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NIST Time and Frequency Bulletin

Kelsey Rodriguez, Editor

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Time and Frequency Division / HQ
Physical Measurement Laboratory

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Author ORCID iD
Kelsey Rodriguez: 0000-0001-8574-1155

Contact Information
This bulletin is published monthly. Address correspondence to:
Kelsey Rodriguez, Editor
Time and Frequency Division
National Institute of Standards and Technology
325 Broadway St
Boulder, CO 80305
(303) 497 5398
kelsey.rodriguez@nist.gov

Abstract

The Time and Frequency Bulletin provides information on performance of time scales and a variety of broadcasts (and related information) to users of the NIST services.

Keywords

Clocks; dissemination; frequency; GPS; oscillators; time.

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1. Time Scale Information

The values listed in the table below are based on data from the IERS, the USNO, and NIST. The UTC(USNO, MC) – UTC(NIST) values are obtained from the BIPM. UTC – UTC(NIST) data are on page 2.

Table 1. Variation in UT1 – UTC(NIST) and UTC(USNO, MC) – UTC(NIST) Time Scales.

0000 HOURS COORDINATED UNIVERSAL TIME			
January 2026	MJD	UT1 – UTC(NIST) (±1 ms)	UTC(USNO, MC) – UTC(NIST) (±5 ns)
4	61044	74.5 ms	2.9 ns
9	61049	72.3 ms	1.7 ns
14	61054	71.7 ms	0.3 ns
19	61059	74.2 ms	-1.7 ns
24	61064	72.2 ms	-2.2 ns
29	61069	70.4 ms	-1.9 ns

The clock pulses used by the WWV, WWVH, and WWVB time-code transmissions are referenced to the UTC (NIST) time scale. Occasionally, 1 s is added to the UTC time scale. This second is called a leap second. Its purpose is to keep the UTC time scale within ±0.9 s of the UT1 astronomical time scale, which changes slightly due to variations in Earth's period of rotation.

Positive leap seconds, beginning at 23 h 59 min 60 s UTC and ending at 0 h 0 min 0 s UTC, were inserted in the UTC time scale on 30 June 1972, 1981, 1983, 1985, 1992-1994, 1997, 2012, 2015 and on 31 December 1972-1979, 1987, 1989, 1990, 1995, 1998, 2005, 2008, 2016.

NO leap second will be introduced at the end of June 2026.

The insertion of leap seconds ensures that UT1 - UTC will always be held within ±0.9 s. The current value of UT1 – UTC is called the DUT1 correction. DUT1 corrections are broadcast by WWV, WWVH, WWVB, and ACTS and are printed below. These corrections may be added to the received UTC time signals in order to obtain UT1.

Table 2. Corrections made to DUT1.

DUT1 = UT1 – UTC =	+0.1 s beginning 0000 UTC 10 July 2025 +0.0 s beginning 0000 UTC 26 December 2024 +0.1 s beginning 0000 UTC 05 September 2024 +0.0 s beginning 0000 UTC 28 July 2022 -0.1 s beginning 0000 UTC 17 July 2021 -0.2 s beginning 0000 UTC 02 May 2019 -0.1 s beginning 0000 UTC 17 January 2019 +0.0 s beginning 0000 UTC 21 September 2018 +0.1 s beginning 0000 UTC 15 March 2018 +0.2 s beginning 0000 UTC 30 November 2017 +0.3 s beginning 0000 UTC 29 June 2017 +0.4 s beginning 0000 UTC 30 March 2017 +0.5 s beginning 0000 UTC 26 January 2017

The difference between UTC(NIST) and UTC has been within ±100 ns since July 6, 1994. The table below shows values of UTC - UTC(NIST) as supplied by the BIPM in their *Circular T* publication for recent periods where data are available. Data are given at ten-day intervals. Five-day interval data are available in *Circular T*.

Table 3. UTC – UTC(NIST).

0000 Hours Coordinated Universal Time		
DATE	**MJD**	**UTC-UTC(NIST), ns**
Jan. 29, 2026	61069	-1.0
Jan. 19, 2026	61059	-1.7
Jan. 9, 2026	61049	0.6
Dec. 30, 2025	61039	2.3
Dec. 20, 2025	61029	-0.2
Dec. 10, 2025	61019	-0.2
Nov. 30, 2025	61009	-0.4
Nov. 20, 2025	60999	-0.0
Nov. 10, 2025	60989	0.6
Oct. 31, 2025	60979	0.6
Oct. 21, 2025	60969	1.8
Oct. 11, 2025	60959	1.9
Oct. 1, 2025	60949	1.0
Sep. 21, 2025	60939	0.6
Sep. 11, 2025	60929	0.2
Sep. 1, 2025	60919	-0.4
Aug. 22, 2025	60909	1.7
Aug. 12, 2025	60899	1.3
Aug. 2, 2025	60889	-0.2
Jul. 23, 2025	60879	-0.3
Jul. 13, 2025	60869	0.3
Jul. 3, 2025	60859	-0.2
Jun 23, 2025	60849	-1.1
Jun 13, 2025	60839	-1.5
Jun 3, 2025	60829	-0.9
May 24, 2025	60819	-0.0

2. Broadcast Outages Over Five Minutes and WWVB Phase Perturbations

Table 4. Broadcast Outages and Phase Perturbations.

