JANUARY 12, 1950

U. S. DEPARTMENT OF COMMERCE
NATIONAL BUREAU OF STANDARDS
CENTRAL RADIO PROPAGATION LABORATORY

LETTER
CIRCULAR
LC 974

STANDARD FREQUENCIES AND TIME SIGNALS, WWV AND WWVH

STANDARD RADIO FREQUENCIES
STANDARD TIME INTERVALS
TIME ANNOUNCEMENTS
STANDARD MUSICAL PITCH
STANDARD AUDIO FREQUENCIES
RADIO PROPAGATION NOTICES

WWV

BROADCAST CONTINUOUSLY

Mc	POWER, Kw	MODULATIONS, c/s
2.5	0.7	1, 440 or 600
5	8.0	1, 440 or 600
10	9.0	1, 440 or 600
15	9.0	1, 440 or 600
20	8.5*	1, 440 or 600
25	0.1	1, 440 or 600
30	0.1	1
35	0.1	1

WWVH

BROADCAST CONTINUOUSLY **

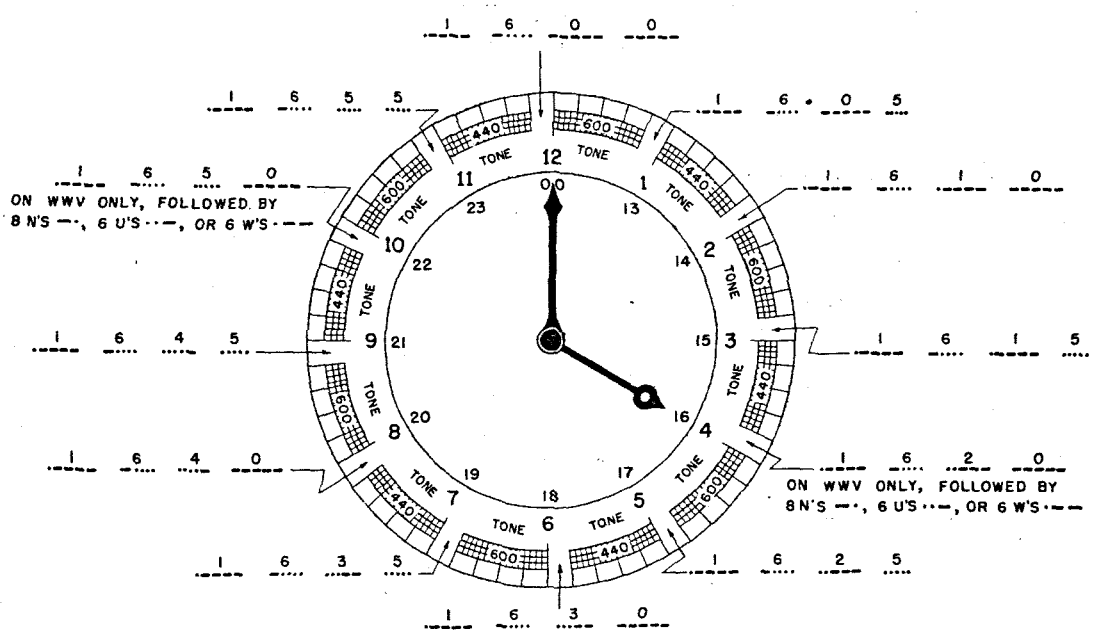
Mc	POWER, Kw	MODULATIONS ,c/s
5	0.4	1, 440 or 600
10	0.4	1, 440 or 600
15	0.4	1, 440 or 600

*0.1 Kw, FOR FIRST 4 WORK DAYS AFTER FIRST SUNDAY OF EVEN MONTHS.

***REGULAR INTERRUPTIONS EXPLAINED* ON REVERSE SIDE.

THE HOUR ILLUSTRATED IS 1600 TO 1700 IN 24 HOUR TIME

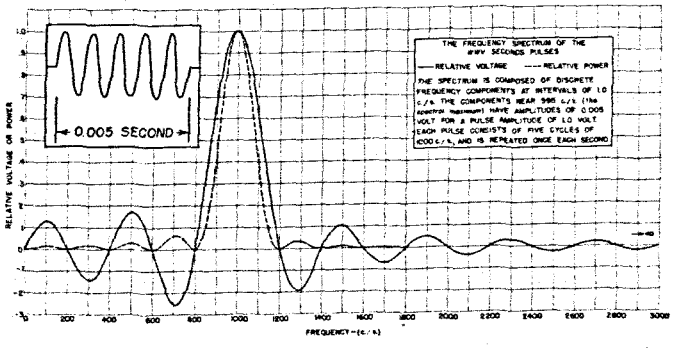
UNIVERSAL TIME



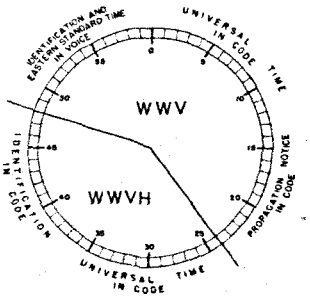
A VOICE ANNOUNCEMENT OF EASTERN STANDARD TIME IS GIVEN EACH FIVE MINUTES FROM STATION WWV

