LOCAL ATOMIC TIME TA(UA)

V. SOLOVYOV[1], O. TKACHUK[1], A. KORSUN'[2]
[1] National Scientific Centre "Institute of Metrology"
42 Mironositska Str., 61002 Kharkiv, Ukraine
e-mail: solovyov@metrology.kharkov.ua
[2] Main Astronomical Observatory, National Academy of Sciences of Ukraine
27 Zabolotnoho Str., 03680 Kyiv, Ukraine
e-mail: akorsun@mao.kiev.ua

The standard of the units of time and frequency, which was realized at the National Scientific Centre "Institute of Metrology", was confirmed as the national standard of Ukraine in 1997.

It consists of the following groups of measurement technique means:

- the equipment of realization and keeping the units of timefrequency, which includes the hydrogen standards of frequency, formed into the main and the reserve groups. The main group consists of not less than three standards as a rule;
- the equipment of keeping the scale of time and the standard frequencies, which includes the system of forming the working scale of time, the system of forming the standard frequencies, the system of amplification and multiplication of the standard signals of time and frequency;
- the equipment of internal comparisons including frequency and phase comparators and automated measurement system;
- the equipment of external comparisons, which includes the equipment of standards comparisons by means of the signals of satellite navigation systems GPS and GLONASS (the specialized time receivers Acutime-2000, Navior-T and geodetic receiver by the company Trimble 4000 SSI); the equipment of comparisons of standards by radio meteoric channel by means of the equipment "Metka"; the equipment of comparisons of standards by TV channels;
- the equipment of standard assurance including the following:
  - the system of reserved power supply;
  - the system of conditioning and thermostating of the working rooms;
  - the system of measurement the environment parameters in the working rooms.

The standard has the following features:

- the metrological characteristics:
  - the standard provides realization of the units of time and frequency with the average square deviation of the measurement result, which doesn't exceed $5{\cdot}10^{-14}$;

– instability of the standard is not more than $2 \cdot 10^{-14}$ within the measurement interval of 1000 s to one day;

– the non-excluded systematic error is not more than $1 \cdot 10^{-13}$.

Mean fractional deviations of the UTC (UA) scale interval from that of UTC and UTC(SU) are presented in Table:

MJD	$\Delta f/f$[UTC(UA)–UTC], $\times 10^{-14}$	$\Delta f/f$ [UTC(UA)–UTC(SU)], $\times 10^{-14}$
53014...53043	2.6	2.3
53044...53073	2.1	2.5
53074...53103	0.8	1.6
53104...53133	1.0	1.6
53134...53163	−0.6	−0.5
53164...53193	−0.8	−0.7
53194...53223	−2.0	−0.8
53224...53253	−3.6	−1.6
53254...53283	−1.6	−0.5
53284...53313	−2.2	−0.5
53314...53343	−1.5	−0.5
53344...53373	−0.6	−4.6
Θ	−0.5	−0.1
σ	1.9	2.0

Θ is the constant difference, σ is the standard deviation

The tasks of the time scale TA(UA):

a) to insert in set of the primary cesium frequence standard,

b) to renovate the set of the hydrogen standards,

c) to enter the international set of the laboratories which collaborate with the BIPM (Bureau International des Poids et Mesures). As a results of these tasks, the accuracy of determination of the differences between the scales UTC and UTC(UA) and so the metrological safety of the time scale TA(UA) will be increased. To solve this problem it is necessary to acquire a special receiver of the GPS and GLONASS signal.