https://www.observatoiredeparis.psl.eu/at-the-3rd-stroke-the-speaking-clock-will-be-80.html

At the 3rd stroke…, the speaking clock will be 80 years old

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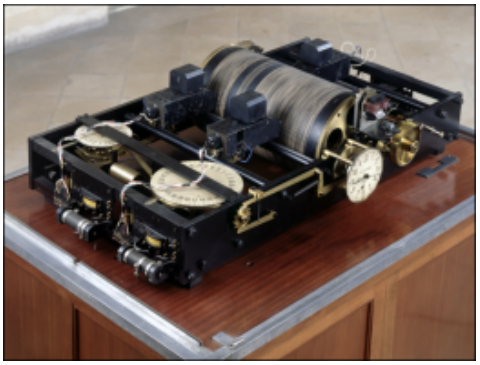
Observatoire de Paris - PSL Centre de recherche en astronomie et astrophysique

On the 14th of February, one of our national assets, the speaking clock, will celebrate its 80th anniversary at the Paris Observatory, where it was born. Invented by Ernest Esclangon in 1933, the present device is a fourth generation machine. The present version is housed in the Systèmes de référence temps espace department - - SYRTE , whose scientific personnel ensures that it works without fail. It participates in the making available in France the Paris Observatory's Universal coordinated time – UTC(OP), the standard for French civil time created by the SYRTE. In the XXIst century, it coexists with other much more efficient time transfer techniques, some of which were developed by that laboratory.



The fist speaking clock in the world was commissioned in1933 at the Paris Observatory
(Bibliothèque de l'Observatoire de Paris)

Since its beginnings in 1667, the measurement of time has been at the heart of the Paris Observatory's occupations. The plane of symmetry of its main building was originally intended to be along the Paris meridian : true midday occurs when the Sun crosses this plane. In 1891, this meridian played an important part in the standardization of time in France, civil time in France having been defined as that of the Paris meridian ; this is no longer the case today.

Thus, at the end of the XIXth century, before the invention of the speaking clock, the Paris Observatory gave out the official time : a telephone operator gave a more or less accurate reply to the numerous telephone requests of the public, which perturbed the normal work of the observatory which at a that time had only one line.

The speaking clock, a world first

In the period between the two wars, professor Ernest Esclangon, then director of the Paris Observatory, tired of being unable to use his telephone, decided, in collaboration with France Telecom (ex P.T.T.) to automate the telephonic transmission of time in France : he invented the speaking clock.

The speaking clock was commissioned on the 14th of February 1933. It was a resounding public success, which solved in a spectacular way the problem of distributing time over the whole country. On the first day, there were 140 000 telephone calls, but only 20 000 could be answered through the 20 lines which had been attributed. Afterwards, 300 000 calls a month would use up sixty lines. The voice you hear is that of Marcel Laporte (the first French radio newscaster, popularly known as « Radiolo »). The time given out by the Observatory, through an ordinary telephone call, is accurate to one tenth of a second.

Its principle was inspired by the then new talking cinema. The idea was to record a voice on a set of optical films. These were coupled to photoelectric cells, which were moved by a motor during the day, in such a way that the cells would read the part of the films which corresponded to the exact time. The device was connected to a fundamental clock (situated in an underground gallery of the Paris Observatory) whose electrically driven pendulum oscillated in an enclosure maintained at constant temperature and pressure and thus kept count of the time.

The current version

This is the fourth generation of speaking clock, the fruit of decades long improvements. It was commissioned in 1991. Designed and managed by the Orange telephone operator, and available through a phone call to 36 99, it is housed at the Paris Observatory, in the « time room » of the SYRTE. Servoed to a hydrogen maser – the time piece – of the SYRTE, it distributes the Universal Coordinated Time of the Paris Observatory, which constitutes today the standard for French civil time, made by the scientific teams of the LNE-SYRTE.

The control room for French civil time, at the Paris Observatory.
(Observatoire de Paris / SYRTE)

The present clock is completely electronic. The distribution of time is guaranteed by a set of four speaking clocks (each made up of a clock and an « announcement generator") under the control of a "comparator". Its current precision is twenty thousandths of a second. The voice you hear is, in turn, masculine (that of an anonymous actor) or feminine (that of the actress Sylvie Behr). It gives you the date as well as the time, and adds « at the third stroke it will be », without the word « exactly » which was in the precedings versions. The various prerecorded syllables of the messages will enable the time to be announced up to 2085.

The distribution of time : a challenge for modern times

The need for ultra-precise date-stamping of certain events, or the synchronization of large scale networks, constitutes a real challenge in certain sectors : telecommunications, data sharing, banking transactions, emergency services, rail and air transport. In such cases, techniques which are more sophisticated than the speaking clock are used :

– The NTP (Network Time Protocol) servers enable the distance synchoronization of computers to UTCC (for more information : http://syrte.obspm.fr/informatique/ntp_infos.php).

– Radioguidance, using the signal transmitted on the carrier wave of France Inter long waves (162 kHz) ; this is used, for example, to synchronize church clocks.

– For professional applications which require that distant clocks be compared with a very high precision – typically a nanosecond, i.e. a thousandth of a second -, are used the GPS satellite system or geostationary telecommunications satellites (the TWSTFT system – Two-Way Satellite Time and Frequency Transfer).

– For scientific research, the REFIMEVE+ is seeing the light of day ; it is supported by the Laboratoire de Physique

des Lasers - LPL of the University Paris 13 in collaboration with the SYRTE and the network RENATER - Réseau National de télécommunications pour la Technologie l'Enseignement et la Recherche. Its objective is to send to about twenty laboratories spread over the whole of France stable reference signals produced by the SYRTE of the Paris Observatory. This network will subsequently expand to connect up all the European metrological laboratories.

1 The SYRTE - Systèmes de Référence Temps-Espace – is one of the five scientific departments of the Paris Observatory ; it is a unité mixte de l'Observatoire de Paris, of the CNRS, and of the Pierre and Marie Curie University – UPMC, in partnership with the Laboratoire national de métrologie et d’essais - LNE .

