means of this table and the table of proportional logarithms as follows Take from this table the logarithm corresponding to the hours and minutes of the Greenwich date, to which add the proportional logarithm of the change of the sun's declination, right ascension, &c., in the 24 hours in which the date lies. The sum will be the proportional logarithm of the part required.

Table (qq), p. 16. *Proportional Logarithms for Seconds and Tenths of Seconds.*—This table may be of use in finding the proportional part, when the daily or half daily difference is small, and expressed in seconds and tenths of seconds. See explanation of Tables (p), (q), and (r.)

Table (r), p. 13*. *Proportional Logarithms.*—It is frequently necessary to work proportions by logarithms, whereof one of the terms is 3 hours. To do this by common logarithms would be extremely tedious, since it would be necessary to reduce every term into seconds, then to take their logarithms from the tables, and finally to bring the resulting seconds into hours, minutes, and seconds. To shorten such operations, the logarithms of every number of seconds below 3 hours are subtracted from the logarithm of the seconds in 3 hours. The results are arranged in a table, and called proportional logarithms; the corresponding hours and minutes being placed at the top of the page, and the seconds at the side.

Since degrees, minutes, and seconds, have the same proportion to each other as hours, minutes, and seconds, it is manifest that the same numbers will be proportional logarithms of any number of degrees, minutes, and seconds, less than 3°.

If any term of four proportionals be required, each of which terms is less than 3^h or 3°, it may be computed by proportional logarithms in the same manner as by common logarithms. If one of the terms be 3^h or 3°, its proportional logarithm need not be considered in the operation, since it is equal to 0. Hence appears the use of proportional logarithms in finding Greenwich time from the distance of the moon from the sun or a fixed star. The variation of the distance in 3^h is taken from the Nautical Almanac, and the proportional logarithm of this is subtracted from that of a less variation of distance. The result is the proportional logarithm of the time required for the latter variation.

Table (s), p. 32. *Log Sine to Seconds.*—Since the sines of small arcs change not only very rapidly, but also irregularly, the common method of proportioning for seconds is both troublesome and erroneous. On these accounts it was thought proper to put down the log sines of arcs as far as 50′ to seconds; the same numbers are the log cosines of arcs from 90° down to 89° 10′ to seconds. If the *log tangent* of a small arc within the limits of the table be wanted, it may easily be found by subtracting the log cosine (Table t) from the log sine (Table s), adding 10 to the index of the log sine

Table (t), p. 37. *Log Sines, &c.*—An angle is put down in this table at the top and left hand side, if less than half a right angle; and at the bottom and right hand side, if greater than half a right angle; the angles included on the whole being from 0 to a right angle. The angle is put down both in ° ′ ″ and in h. m. s.; the columns of log sines, log cosines, &c., are marked at the top or bottom; the titles at the top must be used, when the angle is less than 45°, or 3^h; and a the bottom when greater than 45°, or 3^h.