

**Time scale in GLONASS satellite system and UTC  
modification problems**



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## Time scale in GLONASS satellite system and UTC modification problems

In recent years the necessity for moving from the corrected UTC to the continuous time scale is being discussed widely by international timing community.

Nowadays there is a great amount of user equipment on the base of corrected national realizations of UTC not only in Russia but in other countries as well.

The correction is a standard well-adjusted procedure.



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### UTC Time Scale nowadays

- reference signal 1Hz
- **continuous signal**
- coordinated with atomic time scale with high accuracy

- leap seconds are added
- **corrected** up to several times per year to keep it within 1 s of UT1



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### Characteristics of the Existing UTC

- Reference signal 1 Hz and the process of adding leap seconds are independent.
- Reference signal 1 Hz is a highly stable reference for precise time/frequency applications.
- Corrected time scale being within 1 s of UT1 makes it the reference time scale for different applications.
- Regularly time scale corrections don't influence the continuity of reference signal.



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### Consequences of Abolishing UTC Corrections

- The offset between UTC and mean solar time will increase by 1 min every 50 years.
- The probability of supported systems failures will be large due to rare corrections of the large offset.
- The equipment of the systems referenced to UTC as time scale coordinated to mean solar time will have to be modernized:
  - power generation and telecommunication;
  - control of astronomical instruments;
  - the service of solar activity monitoring;
  - ground user equipment using navigation signals.



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### Providing “Backward compatibility”

- The possible alternative that can provide “backward compatibility” is to keep the corrected UTC as it is nowadays when the new continuous UTC is introduced.
- As a result, all existing GNSS will continue operating in their normal operation mode with all existing models of user equipment.
- At the same time, in future the developers will be able to realize any of the two variants of UTC or both of them simultaneously.



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### Conclusions

Continuous reference signal 1 Hz is not corrected and is successfully used as highly stable reference signal.

Regularly corrections by 1 s are a standard well-adjusted procedure. They are taken into account mathematically by user equipment.

Abolishing UTC corrections will cause the necessity to modernize (replace) the existing models of user equipment.



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**Thank you for your attention!**