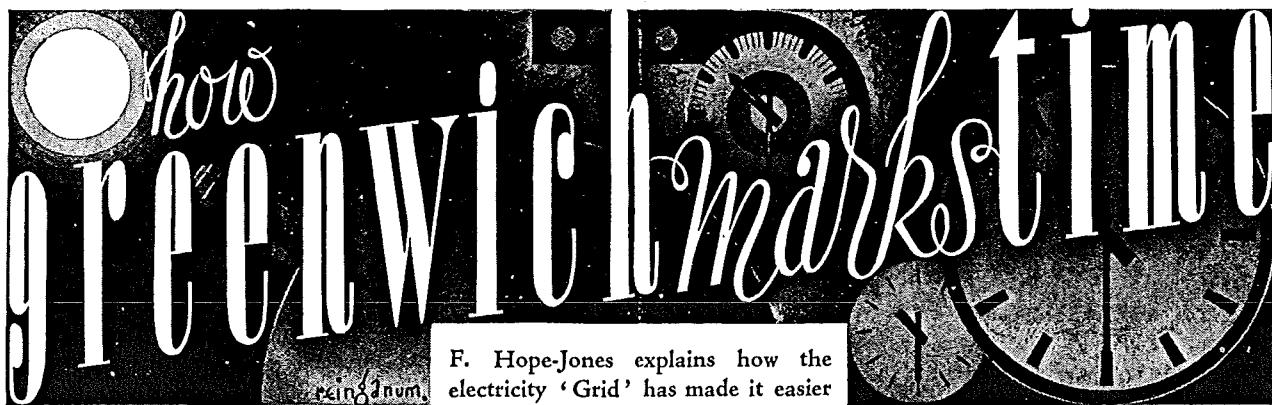


# How Greenwich Marks Time



HIS MAJESTY'S GOVERNMENT conferred a blessing upon the nation when they set up the Central Electricity Board in 1927 and authorised its co-ordination of the nation's electricity supply by means of the 'Grid'—the blessing of uniform and accurate time for the whole community. But they had no such beneficent intention, and in fact they were actually unaware that they were doing it.

In an article on electric clocks that I wrote over forty years ago, I said of the Deptford Power Station:

'A standard clock may be placed in the engine room at the central station of an alternating system, and with it a dial, the hands of which are rotated by a tiny synchronous alternating current motor connected to the mains; the gearing between this dial and its motor being such that when the alternators are run at their normal frequency, the hands progress at the proper rate, and thus any consumer who joins a similar dial across the mains will obtain the same result.'

#### *Time was a Waste Product*

The adoption by the Central Electricity Board of alternating current (to the ultimate banishment of D.C.) and the establishment of 50 cycles per second as the uniform 'periodicity' for the whole country provided the basic conditions for a national time service. There is, however, no reason to suppose that the authorities ever thought of it. The law then required an accuracy of only 2 per cent. in the frequency, equal to a clock error of about half an hour per day. They did not need greater accuracy; it brought no technical benefit to them in their electrical-engineering problems: *time was a waste product*.

Had the Central Electricity Board been constituted otherwise than it was it is possible that they would have denied the blessing out of pure 'cussedness'. Fortunately they had appointed some electrical engineers on the Electricity Commission, and the 'Timing of the Grid' was quietly proceeded with. For this we have mainly to thank Sir Archibald Page, the first General Manager of the Grid and now the Chairman of the Central Electricity Board.

#### *London's Lying Clocks*

What does it mean to you? Recall the chaotic condition of time-keeping in pre-war days: the periodic outbursts of letters to *The Times* on London's Lying Clocks; the missed

F. Hope-Jones explains how the electricity 'Grid' has made it easier for you to catch your morning train

trains; the constant warnings at home—'that clock is slow', 'that clock is fast'; and the difficulty of finding a standard by which to set your watch.

In those dark ages—the first twenty years of the present century—many efforts were made to improve the punctuality of the community, such as the introduction of systems of electric clocks, and now, of course, we have the daily series of time signals broadcast by the BBC.

But more amazing than anything preceding it is the boon now conferred upon us—a boon that I will wager not one in a thousand understands or appreciates.

