(1) The provisional unit of time should be the time of 9 192 631 830 cycles of the cæsium $Fm,(4,0) \longleftrightarrow (3,0)$ resonance at zero field, and named 1 provisional second. This is the frequency obtained[9] in terms of the provisional uniform second in June 1955, but it turns out to be very near the value expressed in the average provisional uniform second for the period June 1955–June 1956, and no alteration is therefore recommended.

(2) The joint work of the National Physical Laboratory and the U.S. Naval Observatory at present in progress should be continued to obtain the value of the cæsium frequency in terms of the second of ephemeris time for a period of, say, five years, when the precision should approach 1 part in $10^9$. As the length of the tropical year is varying by 2 parts in $10^{10}$ per year[10], there is little point in relating the two units more closely than this. Indeed, it may be sufficient to accept the relationship with a lower accuracy which will be available in a shorter time.

(3) This new frequency should ultimately be adopted for the definition of the second. It is expected that the value will not differ by an amount which is significant for most purposes from the provisional value, as the difference between the units of provisional uniform time and of ephemeris time is believed to be small during the present period. A step adjustment could also be made to bring actual time (epoch) to the ephemeris time-scale.

For the purpose of the definition the frequency will be given to 1 part in $10^{10}$, as it will certainly be possible in the near future to calibrate the working standards in terms of the resonance with that precision.

(4) The closest relationship should be maintained by the appropriate authorities between atomic time and astronomical time in order to determine any departure between the two systems and also to preserve the continuity of time determinations over long periods. Quartz clocks and astronomical observations would be used for integrating atomic time just as quartz clocks are now used to subdivide astronomical time.

(5) As other atomic standards come into use, their frequencies should be expressed in terms of the provisional second defined in (1), and, later, in terms of the second as defined in (3). The provisional second is already available through the *MSF* standard-frequency transmissions[11,12].

In making these proposals, the understandable reluctance to break with a practice as old as civilization is fully appreciated; but a consideration of the precision of measurement alone shows that the astronomical unit of time is no longer sufficiently accurate for modern measurements of frequency and time interval.

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## Terrestrial Heat-Flow in Hungary

Numerous borehole temperature measurements have been made in the Carpathian Basin during the past seven decades. It has been found that the value of the geothermal gradient lies between 40 and 70 deg. C./km. The causes of this high value have not yet been established, since the thermal conductivity of the rocks has not yet been measured.

In the Liassic coal basin of South Transdanubia at Zobák and Hosszuhetény, the sinking of four big shafts offered a favourable opportunity of determining terrestrial heat-flow. The shafts have at present reached depths of 550 and 600 metres respectively, and have been sunk throughout in the same Liassic calcareous shale. In order to determine heat-flow, several measurements of the virgin rock temperature were taken in the course of sinking the shafts. The thermal conductivity of rock samples was measured by a method very similar to that of Benfield[1] and Bullard[2].

The heat flow was computed according to the following formula:

$$q = \frac{T_2 - T_1}{\sum_{i=1}^{n} \frac{\Delta h_i}{\lambda_i}}$$

where $\Delta h_i$ is the thickness of stratum with thermal conductivity of $\lambda_i$. According to measurements taken in shafts at a distance of 90 metres, the mean value and probable error of the terrestrial heat-flow is:

$$10^6 q = 3 \cdot 035 \pm 0 \cdot 010 \text{ cal./cm.}^2 \text{ sec.}$$

Our measurements taken in shafts are more direct and reliable than those performed in boreholes, as the virgin rock temperature at the bottom of the shaft is affected by not more than 0·02 deg. C. by ventilation. In boreholes it is the temperature of the drilling fluid that is measured, and this differs, often considerably, from the virgin rock temperature.

It is believed that the present measurements are the first ever attempted in continental Europe[3], and that the high value obtained may be of interest for the geophysicist and geologist. This high value affects mining operations rather unfavourably. Since at a depth of 570 metres the virgin rock temperature is 36° C., it may be assumed to rise to 60° C. at 1,000 metres to which it is planned to sink the shafts. Such high temperatures will present special problems in mine ventilation.

A detailed account of this work will soon be published elsewhere.

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## Effect of Altitude on the Position of the Magnetic Pole

In the most recent analysis of the Earth's magnetic field (for the epoch 1942), Spencer Jones and Melotte[1] evaluated forty-eight coefficients in the spherical harmonic expansion of the magnetic potential. Using their values for a spheroidal Earth, the $X$ (northerly)