KP Ayanamsa–An Analysis

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KP Ayanamsa–An Analysis

Part - 1

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POST 1 (Preface)

Mr.D.Senthilathiban, a kp astrologr, had recently published a book titled "Study of KP Ayanamsa with modern precession theories" (182 pages). It is available as a free eBook and any one can use "Google Search" to download and read. I strongly believe that this research work may bring the long standing confusions and disputes around ayanamsa which is haunting the KP community for more than 45 years, to an end.Upon request from some of the co-members of ‘Astro wonder tamil ‘ astrology group, I took upon the task of explaining the essential features of the said book in tamil languge,in a simple way so that everyone including a kp beginner can easily understand the intricacy of ayanamsa and it’s calculations.It contained 66 postings(75 pages) in all. My work was well received by the tamil members. Encouraged by their overwhelming response, I have now decided to translate the same into English for the benefit of all others. This script covers Newcomb precession theory, lacuna in various ayanamsa systems being followed by the present day KP followers, IAU’s (International Astronomers Union) modern precession theories including Nutation and the formula to calculate ayanamsa and few worked examples. I trust that anyone can easilly follow and understand.

Alongside, I have included my own short summary of great personalities like CG Rajan, BV Raman, NC Lahiri and also Newcomb as additional information. Also I have recalled certain incidents happened in the history of the post KSK period. (They are not part of Mr.D.Senthilathiban's book)

Readers are encouraged to contact me or Mr.D.Senthilathiban through the details given below and discuss if you have any questions or doubt.

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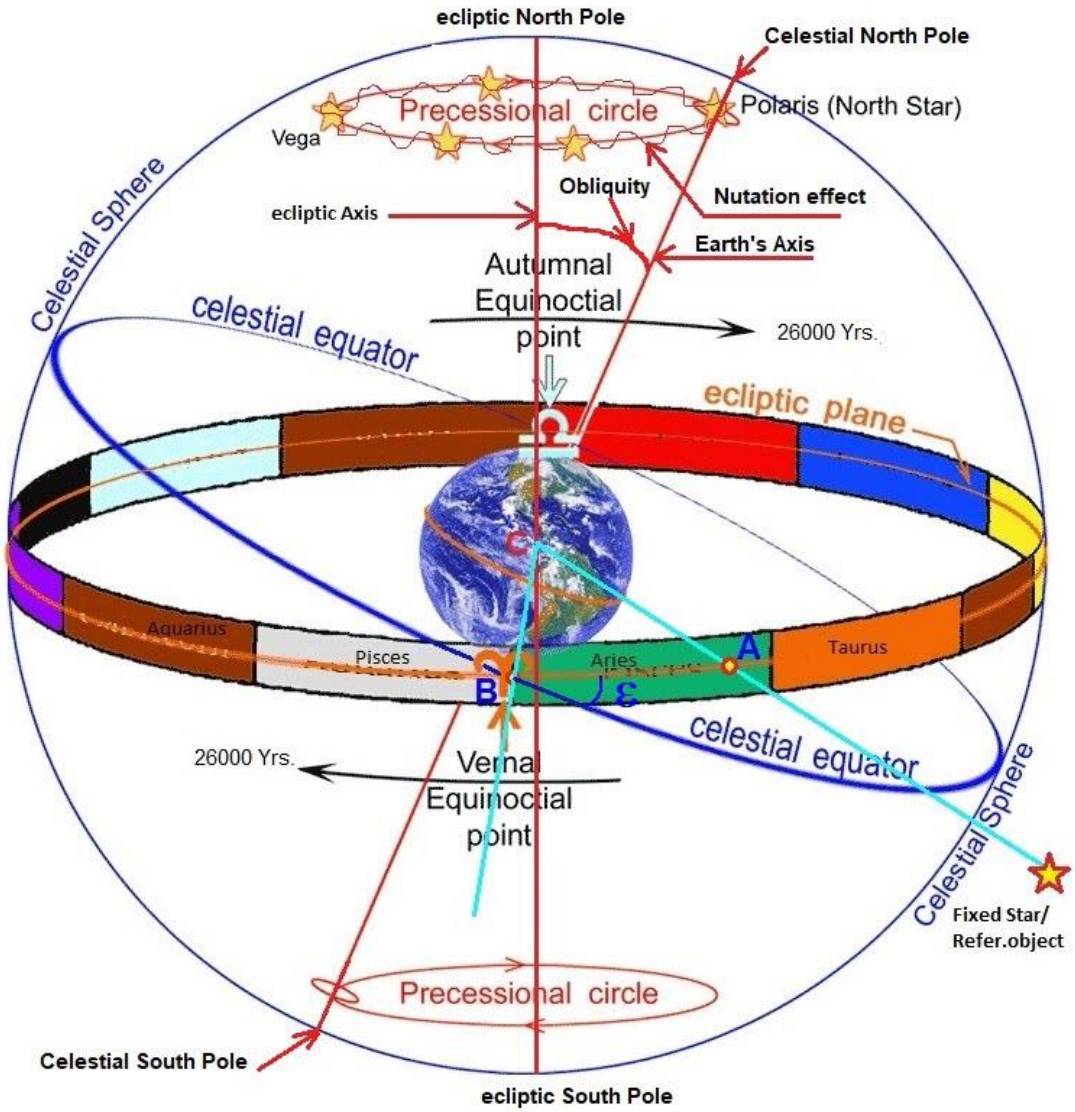
POST 2

The Celestial Sphere given below is an assumption of an imaginary sphere around the earth and assuming planets and stars are fixed on that imaginary sphere.

Picture 1



If we extend the earth equator on the same plane all the way to the Celestial Sphere, in other words, if we draw an equator line on the Celestial Sphere which is in parallel to the earth's equator, it is called Celestial Equator. In the same picture, if we assume that the earth is static and Sun circles around the earth, we can get the path of the Sun, which is called Ecliptic.

The Zodiac is assumed on this Ecliptic. The axis from the center of the earth to the Ecliptic plane is called Ecliptic Axis. If we extend the Ecliptic Axis, it intersects the Celestial Sphere in two points. The point on the upper side is called North Pole and the opposite point in the lower side is called South Pole. At the same time, the Celestial Equator and Ecliptic intersects in two points. One is called as First Point of Aries (♈) and the other one is called as First Point of Libra (♎). The angle between the Celestial Sphere and Ecliptic is called as Obliquity.

POST 3

In the above picture, if we set a fixed referential star and draw a straight line between the star and the center of Celestial Sphere (It is shown in purple colour with the star on the bottom right corner), the same line intercepts the ecliptic at point A. The year when that point intersects at First Point of Aries (♈) is 291 AD, as recommended by Sri Krishnamurti. Let us assume that because of the "Effect of Ayana", this point is slowly moving backwards on the Ecliptic and now at point B on Year 2019, we can see in the picture that the straight line that connects the fixed star to the Center of the Celestial Sphere is moving backwards. The angle between A and B is called "Ayanamsa". The distance it moved between March, 291 and 2019 is approximately 24 degrees.

Western astrologers use the Moving Zodiac and Sayana Positions (or) Tropical Positions of the planets for their anstronomy and astrology. It may be kept in mind that instruments used in Astronomical laboratories can measure only the tropical (Sayana) longitude of celestial bodies. But, the Indian vedic astrology uses Fixed Zodiac or the Sidereal Zodiac. To obtain the fixed zodiac positions for the planets and houses, the value of Ayanamsa must be calculated and subtracted from the Tropical Positions. The result is the planetary degree-minutes positions based on the fixed star.

POST 4

One of the important question still in debate is, when did the Zodiac start moving and how fast it moves per year. Ancient Indian astronomers including Varahamikirar and Aryabhatta, 20th Century astronomers and western experts have done serious research on this phenomenon and submitted their findings at various period of times.

