

ROYAL SOCIETY TERCENTENARY

DURING the last two weeks of this month, Great Britain will celebrate the three-hundredth anniversary of the founding of the Royal Society of London, the world's oldest continuously active scientific organization. The article by Dr. Essen which follows is one of a series written by leading British scientists for publication in the United Kingdom in commemoration of the event.

The Royal Society traces its beginnings to the informal meetings of a small group of seventeenth-century enthusiasts who gathered together frequently in the years following 1645 to discuss the "New Philosophy" dealing with the "improving of natural knowledge by experiments". In the latter part of 1660, a dozen individuals (including Lord Brouncker, Robert Boyle, Sir William Petty, John Wilkins, and Christopher Wren) drafted the framework for a more formal association, an action which gained the quick blessing of the reigning monarch, Charles II. Two years later the organization was incorporated under a royal charter as "The Royal Society of London for Improving Natural Knowledge".

From its earliest years, the Society has been active in the publication of scientific material, in serving in various advisory capacities to the government, and in maintaining scientific relations between Britain and the other nations of the world. *The Philosophical Transactions*, the oldest existing scientific journal, first appeared in 1665 as a periodical of sixteen quarto pages containing selections from contemporary correspondence between members of the Society and natural philosophers in various European countries.

The Royal Society played an instrumental part in the establishment of the National Physical Laboratory late in the nineteenth century, and it appoints most of the members of that Laboratory's governing body. Early in the eighteenth century it was made solely responsible for the work of the Royal Greenwich Observatory, a supervisory function which it now shares with Britain's Royal Astronomical Society. The Society's current responsibilities in international relations are evidenced by its advisory role in Britain's participation in the affairs of UNESCO, by its recent administration of the government grant in support of British scientific activities during the International Geophysical Year, and by its membership in several international scientific unions.

ACCURATE

By Louis Essen

DOMESTIC clocks can be set right to within one second by means of the six "pips" broadcast by the British Broadcasting Corporation, and more accurate clocks used for scientific purposes can be set to about one-hundredth of a second by means of special time signals from the Royal Greenwich Observatory.

The very ease with which clocks can be set in this way may conceal the complex processes involved in establishing the accurate time scale on which the signals are based.

Any process which is repeated in a regular manner can be used to indicate the passage of time, but the regular movements of the bodies of the solar system are so inescapably obvious that they have been adopted for this purpose from the earliest times until the present day. In particular, the rotation of the Earth on its axis gives the solar day, which is divided by means of clocks into hours, minutes, and seconds.

Although the solar day which governs our daily routine is such an obvious choice as the astronomical unit of time, it possesses two marked disadvantages: it is not of equal value throughout the year, and it cannot be measured very precisely.

Anyone who has seen a star moving across the field of a telescope will realize how much more precisely the passing of a star can be timed as it crosses a point vertically overhead; and in practice stellar observations are used to determine the sidereal day which is the time of rotation of the Earth relative to the fixed stars. This is then converted, from a knowledge of the length of the year, into the mean solar day.

A number of other corrections for known irregularities of the Earth's rotation are also made, and the clocks which supply the time signals are adjusted to keep in time with a hypothetical day based on current and past astronomical measurements and corrected to give a unit as nearly as possible uniform throughout the year.

It is important to notice that astronomical time serves two quite different purposes—it gives the time of day, which is required for civil and some scientific purposes, and also furnishes a scale of time on which the duration of events can be measured. It thus supplies the answers to the questions: "What time is it?" and "How long does it take?". Most scientific work is concerned with the second question, and modern developments, par-