

## EARPHONE CALIBRATION SERVICE IMPROVED

The Bureau has announced an improved earphone calibration service for earphones compatible with the NBS 9-A coupler on which calibrations will be made. Many current supra-aural audiometric earphones meet this requirement.

The procedure is equivalent to that described in the American National Standards Institute\* Method for the Coupler Calibration of Earphones, Z24.9-1949, now being revised. The latest version will be used. The coupler is described in Appendix A of S3.6-1969, Standard Specification for Audiometers.

The applied voltage response of the earphone is reported at ten audiometric frequencies from 125 to 8000 Hz. The precision (3 sigma) is estimated as  $\pm 0.2$  dB from 125 to 6000 Hz and  $\pm 0.6$  dB at 8000 Hz. The estimate of credible bounds to the systematic error is  $\pm 0.25$  dB. A continuous response-vs-frequency curve is furnished as a convenience.

The calibrated earphone can be used to check earphone calibration equipment in a standards laboratory. Used together with known reference equivalent threshold sound pressure levels, it can also check audiometer calibrators.

Direct inquiries to, and mark shipments for the attention of: Sound Section, Sound Bldg., Rm. B106, National Bureau of Standards, Washington, D.C. 20234. Telephone: 301-921-3607. The NBS designation of the service is item 213.012a and the fee is \$100.<sup>5</sup>

## WWVL CHANGES BROADCAST FORMAT

For the past several years the broadcasts of NBS Radio Station WWVL (Fort Collins, Colo.) have been used experimentally in a program to study VLF time synchronization capabilities. A time-shared multifrequency concept is being employed to conserve bandwidth and to permit various degrees of receiving equipment sophistication and cost within the same system, as appropriate to timing requirements of the user. WWVL broadcasts on the UTC system<sup>1</sup> so that all frequencies listed here are nominal only and are offset (for 1969 by  $-300 \times 10^{-10}$ ) from the atomic definition. Future broadcasts will be restricted to use of the following frequencies, which are presently assigned to the National Bureau of Standards: 20.9 kHz, 20.5 kHz, and the band 19.9 to 20.1 kHz.

The previous broadcast schedule of WWVL consisted of alternate ten second transmissions of 20.0 kHz and 20.5 kHz. At 0000 UT on 4 November 1969, the format was changed to the following: Alternate 10 second transmissions of 20.0 kHz, 19.9 kHz, and 20.9 kHz, with the 20.0 kHz transmission alternating between the ten second

periods of 19.9 and 20.9 kHz transmissions, that

For 10 seconds, 20.0 kHz will be broadcast

Next 10 seconds, 19.9 kHz will be broadcast

Next 10 seconds, 20.0 kHz will be broadcast

Next 10 seconds, 20.9 kHz will be broadcast

Etc.—

This experimental schedule will continue until further notice.

## STANDARD FREQUENCY AND TIME BROADCASTS

High-frequency radio stations WWV (Fort Collins, Colo.) and WWVH (Maui, Hawaii) broadcast time signals on the Coordinated Universal Time (UTC) system as coordinated by the Bureau International de l'Heure (BIH), Paris, France. These NBS time signals, UTC(NBS), are maintained within 5 microseconds of the corresponding time signals of the U.S. Naval Observatory, UTC(USNO). The UTC pulses occur at intervals that are longer than one coordinate second by 300 parts in  $10^{10}$  during 1969, due to an offset in carrier frequency coordinated by BIH. To maintain the UTC scales in close agreement with the astronomers' time, UT2, phase adjustments are made at 0000 hours Greenwich Mean Time (CMT) on the first day of a month as announced by BIH. *There will be no adjustment made on January 1, 1970.*

The low-frequency radio station WWVB (Fort Collins, Colo.) broadcasts seconds pulses without offset to make available to users the standard of frequency so that absolute frequency comparisons may be made directly, following the Stepped Atomic Time (SAT) system. Step time adjustments of 200 ms are made at 0000 hours GMT on the first day of a month when necessary. BIH announces when such adjustments should be made in the scale to maintain the seconds pulses within about 100 ms of UT2. *There will be no adjustment made on January 1, 1970.*

NBS obtains daily UT2 information from forecasts of extrapolated UT2 clock readings provided by the U.S. Naval Observatory with whom NBS maintains close cooperation.

<sup>1</sup> IEEE standard for precision coaxial connectors, IEEE Trans. Instr. Meas. IM-17, No. 3, 204-218 (Sept. 1968). Also as Standard Publication No. 287, available from the Institute of Electrical and Electronics Engineers, Inc., 375 East 47th St., New York, N.Y. 10017.

<sup>2</sup> For calibrations of these capacitors at frequencies below 0.1 MHz, contact the Electricity Division, National Bureau of Standards, Washington, D.C. 20234.

<sup>3</sup> McGregor, M. C., Hersh, J. F., Cutkosky, R. D., Harris, F. K., and Kotter, F. R., New apparatus at the National Bureau of Standards for absolute capacitance measurement, IRE Trans. Instr. I-7, Nos. 3 and 4, 253-261 (Dec. 1958).

<sup>4</sup> Jones, R. N., and Huntley, L. E., Precision coaxial connectors in lumped parameter immittance measurement, IEEE Trans. Instr. Meas. IM-15, No. 4, 375-380 (Dec. 1966).

<sup>5</sup> Moore, R. D., Lock-in amplifiers for signals buried in noise, Electronics 35, No. 23, 40-43 (June 1962).

<sup>6</sup> See Nat. Bur. Stand. (U.S.), Spec. Publ. 250, Calibration and Test Services of the National Bureau of Standards, available from Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for \$1.75.

<sup>7</sup> For a description see NBS Frequency and Time Broadcast Services, Nat. Bur. Stand. (U.S.), Spec. Publ. 236, revised annually, available from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C. 20402, for 25 cents.

\* Formerly the United States of America Standards Institute.