Unfortunately, there was not one answer, but every one had their own. Due to this difference of opinions, the astrologers' community was unable to make a decision to follow one but they use the best from available, that appears to be correct to their intuition. On this ground, Mr.B.V.Raman accepted 397 AD as the Zero Ayanamsa Year while Mr.N.C.Lahiri took 285 AD and Mr.K.S.Krishnamurti fixed 291 AD. Westerns used the Sayana system and they have less worry about this ayanamsa.

POST 5

With the advent of astrology software in the beginning of 21st century,the necessity of manual calculations for the preparation of horoscope,has become redundant.Taking advantage of this facility, Teachers of astrology normally skip teaching basics including ayanamsa part ,to suit their convenience.So no wonder that the present day astrologers lack sufficient(or nil) knowledge on this subject and hence I have thrown some light on the same.Mr.Senthilathiban had analysed the Ayanamsa used by the famous Astrologer & Mathematician Mr.C.G.Rajan, Astronomer & Mathematician Mr.N.C.Lahiri in his book. The modern astrologers have very less chance to read about Mr.C.G.Rajan, Mr.N.C.Lahiri, Mr.B.V.Raman and Mr.Newcomb and it is my pleasure to give brief general information about them.

POST 6

NewComb [1835 – 1909]

His full name is Simon NewComb, an American citizen born in Canada in 1835 AD. His work continued till 1909 AD. He seems to have little conventional schooling other than from his father. He went to proper schooling first at the age of 19 and later graduated (B.Sc) in Harvard university at the age of 23.He studied privately mathematics and physics.Later he became professor of Mathematics and Astronomer at the United States Naval Observatory,Washington DC. In 1877 he became director of Nautical Almanac Office.He authored number of popular science books and science fiction novel, apart from books on astronomy. He held chairs in both Private and in Government. Based on the rules defined in his research work, the first American Ephemeris and Nautical Almanac was published and duly recognized by American Government. British Government followed suit and published their Ephemeris on the same lines

IAU (International Astronomical Union) also endorsed his research papers and rules. For more than 50 years, all countries accross the glob published their Ephemerides based on his theories only. Only after 1975, IAU made a small change in the Precession recommended by Newcomb, based on their research and collection of datas. Till such time, Newcomb's recommendations were in practice. In later years in India, Mr.C.G.Rajan and Mr.N.C.Lahiri followed the recommendations of Newcomb to calculate their Ayanamsa values.

POST 7

C.G. Rajan

In the begining of the 20th century, India was blessed with a Trinity in Astrology which includes Mr.C.G.Rajan, Mr.B.V.Raman and Mr.K.S.Krishnamurti. The foremost among them was Mr.C.G.Rajan. His full name is C.Govida Rajan. He was born on 05-JUL-1894. He graduated in Mathematics, (BA) during the period of British Ruling. He was an exponent in Mathematics, Astronomy and Astrology coupled with enough command in English which gave him the freedom to write many books both in Tamil and English.

During his time, Panchang makers in india were forced to depend on the Western almanacs and facing difficulties in acquiring datas from them and convert it to sidereal system.Mr. Rajan took initiative and managed to contact the American Naval Academy in the year 1920 and arranged to get copies of original astronomical research papers of Newcomb from them. After extensive study of those materials, he developed complete formulae, required for making Indian Panchang which were easily understandable. He then published his work in his book, titled "Raja Jothida Ghanitham or Siddhanda Sironmani". This book was published both in english and tamil language in the year 1933. He also released another book that includes the planatary positions for 6000 years covering 3000 BC to 3000 AD. High value of accuracy found in his system, was very much appreciated even by western scientists. He adopted Newcomb precession theory for calculation of ayanamsa in all his works.

POST 8

He had written many books on astrology both in english and tamil languge besides books on different topics. During his time, Rajan published a yearly Panchang in the name of "Aananda Bothini" (trikkanitha based) which was very popular in the middle of 20th

century.Mr. Rajan was the first person to convene an astrological conference in pune, to analyse the dissonance in regional Panchangs. He arranged to bring eminent mathematicians and astrologers from all over india for this occasion and debated for two days. Based on the outcome of the above conference, Rajan had made a small correction in his Ayanamsa calculations. Rajan's contribution to the Indian Astrological community is invaluable and un-paralleled. The preface written by him in his book “Raja jyothida Ghanitham” is attached as **Annexure-1** to enable the readers to realize the hard work and dedication exhibited by him. He, being a selfless, hard working and dedicated soul who left treasures and wealth of knowledge for Indian Astrological posterity should in no doubt, be called as "Father of Modern Indian Astrology".

POST 9

N.C.Lahiri [1906 – 1980]

Mr.Nirmal Chandra Lahiri was also an exponent in Mathematics and Astronomy. It appears that he did not involve in Astrology. He published Lahiri Ephemeris which is very popular in India even today and used by many astrologers across the country. He was the first Indian, to represent India in IAU. In the 1953's, Indian Prime Minister Mr.Javaharlal Nehru formed the ‘Callender Reform Committee’ and appointed Lahiri as secretary. This committee under the leadership of Lahiri, made an extensive research on the Ayanamsa and gave the final recommendations to the Government of India. Based on this, the Government of India has been publishing its Indian Ephemeris and Nautical Almanac (IENA) in English and in the name of "Rastriya Panchang" in 12 popular indian regional languages, from 1958 to till date. The IENA name was changed in 1979 as ‘Indian Astronomical Ephemeris’. Both works are still being published by Positional Astronomy Center, Calcutta, India.

POST10

B.V.Raman [1912 – 1998]

The name Bengalore Venkat Raman was very popular in the Astrology World both in India and abroad in the 20th century. When astrology was considered as a "superstition", B.V.Raman made efforts to take the facts to people that astrology is also based on science and revived the fame of Astrology and Astrologers. Astrological community is indebted to him for restoring Astrology a noble place.

Mr.Raman travelled across the globe to many countries including Germany, England, France, Italy, Austria, Holland, Canada, Japan and America, addressing universities,Medical associations, Educational & cultural Institutions on different aspects of Astrology,Hindu Astronomy, Philosophy and Indian culture. He also established institutions in many countries to teach Traditional indian Vedic Astrology. His accurate prediction on the end of World War II, had earned him many laurels. Upon an invitation, from the United Nations, America, in 1970. he delivered a lecture on “Relevance of Astrology in Modern Times" which was well received and appreciated by all members of the UN.

BVR had published hundreds of articles and books. Between 1936 and 1998, he run his monthly ‘Astrological Magazine’ successfully. Apart from "Life Time Achievement Award for Services to the Cause of Astrology”, he was offered several other awards also during his life time. His period could be considered as the “Golden Time of Astrology”. B.V.Raman based his entire work on the traditional texts and did not use the Newcomb recommendations for his Ayanamsa calculations and hence Mr.Senthilathiban did not include Raman’s ayanamsa for analysis in this book.

