LESSON 149

ELEMENTARY NOTES ON ASTROLOGY NO. 2
SIDEREAL AND SOLAR TIME

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(ISSUED BY THE NEW ZEALAND TEMPLE WHARE RA)

Time is ordinarily measured by Sun. That is to say, the circle which the Sun traces in the Heavens is divided into 24 equal parts, each of which is called an hour. Thus, when the Sun is upon the meridian, it is said to be 0h.0m.0s. o'clock (or what is the same thing 12h.0m.0s. o'clock): When he has traversed one division it is 1 o'clock, and so on; till the Sun is immediately under our feet, when the numbers begin again, and it is said to be 12 o'clock midnight or 0h.0m.0s. once more. This is called Solar Time. The Sun as we have seen moves with a motion of his own in the turning "star-sphere", hence even if his motions were perfectly regular, it would be open to objections as a time keeper for delicate calculations. But it is not even precisely regular, as is shown by comparing an accurate chronometer with a good dial and as is indicated by the phrase in the almanack, "clock slow or fast so many minutes", which means that a chronometer keeping exact time is behind or before the Sun at that particular time.

The chronometer is said to indicate the mean solar time. It is obvious that the Sun is only chosen as a popular timekeeper on account of the comparative ease of noting his motions. For astronomical or astrological observations we need something more exact, and for this purpose we must take a point in the "turning wheel of the Zodiac" itself. The point which has been chosen is one easy to identify and to note, viz. that which is occupied by the Sun exactly at the moment when he crosses the Equator from the South to the North, or when he shines absolutely vertically at South point on the Earth's Equator, in other words the point of intersection of the Equator and the Ecliptic. This is termed the "First Point of Aries", though the student must remember that it is a fixed point and does not coincide with the constellation bearing the name of Aries in the Zodiac (considering the circles of the Equator and the Ecliptic as permanent, the "Zodiacal Belt" turns very slowly through them, making a complete round once in about 25,000 years. This is called the "precession of the Equinoxes", so that the constellation Aquarius is now practically at the intersection of Equator and Ecliptic).

The "First" point of Aries then (or that point which lies between Aries and Pisces) is the name of the intersecting point of the Equator and Ecliptic and from this the 12 divisions are measured round the circle, and are called by the names of the Signs. These are called "Conventional Signs" in contradistinction to the "Constellations".

Now when the "Conventional First Point of Aries" passes the meridian, it is said to be 0h.0m.0s. o'clock by "sidereal time", and the circle described by this point is divided into 24 parts, each being a "sidereal hour". If the passage of the Sun over the Equator occurs precisely at noon, then the sidereal and solar time will exactly coincide. The following day, however, the Sun will, as we have seen, have crawled a little back on the turning belt, therefore the "First Point of Aries" will reach the meridian just four minutes before the Sun, or in other words the "Solar noon" will occur at 0h.4m.0s. o'clock of "Sidereal time". The following day it will be about 0h.8m.0s. I say "about", for the Sun's motion is I have said is not exactly regular, and for other reasons too long to enter into here.

To erect a figure for an "astrological judgment", we require to know the <u>exact sidereal time</u>, for all published tables are calculated on this. The "<u>Ephemeris</u> for the year" gives the Sidereal time at noon each day. If then we take the Sidereal time of the noon preceding and add to it the number of hours, minutes and seconds that have elapsed since, we shall have an accurate sidereal time, remembering that the sidereal hours go up to 24 and then start again, so that if the sum exceed 24, we must subtract 24 from it.

Remember also that hours are "Sidereal hours", not solar; that is they are a trifle shorter. If therefore 2 Solar hours have elapsed it will be 2 and a fraction of sidereal hours. To obtain this fraction the following table will be useful:-

I append an example. Let us suppose that time selected is 8a.m. on March 18th, 1848 at Greenwich. Looking at the Ephemeris I find the Sidereal time at preceding noon is 23h.40m.44s. add time elapsed from preceding noon to following morning at 8.20hr. By table, correction for 10hrs is:

			h m s
	is		1:38.30
Twice this is			3:16. 6
or roughly			3:17.00
43:40:44			
plus	3:17	=	43:44: 1
<u>Deduct</u>			<u>24:00:00</u>
			19:44:01

which will be the exact "Sidereal time" at the moment of birth.