#### *Greenwich Time—Free*

If your electric-light supply is alternating current—and very few are not—then you have time accurate to a few seconds in every room, as free as the air you breathe, a waste product of the electric light.

All you have to do is to change your clock for one that has no mainspring or escapement in it. It contains a little motor the size of an egg, and has to be joined up to the back of the nearest switch or plug.

It will not be long before you get so accustomed to accurate time that you will accept it as a right and cease to interest yourself in what it is and where it comes from. So before the novelty wears off and custom stale, let us visit its source at Greenwich and follow it down-stream through a wonderful distributive system of irrigation until it percolates into every room of every home in the land.

#### *In Duke Humphrey's Dungeon*

We begin in the deepest dungeon of the Castle of Duke Humphrey of Gloucester on Greenwich Hill, on the site of which the Observatory was built.

It is now the Sidereal Clock Chamber, and is kept at constant temperature by means of an automatic thermostat. On its four-foot-thick walls are mounted two Synchonome-Shortht Free Pendulums. You would not recognise them as clocks, for they have no faces; their dials are on the slave clocks in the main Observatory building above. The free pendulum measures time just about one hundred times more accurately than was possible ten years ago, when the first one was put into Greenwich Observatory. It records its time automatically on the moving paper of the chronograph, which also receives the astronomer's signals when a 'clock star' passes the

spider's web line in the eyepiece of his telescope.

#### *'Cooking' the Earth's Time*

Thus is fundamental or 'sidereal' time taken from the earth's rotation. It then enters the Time Kitchen, where the chef cooks it and sends out a palatable and useful product called Greenwich Mean Solar Time. From there it goes by land-line to St. Martin's-le-Grand, where the multiple relay or 'Chronofor' is switched on to all the postal telegraph offices throughout the country. Another land-line takes it to the BBC in the form of the six dot seconds, which they switch through direct to the transmitting valves of the National and Regional stations.

By means of special instruments, Greenwich also transmits the Rugby Rhythmic Signals, which latter are received in the Antipodes 'both ways round'.

#### *Organising the Grid*

The executive organisation of the Grid demands its division into nine sections, some of which embrace several counties. There is a control room in each section, equipped with a frequency-checking clock and a wireless receiving-set to keep it on time.

Thus the control engineer is able to impose a periodicity correct to Average Greenwich Mean Time upon all the generating stations in their section.

Apart from this, most of the individual generating stations have frequency-checking clocks of their own and watch the long second-hand of their comparator dials with interest. The one operated by a synchronous motor has red hands, and is running a perpetual race with the Greenwich Mean Time dial, whose hands are black. If the frequency dial lags behind Greenwich, the engineer speeds up his great turbo-generators accordingly.