POST 11

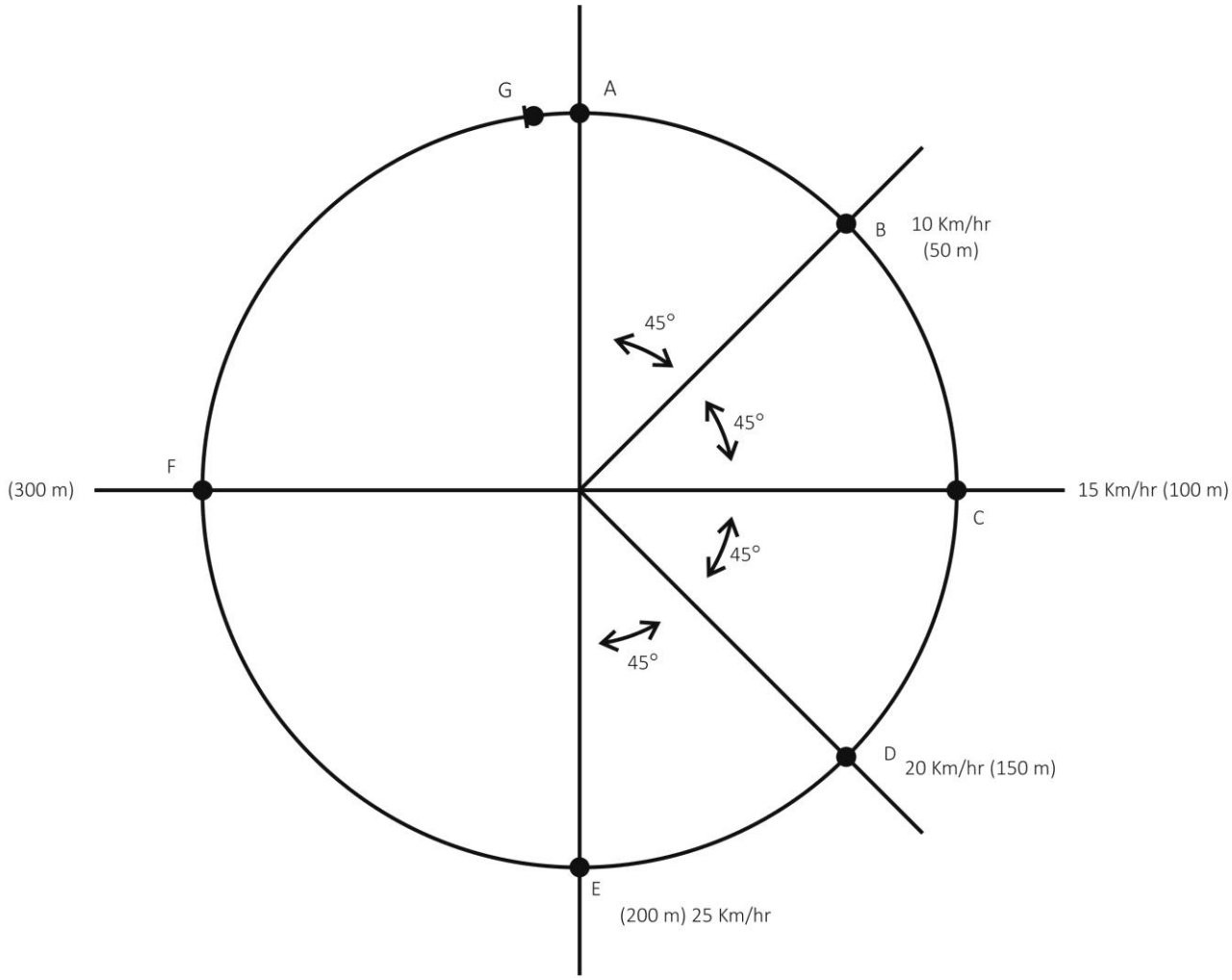
So far, I have brought to the attention of the members some information that are not part of Mr.Senthilathiban's book. I believe, these informations are helpful when you read his book. Mr.Senthilathiban has gone on details in his book about the Newcomb recommendations, Formule to calculate Ayanamsa for any given time based on Newcomb rules, Rashtirya Panchang, Analysis of Ayanamsa of C.G.Rajan, N.C.Lahiri and K.S.Krishnamurti, updated Rate of Precession by International Astronomical Union in 1976 and 2006, Formule to calculate Ayanamsa based on the updated precession model, comparison of Ayanamsa values of the above mentioned popular methods, issues in modern KP Ayanamsas, Nutation details to calculate True Ayanamsa, Nutation in Obliquity to calculate House Cusps. We will discuss one by one in the following posts.

POST12

There are two main parameters in the formula to calculate the Ayanamsa. One is the Rate of Precession (amount of distance the point moves per year) and the other one is Precession (the distance, the point moved). The beginner (in astrology) should understand

this clearly before moving into details. I try to explain using a simple example here for the benefit of them.

Picture 2



In the above picture-2, assume that an athlete is running in a 400-meter track. The track is approimately circular in shape. The track is designed in such a way that if he runs the circle and completes one round, he would have covered a distance of 400m in total.

Here A is the starting point and G is the point where 400m ends. In the circle (track), the point B is at 50m, C is at 100m, D is at 150m, E is at 200m and F is at 300m. When the athelet starts running, he gradually increases his speed. Let us assume that his speed at the points B, C, D and E are 10, 15, 20 and 25 km/hour respectively.

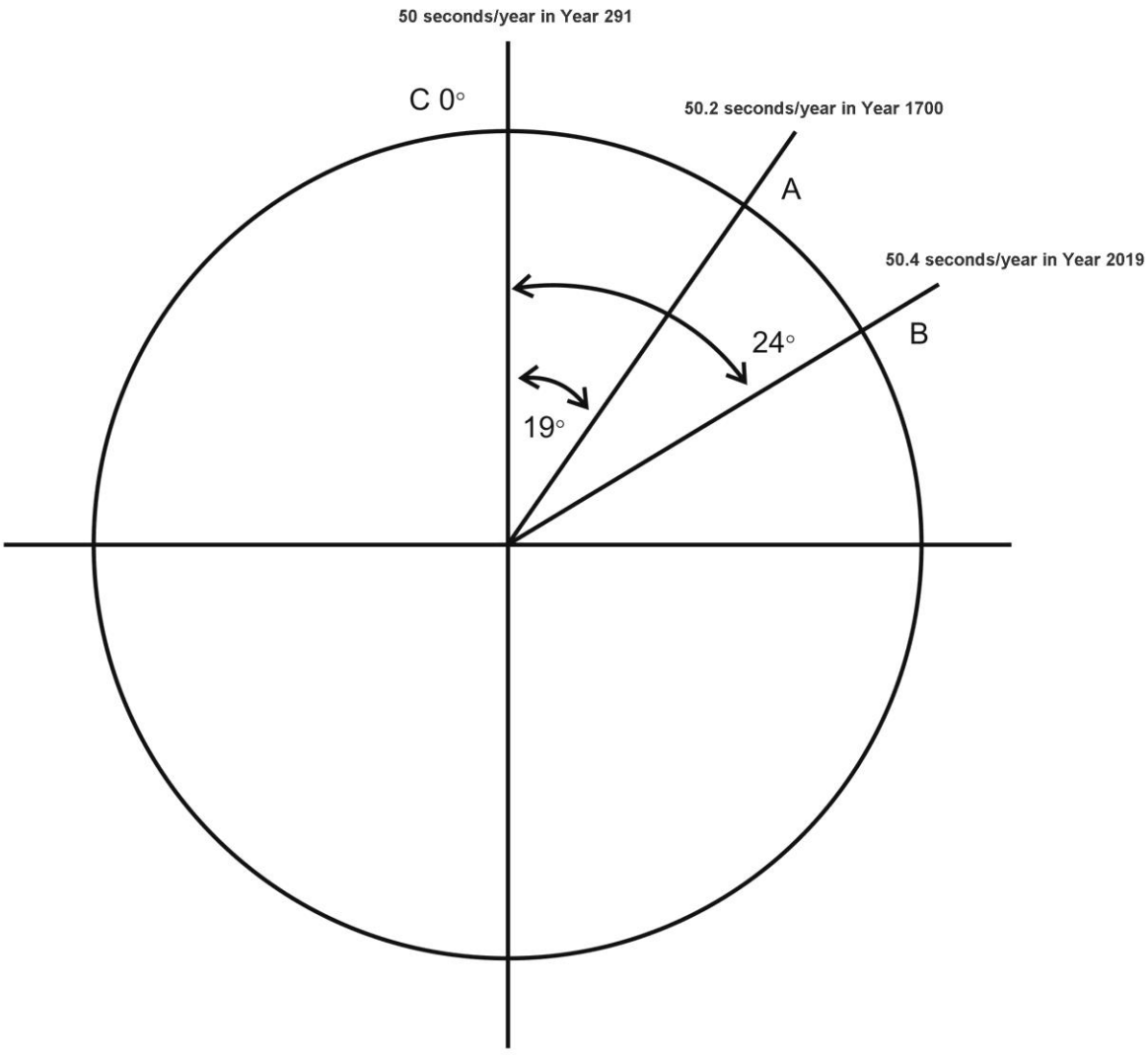
When the athelete crosses point B, his speed is 10km/h and distance covered in the circle is 50m. If we measure this in degree, it is 45 degrees. (To complete 400 meters, he has to complete a circle of 360 degrees). When he crosses 100 meters (point C), he would have run 90 degrees. In the same way, 180 degrees when he is at 200m (point E) and 270

degrees when he is at 300m (point F). When he arrives at 360 degrees (Point G), he completes 400m in total.

