

## CHRONOLOGY

# Time Signals Now Broadcast Twenty Times Each Day

**T**WENTY times daily, every hour on the hour except at 9 and 11 a. m. and 9 and 11 p. m., eastern standard time, a time signal is now broadcast from the U. S. Naval Observatory, through the naval radio station at Arlington. Formerly signals were transmitted only six times daily. The new service was inaugurated several weeks ago on an experimental basis, and it is now expected that the schedule will be made permanent.

With the new schedule astronomers and other scientists who need to know the time with the greatest accuracy can check their clocks more frequently. Seismologists, who study earthquakes, can record the signals directly on the seismograph records, along with the wavy lines produced by the vibrations of an earthquake. This will permit more accurate location of earthquakes in distant parts of the world. The service will be especially valuable to amateur astronomers, not equipped with the precision clocks of their professional colleagues. Even a cheap watch will run accurately enough for an hour, if it can be set before and after.

## Long Wave

The twenty-hour-a-day signal is broadcast from NAA, the Arlington station, on a frequency of 113 kilocycles, or 2635 meters, too long a wave for ordinary broadcast receivers. The hours at which signals are omitted are used for long established broadcasts, in code, which could not be discontinued. In addition to the 113 kilocycle transmission, NAA also sends out signals from the Observatory at six different times during the day on eight frequencies ranging from 64 to 16,820 kilocycles. Only one, on 690 kilocycles, is in the broadcast range, with signals at noon and ten p. m., eastern standard time. Station NSS at Annapolis broadcasts some of the signals on short wave, and they are rebroadcast from NPG at San Francisco and NPM in Honolulu.

A vibrating crystal of quartz is now used to control the clock which transmits the signals, and connection is made by wire with the radio stations at Arlington and Annapolis. This clock was

recently developed by Capt. J. F. Hellweg, superintendent of the Observatory, and Paul Sollenberger, in charge of the time service. It is frequently checked with the standard clocks of the Observatory, which show star time and gain about four minutes daily on ordinary clocks.

## Five Minutes To the Hour

Each signal, as formerly, begins at five minutes before the hour, a short buzz marking each second. The twenty-ninth second of each minute is omitted, and so are the 56th, 57th, 58 and 59th. In addition, the 51st, 52d, 53d, 54th and 55th of the last minute are omitted. Thus the beginning of the next signal after the ten-second pause marks the exact hour. One other second of each of the first four minutes is also omitted. These are the 51st second of the 55th minute, the 52d second of the 56th minute, the 53d second of the 57th minute and the 54th second of the 58th minute. This is not as complicated as it sounds. It simply means that when there is a one-second pause, followed by

four signals and a long pause, the beginning of the next thereafter marks the fourth minute before the hour. If three signals followed the short pause, it will be three minutes before the hour, and so on.

*Science News Letter, November 17, 1934*

## ASTRONOMY

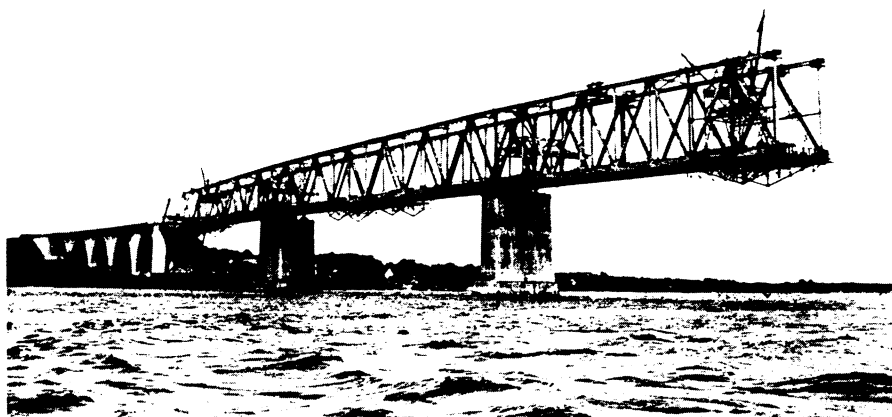
## Reinmuth Comet Back on a Visit

**R**EINMUTH'S comet of 1928, first seen by Prof. K. Reinmuth of Heidelberg Observatory on Washington's birthday, 1928, has been rediscovered by Dr. H. M. Jeffers of Lick Observatory at Mt. Hamilton, California. This is the report of Dr. Harlow Shapley, director of Harvard College Observatory, which is the coordinating center for astronomical data.

Between one and two o'clock Pacific Standard Time in the morning of Nov. 5, Dr. Jeffers first caught sight of the diffuse, faintly glowing object north of the constellation of Orion, which at this hour is slightly southwest of the zenith overhead.

Reinmuth's comet is not observable with the human eye or even weak telescopes. Powerful instruments are needed to detect the faint object of the sixteenth magnitude of brightness. No tail is yet reported.

*Science News Letter, November 17, 1934*



## INTERNATIONAL BRIDGE

*A traffic link joining Germany and Denmark is now being stretched across the tempestuous Baltic Sea between Jutland and Fuenen. Because of rough water, construction of the new bridge was begun at piers in the middle and pushed simultaneously toward both shores. The German end, shown above, is now complete, and the Denmark part is expected to reach completion early in 1935.*