OUTAGES OF 5 MINUTES OR MORE						PHASE PERTURBATIONS 2 ms			
Station	Jan 2026	MJD	Began UTC	Ended UTC	Freq.	Jan 2026	MJD	Began UTC	End UTC
WWVB	None					None			
WWV	None					None			
WWVH	14 22	61054 61061	1906 2016	1920 2020	2.5 MHz 2.5 MHz	None			

3. Notes on NIST Time Scales and Primary Standards

Primary frequency standards developed and operated by NIST are used to provide accuracy (rate) input to the BIPM and to provide the best possible realization of the SI second. Cold-atom cesium fountain frequency standards, currently NIST-F3 and NIST-F4, have served as the U.S. primary standards of time and frequency since 1999. The uncertainty of the primary standards is currently parts in 10^{16}.

The AT1 scale is run in real-time by use of data from an ensemble of cesium standards and hydrogen masers. It is a free-running scale whose frequency is maintained as nearly constant as possible by choosing the optimum weight for each clock that contributes to the computation.

UTC is generated at the BIPM by use of a post-processed time-scale algorithm and is not available in real-time. The parameters that we use to generate UTC(NIST) in real-time are therefore based on an extrapolation of UTC from the most recent available data.

UTC(NIST) is generated as an offset from our real-time scale AT1. Time steps are never used. Instead, the frequency is steered so that the time output remains close to UTC. This is accomplished by using data published by the BIPM in its *Circular T* and by weekly estimates of UTC, which are published by the BIPM as rapid UTC or UTCr. Changes in the frequency may be made as often as once per week and are limited to $\pm 2.3 \times 10^{-14}$. The frequency of UTC(NIST) is kept as stable as possible at other times.

4. UTC NIST – AT1 Parameters

Table 5 lists parameters that are used to define UTC(NIST) with respect to our real-time scale AT1. To find the value of UTC(NIST) – AT1 at any time T (expressed as a Modified Julian Date, including a fraction if needed), the appropriate equation to use is the one for which the desired T is greater than or equal to the entry in the T_0 column and less than the entry in the last column.

The values of x_{ls}, x, and y for that month are then used in the equation below to find the desired value. The parameters x and y represent the offsets in time and frequency, respectively,

between UTC(NIST) and AT1; the parameter x_{ls} is the number of leap seconds applied to both UTC(NIST) and UTC, as specified by the IERS. Leap seconds are not applied to AT1.

Table 5. UTC(NIST) - AT1.

UTC(NIST) - AT1 = x_{ls} + x + $y(T - T_0)$					
Month	x_{ls} (s)	x (ns)	y (ns/d)	T_0 (MJD)	Valid until 0000 on: (MJD)
Jan 26	-37	-564694.40	-38.93	61069	61071
Jan 26	-37	-564422.94	-38.78	61062	61069
Jan 26	-37	-563883.52	-38.53	61048	61062
Jan 26	-37	-563614.51	-38.43	61041	61048
Dec 25	-37	-562262.46	-38.63	61009	61040
Nov 25	-37	-562262.46	-38.63	61006	61009
Nov 25	-37	-561453.33	-38.53	60985	61006
Oct 25	-37	-561183.27	-38.58	60978	60985
Oct 25	-37	-560644.13	-38.51	60964	60978
Oct 25	-37	-560373.86	-38.61	60957	60964
Sep 25	-37	-559832.62	-38.66	60943	60957
Sep 25	-37	-559021.81	-38.61	60922	60943
Aug 25	-37	-558484.49	-38.38†	60908	60922
Aug 25	-37	-558214.78	-38.53	60901	60908
Jul 25	-37	-557672.56	-38.73†	60887	60901
Jul 25	-37	-556862.38	-38.58	60866	60887
Jun 25	-37	-555780.74	-38.63†	60838	60866
Jun 25	-37	-555356.36	-38.58	60827	60838
May 25	-37	-554469.02	-38.58†	60804	60827
May 25	-37	-554159.98	-38.63	60796	60804
Apr 25	-37	-553001.08	-38.63	60766	60796
Mar 25	-37	-551803.55	-38.63	60735	60766
Feb 25	-37	-550721.91	-38.63	60707	60735
Jan 25	-37	-549563.01	-38.63†	60677	60707
Jan 25	-37	-549524.23	-38.78	60676	60677
Dec 24	-37	-549020.09	-38.78†	60663	60676
Dec 24	-37	-548826.69	-38.68†	60658	60676
Dec 24	-37	-548480.82	-38.43†	60649	60658
Dec 24	-37	-548327.50	-38.33	60645	60649
Nov 24	-37	-548212.51	-38.33†	60642	60645
Nov 24	-37	-547942.80	-38.53†	60635	60642
Nov 24	-37	-547170.20	-38.63	60615	60635

† Rate change in mid-month

*** Provisional value**

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Appendix A. List of Symbols, Abbreviations, and Acronyms

ACTS
Automated Computer Time Service

BIPM
Bureau International des Poids et Mesures

GPS
Global Positioning System

IERS
International Earth Rotation Service

MC
Master Clock

min
minute

MJD
Modified Julian Date

ms
Millisecond

NIST
National Institute of Standards and Technology

ns
Nanosecond

SI
International System of Units

TA
Atomic Time

TAI
International Atomic Time

s
Second

USNO
United States Naval Observatory

UT1
Universal Time (Astronomical)

UTC
Coordinated Universal Time

µs
Microsecond