POST13

As explained above, when an object is moving in a circle, the distance can be measured at a given point at a given time by angle in degrees.

Picture 3



Now, look at the above picture-3. Replace the track and the athelet with the Zodiac. Assume that, point C is where the Zero Starting Point of both Sidereal and Tropical zodiacs at year 291. Like the Athelet, the Tropical Zodiac is slowly moving on the circle. Also, the moving speed is increasing every year slightly (detailed explanations later). For example, at point C (Year 291), its moving speed is 50 seconds per year. Assume that, on 1700 AD, it arrives at point A. At the same time, its moving speed is 50.2 seconds per year and the

distance it moved (from year 291) is 19 degrees. Then, 2019 AD, the same parameters may be 50.4 seconds per year and the distance crossed may be 24 degrees (Point B).

In the above explanation, the speed 50 seconds, 50.2 seconds and 50.4 seconds are termed as Rate of Precession. The respective angular distance 0 deg 19 degrees, 24 degrees are called Precession (or) Ayanamsa.

POST 14

I would like to share few more information about the ayanamsa.

It has been couple of billion years since the earth was formed. There has been no clue anywhere in our ancient texts on exactly when the Zodiac first started moving backwards. It appeared that it has been moving continously backwards for several million years. If we assume that if the rate of precession is 50 seconds approximately per year, it will take 72 years for the precession to move by 1 degree. For the precession to complete 360 degrees, it would take 26,000 years. So, it starts in one point and circles around and comes back to the same point in 26,000 years. Since the creation of earth, it would have completed several such circles. The current cycle could have begun in the year 291 AD (21-3-291 09:39 IST). At that date, the Sun is positioned in Aries at 0 degree in both Tropical and Sidereal Zodiacs, that is Ayanamsa value on that particular time is 00.00.00. One should not think that the backward moving cycles began only in the year 291 AD. There were many cycles completed before that. With all these assumptions, we may conclude that the current cycle may end probably in 26291 AD and the ayanamsa value will again begin from 00.00.00.

POST 15

The above process appears to have been accepted by the scientists and some of our old texts. But Surya Siddhantha (SS) and Vedic texts are of different opinions.

According to Surya Siddhanta, the precession starts from the zero degree and moves 27 degrees towards West, in about 1800 years. From there, the movement is in reverse direction and comes back to the starting point zero degree, in another 1800 years. From the zero point, the movement continues now towards Eastend of 27 degrees and comes back, taking 3600 years (1800 + 1800). So, the movement of Zodiac acts like a

pendulum in a clock. To complete one cycles, it takes around 7200 years. This is the theory adapted by Surya Siddhanta. Currently, the validity of this theory can be verified only in the year 2225 AD (approximately). As on today in 2019, the precession is about 24 degrees. It will take another 3 degrees to reach the 27th degree mark in another 216 years (3 x 72). So, 2019 + 216 = 2225 AD, and then its direction has to be reversed as per SS. Only our future generation will have the chance to confirm the correctness of the theory of surya siddhantha.

POST 16

So far, I have deait upon, some of the fundamental concepts in the astrology. Now, let us move on to the essential features of Mr.Senthilathiban's book.

Let us start from Newcomb. Simon Newcomb, in his research papers, explored throughly and formed accurate formule for the rate of precession, planetary positions and transits. Many countries adapted his recommendations and prepared their almanacs for several decades. Now we take a close look at the Rate of Precession in Newcomb's point of view.

Newcomb definition of Precession includes two main elements.

1. Rate of Precession (B) in 1900 is 50.2564 seconds.

2. The above Rate is increasing by 0.0002225 seconds per year.

The year referred to by Newcomb is the Besselian Year(B), and not the Julian Year as we use now. The Besselian year can also be called as Tropical Year. From 1984, the IAU retired the usage of Besselian Year System and started using Julian Year System for their calculations.

POST 17

Besselian Year is said to have 365.242198781 days per year and Julian Year 365.25 days per year. So, any execution of Newcomb formula must use the Besselian Year System.

It may be noted that the work of Newcomb, does not have any other reference, other than mentioned above and nothing about Zero Year of Ayanamsa. It is to be stated here

that the Zero Ayanamsa Year as 291 AD, was chosen by Mr.K.S.Krishnamurti for his system based on his own research and intuition.

POST 18

According to Newcomb, the rate of precession is increasing by 0.0002225 seconds per year. But in practice, the American Ephemeris and Nautical Almanac, Lahiri Panchang and IENA (Indian Ephemerids and Nautical Almanac) have taken only 0.000222 seconds for their calculations (6 digits only). Hence for uniformity, Mr.Senthilathiban used the same value in his mathamatical executions in his book.

Having known the value of Rate of Precession, for the year 1900, one can find Rate of Precession for any year using the following formula.

Rate of Precession = 50.2564 + (Y - 1900) x 0.000222 sec/year.
Y = Required Year for which Rate of Precession needs to be found.

For example, let us find the Rate of Precession for Year 1850.
Rate of Precession = 50.2564 + (1850 - 1900) x 0.000222
Rate of Precession = 50.2453 sec/year.

The readers can use the above formula to find the Rate of Precession for Years 1950 & 2000 and verify the results against 50.2675, 50.2786 respectively.

POST19

we know that all the Newcomb work is based on Besselian Year System and interestingly, this is the Year System followed widely during Mr.K.S.K period. There is only a slight differece between the Besselian System and the Julian System which we are all aware of. (Ref. Post 17). So, when one uses the Newcomb theory today, one has to be very careful on the Year System to be used.

Mr.K.S.K did not give any clear explanation or reference to the Newcomb rules in his entire work, except in KP.Reader-1 where he mentioned that his rate of precession is using Newcomb. So, after his time, his followers did not pay much attention to learn the Newcomb theories properly and it resulted in more than one KP Ayanamsas within the KP System.

So, MR.D.Senthilathiban believes, it would enhance the KP System to next level in 21st century only when every KP Astrologer must be aware of the Newcomb's original theories and ayanamsa calculations based on the same. Also, the astrologer must be able to analyze the changes in the ayanamsa values given by the softwares and give atmost importance to the accuracy of the ayanamsa value which is possible only when they are properly educated.

POST 20

Now, we can calculate the ayanamsa for a given year based on Newcomb theory.

The founder of KP System, Mr.KSK recommended the Year 291 AD as the Zero Ayanamsa Year. If we want to go still precisely, the longitude of Sun is 00.00.00 at 21-03-291 @ 04-09 (Universal Time). So, we need to use this DateTime as a base, to calculate the ayanamsa values of other years.

Newcomb theory is based on Year B1900 (Besselian). So Many of the writers follow a process of first calculating the ayanamsa for B1900 and use the same to find the ayanamsa values of required years.

The general formula to calculate the ayanamsa value for any year based on B1900, using Newcomb’s parameters would be as follows.

