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DEPARTMENT OF THE ARMY TECHNICAL BULLETIN

CALIBRATION PROCEDURE FOR FREQUENCY AND TIME MEASUREMENTS

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REPORTING OF ERRORS

You can help improve this publication. If you find any mistakes or if you know of a way to improve the procedure, please let us know. Mail your letter or DA Form 2028 to: Commander, U. S. Army Aviation and Missile Command, ATTN: AMSAM-MMC-MA-NP, Redstone Arsenal, AL 35898-5230. A reply will be furnished to you. You may also send in your comments electronically to our e-mail address: ls-lp@redstone.army.mil or FAX 256-842-6546/DSN 788-6546.

CHANGE 1

SECTION I
GENERAL INFORMATION

1. Purpose. This information and guidance for personnel who are involved with frequency and time measurements. This covers frequency and time standardization information and the present frequency and time capabilities and techniques.

2. Applicability. This bulletin is applicable to all TMDE support activities (TSA), Army National Guard (ARNG), and Government owned contractor operated facilities (GOCO), to include the U.S. Army Primary Standards Laboratory (APSL).

3. Definitions

a. Accuracy. The accuracy of a frequency standard is the difference between its measured frequency and the U.S. Naval Observatory (USNO) time and frequency standard. Accuracy is usually expressed in parts in $10^{N.}$

b. Diurnal shift. Diurnal shift is a phase offset between eat local standard and a very low frequency (VLF) signal caused by a shift from a daylight propagation path to a night path. An opposite (approximately) equal phase offset will occur when propagation changes from a night path to a daylight path.

c. Global Positioning System (GPS). GPS is a worldwide, satellite-based radio navigation system developed by the U.S. Department of Defense (DOD).

d. Precise frequency. Signifies a frequency (time interval) requirement within 1 part in 10^{N}.

e. Precise time. Signifies a time requirement within 10 ms.

f. Retrace. Retrace describes the ability of a frequency standard to return to an original frequency after an offset period. For example, the quartz oscillator will retrace to less than 1 part in 10^{8} of the original frequency within 45 minutes following a 24-hour off period. Fast warm-up quartz oscillators will achieve a stability of 5 parts in 10^{10} in less than 24 hours. However, the frequency must be adjusted to the accuracy needed. The exact frequency at which high stability oscillators will stabilize after an off period is not known and may be any value from the original frequency to the retrace specification.

g. Stability. The stability of a frequency standard is its frequency change. Stability is usually expressed in parts in 10^{N}/day for the time interval of interest.

h. Standards. Signify the reference values of time and time interval. These standards are determined by astronomical observation and by the operation of atomic clocks. They are disseminated by the transport of clocks, radio transmission, and other means.