

GNSS calibration of ESTEC receivers with respect to PTB G1 (1013-2020)

Summary

In July 2020, the Physikalisch-Technische Bundesanstalt conducted trip to calibrate GNSS equipment owned by the European Space Technology Centre (The Netherlands, UTC acronym ESTC). The trip started and finished at the PTB, providing closure with respect to PTB Group1 reference receiver PT13.

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

• Final results for the calibrated systems

The INTDLY values of the receivers given in Table 1 have been computed by PTB based on the results of the Group 1 trip [1001-2018](#) for PT13 (GPS and Galileo) and should not be updated to reflect later changes in the conventional INTDLY values of the reference receiver.

For a P3/E3/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 is the conventional Group 2 value, and where ΔU_{CAL} (generally zero) is specified for each system.

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 <ftp://ftp2.bipm.org/pub/tai/publication/gnss-calibration/guidelines/>.

Table 1. Final P1/P2/E1/E5a INTDLY values from the 1013-2020 exercise. Values of REFDLY and CABDLY during the calibration are also indicated for reference. 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 E1	INTDLY E5a	REFDLY	CABDLY	Note	ΔU_{CAL}	Impl. date
ES03	ES03	2020/07/18	48.7	47.2	N/A	N/A	195.0	187.4		0.0	59121
ES04	ES04	2020/07/18	57.0	55.1	58.2	65.1	136.1	187.3		0.0	59121
ES07	ES07	2020/07/18	29.1	25.7	31.5	30.7	113.0	210.3		0.0	59121
ES08	ES08	2020/07/18	30.4	28.8	33.3	35.2	113.0	251.0		0.0	59121
ES09	ES09	2020/07/18	20.7	17.5	21.4	23.6	117.8	253.3		0.0	59121
ESo7	ESo7	2020/07/18	29.4	27.2	31.9	30.6	122.5	220.4		0.0	59121

Notes:

(1).

Version history

V1.0 2020/09/15: Publication of results from V1.1 of the PTB report..