The general Precession Rate for any year based on B1900 epoch
Pc = 50.2564 + 0.000222 x T seconds
Integrating the above equation with respect to T we get Ayanamsa for any year
PC = C + (50.2564 x T) + (0.000222 x (T x T) / 2)
PC = C + (50.2564 x T) + (0.000111 x (T x T))
PC = Precession (Ayanamsa) in seconds for Required Year (Besselian)
C = Ayanamsa in Seconds for 1900 (B)
T = Required Year(B) – 1900

Now the same above formula can be used to find the ayanamsa for B1900. As we know that the ayanamsa value for 291 AD is Zero, we can assign that value zero to PC and find the value of C.

The Besselian value of the exact time of Zero Ayanamsa (21-03-291 @09-39 IST) is 291.21645153698 Years. (Clue to find equivalent besselian value for any given Date/time, is explained in the later chapter.) Using this Besselian Year value, we can calculate the ayanamsa for B1900 as follows.

POST 21

T = (291.21645153698 - 1900) = (-1608.78354846302)

So,

0 = C + {50.2564 × (-1608.78354846302)} + {0.000111 × (-1608.78354846302) x (-1608.78354846302)

C = 80564.38104 seconds = 22 deg 22 min 44.38 sec.

Thus The ayanamsa value of B1900 is 22 D -22 M- 44.38 S or (80564.38104 sec)

Using the above ayanamsa value for B 1900, one can find ayanamsa value for any year before or after B1900 using the following formula.

PC (sec) = 80564.38104 + (50.2564 × T) + (0.000111 × T × T)

T = (Required Year (B) -1900)

The result obtained is in seconds. It needs to be converted in to Degrees-Minutes-Seconds. In the next post, let us calculate a ayanamsa value for a year using the B1900 Ayanamsa value.

POST 22

Let us find the ayanamsa value for 01-01-2000, 05.30 PM IST using the above formula.

Note:

Here, I would like to remind again the readers, one important point. Besselian year(B) 1900 is actually refers to 31-12-1899,19:31:28 Universal Time, (And not the callender year) which is equal to 01-01-1900, 01:01:28 IST. So, we need to first find out how many days passed since 01-01-1900, 01:01:28 to the Date/Time value for which the ayanams has to be found.

And then, number of days passed must be divided by 365.242198781 to get the Besselian Year because one Besselian year contains 365.242198781 days. The result would be the T value which can be used in the given formula.

Now, let us proceed with the calulations to find out ayanamsa for 01-01-2000, 05.30 PM IST.

POST 23

First step is to find the value of T as explained in the previous post.

T is the Besselian Years between 01-01-1900, 01:01:28 IST and the DateTime for which Ayanamsa is to be calulcated ie: 01-01-2000, 05:30:00 PM IST. We fist calculate the number of days and then divide by 365.242198781 to get the Besselian Years.

There are 100 years between 01-01-1900 01:01:28 IST and 01-01-2000 01:01:28 IST. In between, there are 24 leap months. (note that 1900 is not a leap year)

So, the total days are (100 x 365) + 24 = 36524 days.

This is only up to time 01:01:28 on 01-01-2000. Our target time is 05:30:00 PM IST on the same day. So the time interval between the two has to be taken into.
17:30:00 - 01:01:28 = 16:28:32.

Convert this value into days as follows:
16.4755 ÷ 24 = 0.6864814815 days.

So the total days passed between the two datetimes are

36524 + 0.6864814815 = 36524.6864814815 days.

Now, find T value
T = 36524.6864814815 / 365.242198781 (one B year is = 365.242198781 days)
T = 100.0012775177 (B)

Substitue this value of T in the formula, we get,
80564.38104 + (50.2564 x 100.0013) + (0.000111 x 100.0013 x 100.0013)
80564.38104 + 5025.70420 + 1.11002 = 85591.19526 seconds.
= 23 Degrees 46 Minutes 31.19526 Seconds

So, the ayanamsa value on 01-01-2000, 05:30:00 IST is 23-46-31.

POST 24

In the above example, we used the year B1900 as basis in the formula, to calculate the ayanamsa value for 01-01-2000, 05:30:00 IST. At the same time, it may be understood that it is not the only option for us. The formula can be altered suitably for any year base. The reader can choose the year, he feels comfortable with and can use that Year(B) as a base year. For example, here are four more forumle listed with different base years, which will ultimately give the same results. The option is yours.

(1) B1800 (Base Year) = (20-58-59.85) + (50.2342 x T + 0.000111 × T × T)
(2) B1850 (Base Year) = (21-40-51.84) + (50.2453 x T + 0.000111 × T × T)
(3) B1950 (Base Year) = (23-04-37.48) + (50.2675 x T + 0.000111 × T × T)
(4) B2000 (Base Year) = (23-46-31.23) + (50.2786 x T + 0 .000111 × T × T)

The final ayanamsa answer will be the same regardless of which base year formula is used. If you take a close look at the formule listed above, you can observe that there are 2 elements which are common in all. One is the Ayanamsa value and the other one is the corresponding Rate of Precession, for the chosen year, appearing in the formula.

For example, in the formula (3) above, with B1950 as base year, the first value 23-04-37.48 indicates the Ayanamsa for that Year B1950 and 50.2675 is the Rate of Precession for that Year.

The (Equvalant) calendar dates for the above mentioned Besselian years are:
(1) B1800: 31-12-1799, 14.14.50 (UT)
(2) B1850: 31-12-1849, 16-53-09 (UT)
(3) B1950: 31-12-1949, 22.09.47 (UT)
(4) B2000: 01-01-2000, 00-48-05 (UT)
UT: Universal Time. (IST= UT + 05-30 Hours)

Note: These dates and times are required to calculate T.

POST 25

Now let us work out Ayanamsa for the date/time 01-01-2019, 09 AM (IST), using the formula 4 (B2000 as base) as a practical exercise.

First we have to calculate the value of T.

The starting time for B2000 is 01-01-2000 00:48:05 UT. Which is
01-01-2000, (00:48:05 + 05:30:00) = 01-01-2000, 06:18:05 IST.

To use the formula based on B2000, we need to find the total number of days elapsed between 01-01-2000, 06:18:05 IST and 01-01-2019, 09:00:00 IST and then convert it into Besselian Years. The steps are follows:

(1) Total years between 01-01-2000, 06:18:05 and 01-01-2019 06:18:05 are 19 including 5 Leap years. So the total days between the two datetimes are (19 x 365) + 5 = 6940 days.

(2) The time interval between 01-01-2019, 06:18:05 and 01-01-2019 09:00:00(Our chosen time) is 02:41:55, which is 2.6986111 hours. If we convert it into days, then 2.6986111 / 24 = 0.11244 days. So, the total days between 01-01-2000 06:18:05 and 01-01-2019 09:00:00 are 6940 + 0.11244 = 6940.11244 days.

(3) i.e T = 6940.11244 / 365.242198781 (One B year = 365.242198781 days), So the value of T = 19.0013981495 years (B)

(4) Substituting this T value in the B2000 formula, we get the following:

(23-46-31.23) + (50.2786 x 19.0013981495) (+) [0.000111 x 19.0013981495 x 19.0013981495]
= (23-46-31.23) + [955.3636969995 sec + 0.0400768976 sec]
= 23-46-31.23 + (955.4037738971 sec)
= 23-46-31.23 + 00-15-55.40
= 24-02–26.63

∴ The ayanamsa value on 01-01-2019, 09:00:00 AM (IST) is = 24d-02m–26.63s.

POST 26

The readers are requested to calculate ayanamsa for the same 01-01-2019,09:00:00 AM(IST)time, using different base year formule given in post 24 and verify the answer, which should be 24-02–26.63.

Eventhough B1800, B1900 and B2000 are apparently somewhat easy to be held as base years for ayanamsa calculation, it is not compulsory. The reader can use any year in between, calculate ayanamsa for that year and then keep that as base year for future calculations. For example, the Zero ayanamsa date time of 21-03-291, 09:39:00 can also be used as base year. As we have seen before, the Precession and Rate of Precession must be known to construct the formula. We all know the Ayanamsa at 21-03-291 09:39:00(ist) is Zero. Rate of Precession must be calculated using the formula given in Post 18 as follows.

