

**NIST TIME AND FREQUENCY BULLETIN
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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 the most recent 310-day period in which data are available. Data are given at ten-day intervals. Five-day interval data are available in *Circular T*.

0000 Hours Coordinated Universal Time		
DATE	MJD	UTC-UTC(NIST), ns
Mar. 27, 2017	57839	5.5
Mar. 17, 2017	37829	-4.9
Mar. 7, 2017	37819	-6.6
Feb. 25, 2017	57809	-5.1
Feb. 15, 2017	57799	-2
Feb. 5, 2017	57789	-0.6
Jan. 26, 2017	57779	-0.6
Jan. 16, 2017	57769	-1.2
Jan. 6, 2017	57759	-1.4
Dec. 27, 2016	57749	-1.2
Dec. 17, 2016	57739	-2.6
Dec. 7, 2016	57729	-1.3
Nov. 27, 2016	57719	0.9
Nov. 17, 2016	57709	1.6
Nov. 7, 2016	57699	1.2
Oct. 28, 2016	57689	1.8
Oct. 18, 2016	57679	4.5
Oct. 8, 2016	57669	5.5
Sep. 28, 2016	57659	4.1
Sep. 18, 2016	57649	1.3
Sep. 8, 2016	57639	0.4
Aug. 29, 2016	57629	-1.6
Aug. 19, 2016	57619	-4.7
Aug. 9, 2016	57609	-4.2
Jul. 30, 2016	57599	-4.1
Jul. 20, 2016	57589	-2.0
Jul. 10, 2016	57579	-0.3
Jun. 30, 2016	57569	0.7
Jun. 20, 2016	57559	1.1
Jun. 10, 2016	57549	0.9
May 31, 2016	57539	0.4
May 21, 2016	57529	-0.3
May 11, 2016	57519	-0.6
May 1, 2016	57509	-2.0

3. BROADCAST OUTAGES OVER FIVE MINUTES AND WWVB PHASE PERTURBATIONS

OUTAGES OF 5 MINUTES OR MORE						PHASE PERTURBATIONS 2 ms			
Station	Mar 2017	MJD	Began UTC	Ended UTC	Freq.	Mar 2017	MJD	Began UTC	End UTC
WWVB	None					None			
WWV	3-7-17	57819	2325	2347	2.5 MHz	None			
WWVH	None					None			

4. 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. NIST-F1 and NIST F-2, cold-atom cesium fountain frequency standards, have served as the U.S. primary standards of time and frequency since 1999. The uncertainty of NIST-F2 is currently about 1 part 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(NIST) is generated as an offset from our real-time scale AT1. It is steered in frequency towards UTC by use of data published by the BIPM in its *Circular T*. Changes in the steering frequency will be made, if necessary, at 0000 UTC on the first day of the month, and occasionally at mid-month. A change in frequency is limited to no more than ± 2 ns/day. The frequency of UTC(NIST) is kept as stable as possible at other times.

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.

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5. UTC(NIST) – AT1 PARAMETERS

The table below 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.

$UTC(NIST) - AT1 = x_{ls} + x + y(T - T_0)$					
Month	x_{ls} (s)	x (ns)	y (ns/d)	T_0 (MJD)	Valid until 0000 on: (MJD)
May 17	-37	-444336.4	-36.45*	57874	57905
Apr 17	-37	-443935.45	-36.45	57863	57874*
Apr 17	-37	-443418.15	-36.95	57849	57863†
Apr 17	-37	-443231.4	-37.35	57844	57849†
Mar 17	-37	-443156.7	-37.35	57842	57844
Mar 17	-37	-442621.2	-38.25	57828	57842†
Mar 17	-37	-442099.7	-37.25	57814	57828†
Mar 17	-37	-442062.85	-36.85	57813	57814†
Feb 17	-37	-441325.85	-36.85	57793	57813
Feb 17	-37	-441029.45	-37.05	57785	57813†
Jan 17	-37	-439880.9	-37.05	57754	57785
Dec 16	-36	-439547.45	-37.05	57745	57754
Dec 16	-36	-439287.05	-37.2	57738	57745†
Dec 16	-36	-438770.45	-36.90	57724	57738†
Dec 16	-36	-438733.45	-37.00	57723	57754†
Nov 16	-36	-437694.75	-37.00	57704	57723
Nov 16	-36	-437694.75	-37.30	57695	57704†
Nov 16	-36	-437620.95	-36.90	57693	57695†
Oct 16	-36	-436956.75	-36.90	57675	57693
Oct 16	-36	-436510.35	-37.20	57663	57675†
Oct 16	-36	-436472.9	-37.50	57662	57663†
Sep 16	-36	-435910.4	-37.50	57647	57662
Sep 16	-36	-435350.9	-37.30	57632	57647†
Aug 16	-36	-434936.7	-37.65	57621	57632
Aug 16	-36	-434191.7	-37.25	57601	57621†
Jul 16	-36	-434079.95	-37.25	57598	57601
Jul 16	-36	-433041.2	-37.10	57570	57598†
Jun 16	-36	-431923.7	-37.25	57540	57570
May 16	-36	-431476.7	-37.25	57528	57540
May 16	-36	-430771.8	-37.1	57509	57528†
Apr 16	-36	-430697.6	-37.1	57507	57509
Apr 16	-36	-429931.05	-36.5	57486	57507†
Apr 16	-36	-429672.75	-36.9	57479	57486†
Mar 16	-36	-428636.75	-37.0	57451	57479

† Rate change in mid-month

*Provisional value