and Herzegovina (BIPM acronym IMBH). The trip started and finished at the PTB, providing closure with respect to PTB Group1 reference receiver PT09.

The operations and report of measurements are described in in the [report by PTB](#).

In September 2021, the IMBH conducted a transfer of calibration from the receiver BH02, part of the original trip, to a new receiver BH03, see the [report by IMBH](#).

- **Final results for the originally calibrated system**

The INTDLY values of the IMBH receivers given in Table 1 have been computed by PTB based on the results of the [1001-2018](#) Group 1 trip for PT09 and should not be updated to reflect later changes in the conventional INTDLY values of the reference receivers.

For a P3/PPP UTC link A-B involving any Group 1 and any receiver in this trip, the uncertainty resulting from the calibration, $U_B(A-B)$, is computed as

$$U_B(A-B) = (U_{CAL0}^2 + \Delta U_{CAL}(A)^2 + \Delta U_{CAL}(B)^2)^{1/2} \quad (1)$$

where $U_{CAL0} = 2.5$ ns at the time of calibration, as given conventionally to Group 2, and where ΔU_{CAL} (generally zero) is specified for each system.

For single frequency C1 links, U_{CAL0} is 2.5 ns but could be complemented by an additional component to represent systematic errors in the ionospheric model.

Changes in the set-up of the receivers after the calibration must be accounted for as described in section A.3.6 of the most recent Calibration guidelines in <https://webtai.bipm.org/ftp/pub/tai/publication/gnss-calibration/guidelines/>.

Table 1. Final P1/P2/C1 INTDLY values from the 1011-2019 trip. Values of REFDLY with respect to UTC(k) and of CABDLY during the calibration are also indicated for reference as available. All values are in ns. “Meas. Date” refers to the first day of the differential calibration, to which the calibration results can be applied. “Impl. Date” is the MJD when the results should be implemented in the receiver.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	INTDLY C1	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
BH01	BH01	2019/03/05	-38.6	-42.3	-37.4	11.3	144.8	(1)	0.0	58696
BH02	BH02	2019/03/05	30.2	29.8	30.2	7.6	128.2		0.0	58696

Notes:

(1) BH01 moved to [1101-2020](#) on MJD 59001.

- **Transfer of calibration performed by IMBH in September 2021**

The receiver BH03 has been differentially calibrated with respect to BH02 in September 2021, see the [report by IMBH](#).

The value ΔU_{CAL} is to be added to compute the final calibration uncertainty for links including the receiver BH03. It has been adopted from uncertainties given in the reports by IMBH.

Table 2. Final P1/P2/C1 INTDLY values for the BH03 receiver. Values of REF DLY and CABDLY during the calibration are also indicated for reference. “Meas. Date” refers to the first day of the differential calibration, to which the calibration results can be applied. “Impl. Date” is the MJD when the results are implemented in the CGGTTS files.

System	BIPM	Meas. date	INTDLY P1	INTDLY P2	INTDLY C1	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
BH03	BH03	2021/09/01	13.9	11.5	14.6	10.5	137.3		0.7	59486

Notes:

Version history

V1.0 2019/07/18: Publication of results from V1.0 of the Calibration report, to be implemented in the receivers.

V2.0 2021/10/05: Transfer of calibration from BH02 to BH03.