Formula = 50.2564 + (Y - 1900) × 0.000222 sec/year. (Y = Required (B) Year)

The corresponding Besselian Years for Zero Ayanamsa Date / Time 21-03-291 09:39:00 is 291.21645153698. Substituting this value for Y in the above formula, we get
Rate of Precession = 50.2564 + [(Y - 1900) × 0.000222.)] Seconds
= 50.2564 + [(291.1645153698 - 1900) × 0.000222.]
= 50.2564 + [-1608.7835484630 × 0. 000222]
= 50.2564 - 0.3571499478 = 49.8992500522 Seconds

So the final formula to be used, if one has to choose Zero Ayanamsa Year as base year is as follows:

Ayanamsa for Required Date/Time = 0 + (49.8992500522 × T) + (0.000111 × T × T)

T is the time interval between between 21-03-291, 09:39:00 (IST) and the Date/Time for which ayanamsa is to be calculated, in Besselian years.

(End of Part 1)

Annexure 1

Preface

from

Raja Jothida Ganitham (or) Siddanda Sironmani

by

C.G.Rajan

PREFACE.

I was drawn to the amateur study of Hindu astrology about two decades ago as the result of the amateur study and practice of the same by my father and eldest brother, who were trained in the art of prediction by a maternal uncle of my father. Till a few years afterwards, I was a staunch believer in the accuracy of indigenous Vakya Ganitha Panchang, following in my belief the foot steps of my relatives referred to above. My faith in it was suddenly shaken when to my astonishment, I noticed, on one evening in the western horizon, the two bright moving luminaries of Jupiter and Venus occupying positions * relatively to themselves contrary to the positions given in the Vakya Ganitha Panchang which was followed in my family till then. I had consequently taken to the study of Hindu Astronomy, prompted by a desire to calculate planetary positions myself. My study of European Astronomy as a part of the University Syllabus for the Mathematics course of B.A. Degree afforded me ample opportunities to study the ground work of astronomy and this, combined with the facilities and help that I had secured then and there from the authorities of the observatories of Madras and Washington in the United States of America in respect of the right kind of books dealing with the Modern Astronomical tables, had enabled me to make a comparative study of Hindu astronomical tables and European astronomical tables. I was convinced thereby that the Hindu Astronomical tables are far inferior to the European astronomical tables in point of their accuracy. The ever-growing tendency now-a-days even among the most orthodox communities of Indians to go in for western tables at least for horoscope-reading and social functions (though not for such religious services as appear to be impregnable citadels founded upon strong and age-long Vakya Panchang traditions) and the tendency of the Vakya and Siddhanta almanac-makers to embody in their Panchangs the data about the occurrence of eclipses as calculated from European tables are a proof positive in themselves that the Indian astronomical tables are defective and require recasting and improvement in the light of numerous astronomical discoveries made since the days of the theories on which the Siddhantas (from which the Vakya Ganitha Tables were evolved) were formulated and written. The fundamental concepts and theories of Hindu Astronomy and European astronomy are so divergent that it is an Herculean, if

* Not entirely due to Parallax.

N.B.—This book is published in English and Tamil separately. The tables being coommon to English and Tamil editions, have been provided with headings both in English and Tamil to avoid printing cost. Readers of the English edition are requested to ignore the headings in Tamil.

not a well-nigh impossible, task to raise Hindu astronomy to the same level of Modern European Astronomy in respect of accuracy by making scientific corrections which will be tenable for some centuries at least and without running the risk of seriously jeopardising Hindu astronomy in its identity. There are some European astronomical tables which enable the calculation of planetary positions correct even to the second decimal place of seconds of arc, but so far as I know, they are either very costly (the cost coming upto about one hundred rupees) or in the German and French languages which even many of the English knowing population do not know. It has therefore been my desire for some years past to produce a cheap and convenient book of planetary tables in the wide-spread language of English, and also in Tamil to enable the public to calculate easily planetary positions correct to the nearest minute of arc without going through the laborious, tedious and yet inaccurate methods of the Siddhantas and to set at rest once for all, if possible, the controversy that very often rages in the most orthodox temples about the exact beginning and ending moments of a tithi to determine when a religious festival should commence. These I consider to be the only justification for the introduction of this book to the public.

(2) The list of the important books that I have consulted is given at the end of this book. As regards the Sun, Mars, Mercury Jupiter, Venus and Saturn, I have adopted the Equations given in the Astronomical Papers prepared for the use of the American Ephemeris and Nautical Almanac Vols. VI and VII by Professor Simon Newcomb and George William Hill† for the Mean longitudes of the Sun and its perigee and for the mean longitudes of the other planets and of their nodes, and perigees with Ross's correction to Newcomb's equation wherever necessary. I have also pressed into my service the equations given in them for some of the important inequalities including those caused by Planetary Perturbations" and for the Reduction to the ecliptic, keeping always in view my object of aiming at accuracy to the nearest minute of arc. The arguments for the tables of the Equation of the Centre, Secular Variations, Logarithm of Radius Vector and its Secular variation are expressed in those volumes in terms of days but I have given my arguments in terms of degrees of the mean anomaly to suit my purpose of securing uniformity and convenience. I have constructed altogether original tables from the equations employed by me. I have framed an equation for the Great Inequality (or Long Period Inequality) of Jupiter and Saturn from the equations given for them in the Astronomical Tables containing the Tables of Jupiter Saturn and Uranus by M. A. Bouvard (a French Book). For ready use, I have calculated the values of the Great

NOTE.—* The tables of Newcomb and Hill in the Astronomical Papers of the American Ephemeris and Nautical Almanac are still being used for the preparation of Greenwhich Nautical Almanac—Vide pages 757 and 766 of Greenwich Nautical Almanac for 1933.

Inequalities of Jupiter and Saturn for the years from 1800 A.D. to 2100A.D. and given them in Table No. 8. For other years outside this limit, the values have to be calculated from the equations given at the foot of Table No. 8. To determine the inequality caused by the perturbation of Saturn by Uranus, I have employed the equation given by Simon Newcomb for the mean longitude of Uranus. As for the Moon, I have employed the equations given for the mean longitudes of the Moon, its *Node* and Perigee by Mr. E. W. Brown in his "Tables of the Motion of the Moon" and extracted in the Nautical Almanac and Astronomical Ephemeris for the year 1925. As Mr. Brown's book* costing over four pounds sterling was not available to me for loan, I have adopted the equations given in P. A. Hansen's Tables De La Lune (Tables of the Moon with Neisson's corrections to Hansen's Tables) for the *perturbations* including Equation, Variation, and Annual Equation caused to the Moon. With the help of the equations referred to above, I have constructed original tables. European Almanac or Ephemeris usually gives only the mean longitude of the Nodes of the Moon, while I have added an equation to calculate their true longitudes from their mean longitudes and shown also how to calculate them from the first principles.

