



OPEN

Compute Project

NMEA UTC Message for Time Card and GNSS Receivers

A

1.0

Base Specification

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1.1. OPTION A: OCP CLA

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1.2 Acknowledgements

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2. Change Log

Date	Version #	Author	Description
27NOV23	1.0	Sven Meier	Initial Version

3 NMEA UTC Message

3.1. Background

Every GNSS receiver basically supports NMEA messages to transfer information via a serial interface (UART). NMEA standard messages do not contain TAI time or any UTC offset or leap second information. Since many timing application nowadays use GNSS as their reference for time it is desirable to have a standard way of not only transferring the UTC time like in e.g. RMC or ZDA messages, but also a continuous time base (without leap seconds) like TAI. For wall clock applications or wherever UTC time is desirable UTC sideband information is required to convert from TAI to UTC and to correctly handle leap second events.

In the scope of OCP Time Card where different GNSS receivers are possible it is desirable to have a standard way for transferring this UTC sideband information from the GNSS receivers to the Time Card. Otherwise for each GNSS receiver the vendor specific protocol needs to be implemented. However, this is not something specific to the Time Card but relevant for the timing appliances in general.

Therefore a new NMEA message was defined. The format of the message is described in the next chapter.

3.2. NMEA UTC Message Format

\$GxUTC,TTTTTTTTTTTTTTTT,(-)ooo,(-)ttttttt,SS*CC

- **x:** P (GPS), L (GLONASS), A (GALILEO), B (BEIDOU), N (All)
- **TTTTTTTTTTTTTTTT:** current TAI Time in seconds (0 to $(2^{48}-1)$)
- **(-)ooo:** current TAI-UTC offset in seconds (-128 to 128)
- **(-)ttttttt:** time since last (negative) or to next (positive) leap second event in seconds (-99999999 to 99999999)
- **SS**
 - status as ASCII represented hex (00-FF, MSB left)
 - Bit0: TAI-UTC offset valid
 - Bit1: Leap info valid
 - Bit2: Leap61 announcement
 - Bit3: Leap59 announcement
 - Bit4: Time since last or to next leap event valid
 - Bit5: TAI time valid
 - Bit6: Reserved '0'
 - Bit7: Reserved '0'
- ***CC:** checksum (00-FF)

The messages are supposed to be sent once per second.

The message allows to:

- Directly get a continuous time in TAI.
- Calculate the previous or next leap second event by adding the time since the last or to next leap second event to current TAI time.
- Convert the current TAI time to UTC time taking the leap seconds into account.