

# GNSS calibration of DLR, IFAG and DTAG receivers with respect to PTB G1 (1016-2024)

## Summary

From September to December 2024, the Physikalisch-Technische Bundesanstalt (PTB) conducted a trip to calibrate GNSS equipment owned by the Deutsches Zentrum für Luft und Raumfahrt (DLR), the Bundesamt für Kartographie und Geodäsie (BIPM acronym IFAG) and the Deutsche Telekom AG (DTAG). The trip started and finished at PTB, providing closure with respect to the 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 ROA based on the results of the Group 1 trip [1001-2022](#) 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  $\Delta U_{CAL}$  (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](#).

Table 1. Final C1/P1/P2/E1/E5a INTDLY values from the 1016-2024 exercise. Values of REFDLY and CABDLY during the calibration are also indicated for reference. All values are in ns date in YYYY/MM/DD format. “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 C1	INTDLY P1	INTDLY P2	INTDLY E1	INTDLY E5a	REF DLY	CABD LY	Note	$\Delta U_{CAL}$	Impl. date
OBET	DL11	2024/9/18	30.1	27.9	24.7	30.2	30.5	2.2	213.2		0.0	
OBEB	DL12	2024/9/18	30.7	28.4	24.7	30.8	30.3	2.2	212.2		0.0	
DL02	DL02	2024/9/18	28.2	25.9	22.6	28.3	28.1	30.4	258.6		0.0	
WTZS	IF20	2024/10/09	29.3	26.6	28.7	27.2	28.4	74.5	118.0		0.0	60765
GOWT	GOWT	2024/10/09	-35.7	-36.9	-32.8	-36.3	-29.3	4.1	94.0		0.0	60765
WTCO	WTCO	2024/10/09	125.7	123.6	122.4	-	-	30.2	182.4		0.0	60765
DT04	DT04	2024/11/14	35.6	35.8	37.6	36.9	34.3	25.3	506.1		0.0	
DT05	DT05	2024/11/14	33.1	33.4	36.1	34.5	34.5	25.3	530.7		0.0	

Notes:

Version history

V1.0 2025/05/02: Publication of results from V1.1 of the PTB report.