As regards Nutation, it is made up of several independent motions of the Earth's axis and the most important of them is the "*Lunar Nutation*". The total quantity of the Lunar Nutation in longitude ranges from $+17''.639$ to $-17''.639$ and the total quantity of the Solar Nutation due to the action of the Sun ranges from $+1''.454$ to $-1''.454$. I have taken into account the greatest component quantity of $-17''.234$ Sin ☊ which is the Nutation in Longitude due to the action of the Moon and rejected the other component quantities which are very small. The error in doing so will range between the negligible limit of $+1''.454$ and $-1''.454$, in as much as the total Nutational correction ranges between $+19''.093$ and $-19''.093$ according to the equations employed by Simon Newcomb. I have prepared table No. 8 of the Sun from the quantity of $-17''.234$ Sin ☊ and employed the correction for Nutation in the case of the Sun and Rahu and Ketu only. I have not embodied, in the illustrative examples for the other planets, the correction for Nutation which is $-12''$ as worked out in the Example for the Sun. On the whole, the correction for Nutation can be safely ingored for all the planets if the reader or computer does not require accuracy to the nearest second of arc and wants to avoid additional labour of calculation. If however he wants to employ the correction for Nutation also, he has to calculate it from table 8 of the Sun as shown in the case of the Sun and add it *algebraically* to the mean longitude denoted by L in Part I of the illustrative examples for the several

* The other books, except Surya Siddhanta by Burgess, mentioned in the Bibliography, being my own copies, are with me and I shall feel highly obliged if any one can sell me even a second hand copy of Surya Siddhanta by Burgess and Siddhanta Sironmani of Bhaskara by Lancelot Wilkinson.

planets. I have also added two sections, one on "the Siderial Time" and the other on the occurrence of eclipses. To calculate siderial time sufficiently accurate for astrological purposes, I have evolved the necessary tables for the period from 1800 A. D. to 3100 A. D. from the equation given by Simon Newcomb in the Astronomical Papers. For other periods, the table No. (1) in this section can be constructed from the equation given in the first paragraph of this section. I have ignored Nutation in the calculation of the Siderial Time as the error thereby does not exceed 1"·168 (being equal to the Nutation in longitude multiplied by the cosine of the obliquity and reduced to time *i.e.*, =19"·093 × 0·9174 ÷ 15) seconds of time in Right Ascension or 1·168 seconds of time in Siderial Time. If however the computer wants to embody the Nutational correction also, he has to calculate it from table 8 of the Sun as before, and multiply it by 0·9174 and divide the product by 15 to get Siderial time in seconds of time and add it algebraically to the final result got for Siderial time for any given moment for any place. In the illustrative example for siderial time, $-12'' \times 0{\cdot}9174 \div 15 = -0{\cdot}73$ seconds of time has to be added algebraically to the final result of 23 hrs.-0-ms.-24·53 seconds of Siderial Time. If we do so, we get 23 hrs.-0-ms.-23·8 seconds. In omitttng small quantities on the score that they are negligible, I have always had in my view the object of simplifying calculation and also the purpose for which, or the degree of accuracy to which, we require our calculation and in this, I have followed the precedent of no less an authority than Simon Newcomb who says thus:—"in the following expressions (*i.e.*, expressions for Nutation) I have included all the terms of which the coefficients exceed 0"·006. Below this limit, it does not seem necessary to go, as no astronomical result *will be practically affected by a small error* in the assumed nutation...". To preclude the contingency of my tables becoming approximate for distant periods, I have given, wherever necessary, tables of Secular Variation which will keep the tables sufficiently accurate even to distant dates. As regards the occurrence of eclipses, I have consulted the "Recurrence of Solar Eclipses in the Astronomical Papers Vol. I" by Simon Newcomb and R. Buchanan's Mathematical Theory of Eclipses and could not consult Oppolzer's "Kanon der Finsternisse" as it is in German which I do not know and as I could not get it also being very costly. Though Buchanan's book gives the ecliptic limits with reference to the Moon's latitude, I have calculated the ecliptic limits with reference to the difference in longitude between the Moon and its Node and given them along with the ecliptic limits in terms of the Moon's latitude to enable indigenous Panchang makers and chronologists to determine the occurrence of eclipses with reference to longitude. The tables in this book cover the period from 3200 B.C. to 3100 A.D. so that this book will be useful to chronologists and almanac-makers. As regards the *Heliacal Rising and Setting* of a heavenly body, they belong to *Old Astronomy* rather

than to *Modern Astronomy*. The discovery of telescope has made them a thing of the past. They depend on the conditions of the optical power of the sight of the observer's eyes and the atmospheric conditions determining the clearness of the sky. These two factors are very uncertain and varying. Hence the heliacal rising and setting are not *exact* astronomical phenomena. I have not therefore dealt with them in this book. They depend also on the latitude of the observer and the elongation of the planets from the Sun. Those who are interested in them are recommended to follow the directions given in chapter IX and X of "*Surya Siddhanta*" which are extracted and given in the foot-note for easy reference in the case of the planets only.* I have added three appendices containing information which will be very useful to astrologers, such as the Conversion of Right Ascension and Declination into Celestial Longitude and Latitude, Apparent time, Mean time, Local time and Standard time, the rising and setting of Heavenly bodies including the Sun and the planets and the rising and setting of Zodiacal Signs and the calculation of the Lagna (Ascendant) and the Bhavachakra. In this connection I have to state that I have great pleasure to acknowledge my indebtedness to the books referred to above as having been consulted by me.

3. The books referred to above stop with the calculation of the heliocentric positions of Mars, Mercury, Jupiter, Venus, Saturn (Uranus and Neptune) and do not proceed further with the calculation of their geocentric positions. To facilitate the computer of planetary geocentric positions, I have produced a separate book entitled "Conversion of Heliocentric Co-ordinates into Geocentric Co-ordinates-containing tables for converting Heliocentric longitude and latitude into Geocentric Tropical longitude and latitude and into Indian Siderial longitude" and it is bound with this book for the sake of convenience. The attention of the reader is invited to the preface (of that book) in which it is stated that (1) that book is specially designed to be useful both to those who know the application of logarithmic tables and to those who are ignorant of logarithm and that that book contains also four ready-reckoner tables to convert Tropical longitude and latitude into Indian Polar Longitude and Polar Latitude and to find Hindu Kranti (i.e., Hindu Declination) and European Declination. In the case of Mars, Mercury, Jupiter, Venus and Saturn, the computer, after arriving at their Heliocentric longitude, latitude and logarithm of Radius Vector or simply Radius Vector and also the geocentric longitude of the Sun and its Radius Vector—all according to the rules of this book—has to follow the instructions given in

* The planets are visible to the naked eye when their elongations (i.e., their distances from the Sun in degrees of time) are less than the figures given below. The heliacal setting can be calculated from these limits and the calculation will be sufficiently accurate for estimating the effects of Asthangatha planets, for doing the process of Asthangatha Haranam and for determining Upakarma, etc.

The Moon...12°	Venus...8° or 10°
Mars...17°	Jupiter...11°
Mercury...12° or 14°	Saturn...15°.

the separate book to compute their geocentric positions. In following this method, I have followed the method of European astronomers.

4. From two-fold considerations, I have adopted the method of arriving at the tropical (*i.e.*, Sayana) longitude and tropical latitude first instead of getting the Nirayana longitude first, by making the necessary correction for Ayanamsa in the several tables giving the mean longitudes. To take the Tropical (or Sayana) mean longitudes first and then to apply the necessary corrections ensures much more accuracy—a circumstance which no less an Indian astronomer than the famous Bhaskara of Siddhanta Siromani had admitted as being more accurate. Further, the question of Ayanamsa is still considered a moot one and several schools of thought follow different quantities of Ayanamsa. I have therefore purposely followed the Sayana measure first to deduce from it the Nirayana measure subsequently so that the accuracy of calculation may not be seriously affected and so that the several schools of Ayanamsa may apply their own Ayanamsa quantity and get at the Nirayana longitude which they consider to be correct. I have devoted also, in the separate book referred to above, a section to the question of Ayanamsa, determining in it, from the first principles in some cases, the several quantities of Ayanamsa which have their own votaries or protagonists. The Ayanamsa Tables 1*b* and 1*c* in it are so designed that they can be used by all schools of thought about Ayanamsa.

5. I shall now enable the reader to have an idea of the degree of accuracy of my tables by instituting a comparison with European Almanacs, the accuracy of which, is undoubtedly beyond question as admitted by many. In the illustrative examples, I have calculated the positions of the planets at 5-30 p.m. Standard Time on 16—12—1924 A.D. at Madras.

COMPARATIVE TABLE NO. 1.