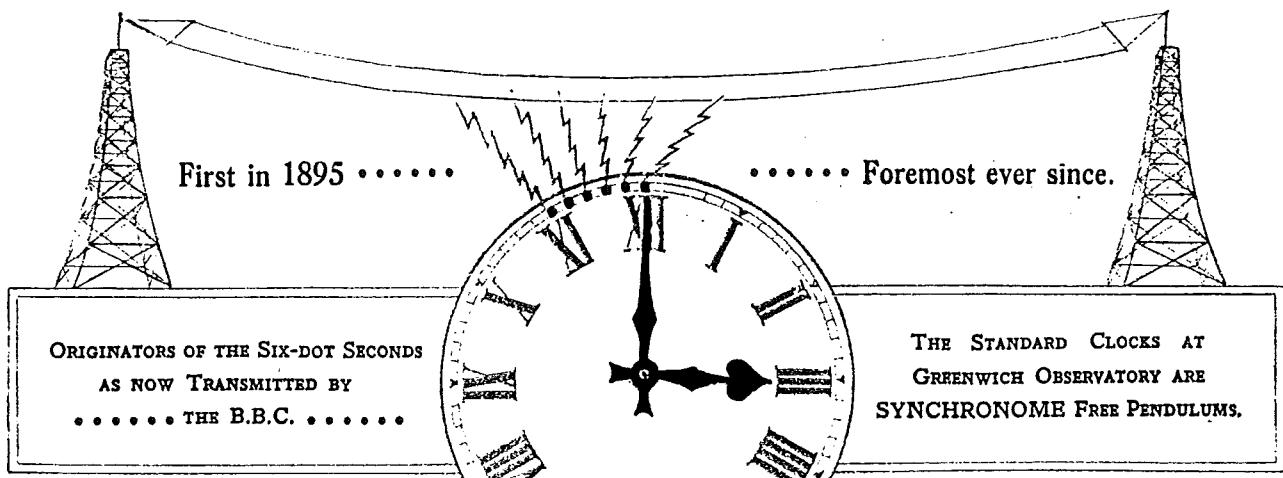
#### *Two Hundred Master Clocks*

There are about two hundred master clocks in the generating stations in Great Britain. By these means, and the wireless time signals, the engineers in charge have now become the timekeepers of the nation.

It is given to few men to see their prophecies fulfilled, to shape the destiny of their pet scheme, and to forge the links of the chain that bring it to fruition. This has been the happy lot of the young engineer whose forty-year-old prophecy is quoted at the beginning of this article.

With the Compliments of

**SMITH'S ENGLISH CLOCKS, LIMITED**



THE UNIVERSAL USE OF SYNCHRONOME ELECTRIC CLOCKS FOR OVER FORTY-TWO YEARS HAS EARNED THE SYSTEM A REPUTATION WHICH IS UNASSAILED AND UNASSAILABLE.

BY INSTALLING EITHER SYNCHRONOME OR SYNCHRONOMAINS ELECTRIC CLOCKS YOU WILL SECURE A TROUBLE-FREE TIME SERVICE IN PERPETUITY.

REMEMBER: It is a SYNCHRONOME FREE PENDULUM which has measured the time of the world at GREENWICH OBSERVATORY since 1925, thus bringing back to England the world's record for accuracy.

It is from this source that the Wireless Time Signals are derived and they are transmitted over SYNCHRONOME apparatus by the B.B.C., all of whose transmitting stations are equipped with SYNCHRONOME clocks.

There is no limit to the number of dials which can be operated by our Standard Master Clock, including Turret Dials, for which no provision need be made for cumbersome works or weights. Many of the leading Electricity Supply Authorities use SYNCHRONOME MASTER FREQUENCY CONTROLLERS to time their periodicity and thus render their supplies suitable for the operation of SYNCHRONOMAINS Clocks in 75 per cent of the homes in Great Britain.

For small installations, where the expense of a Master Clock is not warranted, you cannot do better than install SYNCHRONOMAINS A.C. Plug-in Clocks for operation directly from 50 cycle time-controlled main supplies. The general use of this type of clock was foretold by us as long ago as 1895.

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BROADCASTING HOUSE. CABLE STATIONS of the Eastern and Western Telegraph Companies all round the world. All the larger London Stores, notably HARRODS, the ARMY & NAVY STORES, WARINGS, SELFRIDGES, LIBERTY'S, etc., etc.

Imperial Chemical Industries, Ltd., Millbank, S.W. .. .. .. .. 680 dials  
(The largest installation in the world operated from one Master Clock.)

Vickers, Ltd., London, Sheffield, Barrow, etc. .. 436 dials  
Anglo-Persian Oil Co., Finsbury and Skewen .. 418 "  
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Austin Motor Co., Ltd., Birmingham .. 202 "  
Lever Bros., Ltd., Port Sunlight .. 172 "

Unilever House, Blackfriars .. .. .. ..	170	dials
J. Lyons & Co., Cadby Hall and Greenford .. .. .. ..	147	"
J. & P. Coats, Ltd. .. .. .. ..	143	"
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Guest, Keen & Nettlefolds, Ltd., Smethwick .. .. .. ..	118	"
Crittall Manufacturing Co., Ltd. .. .. .. ..	106	"
John Player & Sons, Nottingham .. .. .. ..	100	"
Morris Motors Ltd., Cowley .. .. .. ..	68	"
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THE SYNCHRONOME Co., LTD., STILL LEADS THE WAY AS IT DID IN 1895. ALL TIME SYSTEMS OF BRITISH ORIGIN HAVE ADOPTED OR ADAPTED THE BASIC PRINCIPLES OF THE SYNCHRONOME SYSTEM AS ENUNCIATED BY US OVER FORTY-TWO YEARS AGO.

IN WORKS, OFFICE OR HOME—SYNCHRONOMAINS OR SYNCHRONOME