SECONDS PULSE

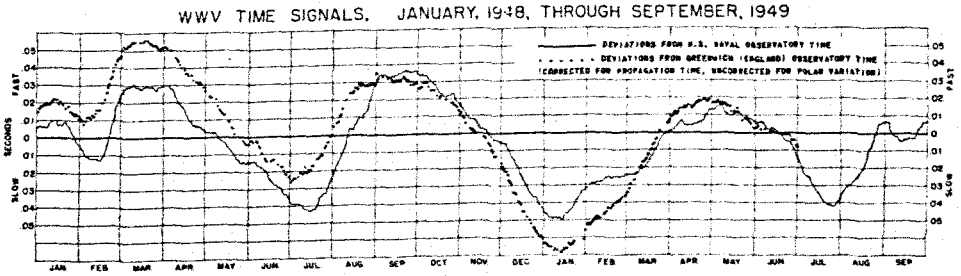
(NO PULSE IS TRANSMITTED AT THE BEGINNING OF THE LAST SECOND OF EACH MINUTE)



ONE-MINUTE ANNOUNCEMENT INTERVALS



WWV TIME SIGNALS, JANUARY, 1948, THROUGH SEPTEMBER, 1949



Standard Frequencies and Time Signals
WWV and WWVH

1. Radio Frequencies and Locations

Station WWV (N 38° 59' 33", W 76° 50' 52"; near Washington, D.C.) broadcasts continuously, night and day, on standard radio frequencies of 2.5, 5, 10, 15, 20, 25, 30 and 35 Mc.

Station WWVH (N 20° 46' 02", W 156° 27' 42"; near Puunene, T.H.) broadcasts on standard radio frequencies of 5, 10 and 15 Mc. Entire broadcast is interrupted for 4 minutes following each hour and half hour and for periods of 40 minutes beginning at 0700 and 1900 UT.

2. Audio Frequencies and Musical Pitch

Two standard audio frequencies, 440 cycles per second and 600 cycles per second, are broadcast on all radio carrier frequencies except 30 and 35 Mc. The audio frequencies are given alternately, starting with 600 c on the hour for four minutes, interrupted one minute, followed by 440 c for four minutes, and interrupted one minute. Each ten-minute period is the same. The 440 cycles per second is the standard musical pitch, A above middle C.

3. Time Signals and Standard Time Intervals

The audio frequencies are interrupted for intervals of precisely one minute. They are resumed precisely on the hour and each five minutes thereafter. They are in agreement with the basic time service of the U. S. Naval Observatory so that they mark accurately the hour and the successive 5-minute periods.

Universal Time (Greenwich Civil Time or Greenwich Mean Time) is announced in telegraphic code each five minutes starting with 0000 at midnight. Time announcements are with reference to return of the audio frequencies.

A voice announcement of Eastern Standard Time follows each telegraphic code announcement from station WWV.

There is a pulse on each carrier frequency of 0.005-second duration which occurs at intervals of precisely one second. The pulse consists of five cycles, each of 0.001-second duration, and is heard as a faint tick when listening to the broadcast.

4. Accuracy

Frequencies as transmitted from WWV and WWVH are accurate to within 2 parts in 10^8; this is with reference to the mean solar second, 100 day interval, as determined by the U. S. Naval Observatory with a precision of better than 3 parts in 10^9. Time intervals, as transmitted, are accurate within $\pm$(2 parts in 10^8 + 1 microsecond).

Frequencies received are as accurate as those transmitted for several hours per day during total light or total darkness over the transmission path at locations in the service range. During the course of the day errors in the received frequencies vary approximately -3 to +3 parts in 10^7. During ionospheric storms transient conditions in the propagating medium may cause momentary changes as large as 1 part in 10^6.

Time intervals as received are normally accurate within $\pm$(2 parts in 10^8 + 1 millisecond). Transient conditions in the ionosphere at times cause received pulses to scatter by several milliseconds.

5. Radio Propagation Disturbance Warning Notice from WWV

An announcement of radio propagation conditions is broadcast in code on each of the standard radio frequencies at nineteen and forty-nine minutes past the hour. If a warning is in effect, the letter "W" (in International Morse Code) is repeated 6 times following the time announcement; if unstable conditions are expected, the letter "U" is repeated 6 times; if there is no warning, the letter "N" is repeated 8 times.