Correction to be made for solar Hours

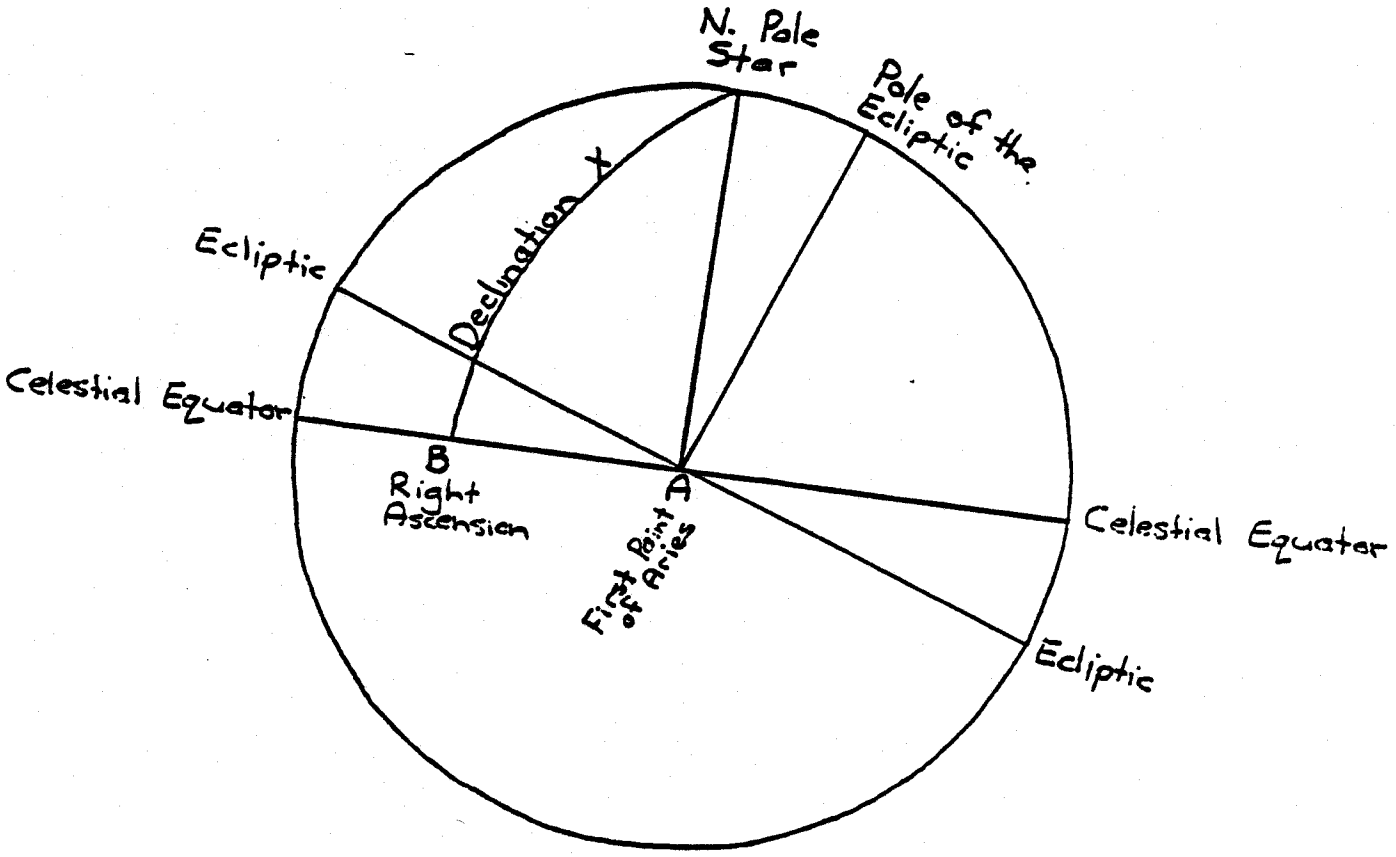
Solar Hours			Solar Correction	
1	0	9.83	1	0.16
2	0	19.66	2	0.33
3	0	29.49	3	0.49
4	0	39.32	4	0.66
5	0	49.15	5	0.82
6	0	58.98	6	0.98
7	1	8.81	7	1.15
8	1	18.64	8	1.31
9	1	28.47	9	1.47
10	1	38.30	10	1.64
11	1	48.12	11	1.80
12	1	57.95	12	1.97

Observe also that the railway time all over the United Kingdom is "Greenwich mean time". If the place of birth is one degree east of Greenwich the "true local noon" will be 4 minutes earlier. If it be one degree West it will be 4 minutes later, and so proportionally. Thus in the foregoing example, if the birth had been at Bristol (ca. 3 degrees 30 minutes W of Greenwich) the true sidereal time at noon preceding would have been 14 minutes later, adding the correction:

	M S
for 12 minutes	12:01.97
for 2 minutes	2:00.33
for 14 minutes	14:02.03

This would give us 14m 2.3s later or 23h.54m. 46.3s as the Sidereal time at the previous noon; or 19h.58m.3.3s. as the "Sidereal time" at birth, assuming it took place at 8 O,clock "local time".

In some tables instead of Sidereal time the "right ascension of the meridian" is given, and the student should clearly understand this. It is obvious that the exact position of any point in a sphere can be indicated if we fix on a "great circle" from which to measure, and a point on that great circle as the point of commencement, for we have only to draw a line from the given point at right angles to the circle and then to measure the distance from the point to the circle, and from the point where the line cuts the circle to the agreed upon point of origin, and there we have exactly described the position of the required point.



Thus let X be the point and A the commencement of the "great circle of reference". BX the line drawn at right angles to the "great circle of reference" and AB the distance from B to the "agreed point of origin" - then AB and BX will be called the "co-efficients of X", and will describe its exact position. If we take the celestial Equator to be the "great circle of reference", and the point A the "first point of Aries" (or the point where the Ecliptic cuts the Equator), then the distance AB will be called the "Right Ascension" and BX the declination .of the required point. The distance along the great circle of reference, and consequently the right Ascension and Declination, are measured in degrees, minutes and seconds instead of hours. There are 360 degrees in the great circle, 60 minutes in each degree and 60 seconds in each minute.

Assume that the "first point of Aries" is on the meridian, then the right Ascension of the meridian will be 0deg 0m 0s. (= 0° 0' 0"), in one hour the first point of Aries will have travelled 1/24 of the whole 360 degrees of the great circle towards the West (or 15 degrees) and the Right Ascension of the meridian will now be 15 degrees. In other words, the "first point of Aries" travels one degree in four minutes (1/15 of an hour). Therefore if we have the Right Ascension of the meridian (given in degrees, minutes, and seconds) we can find the exact "sidereal time" by multiplying by 4 and writing <u>minutes</u> instead of <u>degrees</u> and <u>seconds</u> instead of <u>minutes</u>.

Example:

Right ascension of meridian 15° 20' 0"

× 4

61° 20' 0"

or 61 minutes and 20 seconds, which gives Sidereal time, 1 hour 1 minute and 20 seconds.