At 5–30 p.m. (Standard Time) on 16—12—1924 at Madras (*i.e.*, at Noon on 16—12—1924 at Greenwich).

Names of Planets.	Heliocentric Longitude.		Heliocentric Latitude.		Logarithm of Radius Vector.	
	Our results.	Nautical Almanac results.	Our results.	Nautical Almanac results.	Our results.	Nautical Almanac results.
	° ′ ″	° ′ ″	° ′ ″	° ′ ″		
Mars ...	40–40– 5	40–39–50	0–16– 3 *S*	0–16– 4 *S*	10·16291	10·16291
Mercury.	28–42–55	28–42–36	2–15–27 *S*	2–15–33 *S*	9·51276	9·51277
Jupiter ...	270–36–34	270–36– 7	0–13–44 *N*	0–12–25 *N*	10·71906	10·72026
Venus ...	188–50– 5	188–50– 2	3– 7–42 *N*	3– 7–43 *N*	9·85777	9·85775
Saturn ...	216–42–42	216–42–18	2–25–15 *N*	2–25– 4 *N*	10·99347	10·99194

COMPARATIVE TABLE No. 2.

At 5–30 p.m. (Standard Time) on 16—12—1924 at Madras
(i.e., at Noon on 16—12—1924 at Greenwhich).

Names of Planets.	Geocentric Tropical Longitude.				Geocentric Tropical Latitude.			
	Our results.		Nautical Almanac results.		Our results.		Nautical Almanac results.	
	°	′	°	′	°	′	°	′
Sun ...	264	17	264	17	0	0	0	0
Moon ...	140	50	140	49	0	32*N*	0	33*N*
Mars ...	358	14	358	14	0	23*S*	0	23*S*
Mercury. ...	282	50	282	50	0	52*S*	0	51*S*
Jupiter ...	269	36	269	36	0	12*N*	0	11*N*
Venus ...	233	24	233	24	1	40*N*	1	40*N*
Saturn ...	220	39	220	40	2	16*N*	2	16*N*
Rahu ...	136	27	136	27	0	0	0	0*
Ketu ...	316	27	316	27	0	0	0	0*

Siderial Time :—Our result is 17 hrs.-39 ms.-23·65 sds. as against the Nautical Almanac result of 17 hrs.-39 ms.-23·75 sds. as shown below :—

	Hr.	M.	Sds.
Sum of items up to 1900 A.D., 356 days in page 2 of the Section on Siderial Time ... ... is	17	39	24·38
Nutation ...	— 0	0	0·73
Total ...	17	39	23·65

These two comparative tables clearly show that our results agree fairly well with the results of the Nautical Almanac and that our tables are sufficiently accurate. In a small volume of this kind, it is absolutely impossible to make our results agree with the results of the European Almanacs to the nearest second, as the European Almanacs employ innumerable equations resulting in the laboriously calculated tables to arrive at their results. *My object is to make my book popular and useful*

* The longitudes of Rahu and Ketu are mean longitudes. The latitudes of Rahu and Ketu are always zero.

both to an expert calculator and to the mechanical worker who does not know much of mathematics beyond the four fundamental rules of Arithmetic namely addition, subtraction, multiplication, and division and at the same time to aim at a moderate degree of accuracy which is sufficient for astrological and chronological purposes. To this end in view, I have given also many tables to reduce the calculation to one of a mechanical nature securing considerable ease in practical working ; for, otherwise, any book is bound to get into the limbo of oblivion except with the investigating scholars.

There now remains the pleasant duty of greatfully acknowledging the kind help that I have received from various quarters without which I venture to say that I would not have produced this book. In the first place, I have to thank the staff of the Madras observatory and in particular Messrs. C. Chengalvaraya Mudaliar and A.A. Narayana Ayyar B.A. (now pensioner) who were exceedingly kind to me in allowing me free access to the observatory of Madras from about 1920 A.D. to consult books on the subject whenever necessary. I have next to thank with very great pleasure the invaluable help and instructions that I have been off and on receving from 1920 A.D. from the staff and the Superintendent of the United States Naval Observatory, Washington, who were kind enough to clear my doubts whenever I had difficulty to understand the Astronomical Papers of the American Ephemeris and who were also kind to send me free of cost Astronomical Papers Vol. III parts I and V and Vol. V, parts I and II. I take this opportunity to thank also some of my well-wishers whose kind correspondence with me has equipped me with such experience as has been utilised by me in the preparation of this book.

Last but not least is the task of thanking those who were responsible for bringing this book out of the press, despite the special difficulties of printing a book of this nature involving figure-work and enormous labour and expenditure. I heartily thank my eldest brother Mr. C. Appaswamy Mudaliar (a Government pensioner) and his son Mr. C. Viswanatha Mudaliar for their having corrected the proof and pushed the work through the press and for their invaluable help in the construction and preparation of the tables. The readers are specially requested to carry out the corrections given in the Errata list before they proceed to read the book proper ; otherwise, they may find it difficult to follow the illustrative examples given. Lastly, I crave the in dulgence of thereader to excuse clerical errors and print-mistakes in the book and also any slip of the hand in working out the illustrative examples and to take into account only the methods for guidance in the illustrative examples even if there be any slips of the hand in them.

I have chosen to style this work a Siddhanta and a Graha Karana as well, as I consider that it partakes of the character of both a Siddhanta and a Karana. I have dedicated this work to the loving memory of the ancient and modern astronomers of the East and the West in token of my humble admiration of their intellectual qualities which are par excellence. The undersigned, (C. G. Rajan whose full name is C. Govinda Rajan, a Vellala Mudaliar of Sigamani Maharishi Gotram, aged thirty six years.) ventures to place this work before the public, in the hope that the Almighty will make it useful to astronomers, astrologers, Panchang-makers and chronologists and make him realise that he has done his duty to his countrymen. Salutation to ancient and modern astronomers.

7, Venkatesa Maistry Street,
Near Krishnappa Naick Tank,
Sowcarpet Post,
MADRAS,
9th February 1933, A.D.

C. G. RAJAN.

KP Ayanamsa – An Analysis

V.Subramanian

KP Astrologer, Chennai–92

Part – 2

Contents (Part 2)

POST 27

We are all aware that many Ayanamsas are existing in softwares / ephimeris that are currently being used by KP astrologers. Now we will discuss about them one by one for it's accuracy vis–à–vis Newcomb precession theory.

First let us consider the ayanamsa advised by Sri K.S.Krishnamurti.

1. Vide pag 57 of reader 1, He has declared that he intented to follow Newcomb ayanamsa and year of coincidence as 291 AD (Page 59). He further stated that
2. Ayanamsa values for years 1840 and 2001 should be taken from the table given by him in Reader 1 and for subsequent years ,50.2388475 seconds should be added every year.

About Zero Ayanamsa year 291.

As I have mentioned earliar (in post 4) the ancient astronomers and researchers in the previous century had arrived at different Zero Ayanamsa Years.Every one of them provided supporting evidences to their own theory. This particular situation left the astrologer community without proper guidance on choosing the right year/ayanamsa. And in result, Stalwarts in the field had chosen one, they thought correct, based on their own conviction and intuition.

In that way, BV Raman has chosen 397 AD and N.C.Lahiri 285 AD. But C.G.Rajan instead of setting up a Zero Ayanamsa year, has followed an unique method of first calculating ayanamsa value for the year 1925 AD, with assistance from the popular text Surya Siddanta and western ephimeris data and then he calculated the ayanamsa values for other years using Newcomb theory. However, all the three personalities mentioned above had provided supporting antronomical evidences in their books for their selection of respective zero ayanamsa years but KSK unfortunately preferred to keep quite on his choice of year 291.

POST 28

To the best of my knowledge, either in our ancient astrological treaties or in any modern astronomical texts, no reference to the year 291 as zero ayanamsa year, could be

spotted. However an article by Mr.D.V.Ketkar, in the May 1963 issue of 'Astrlogical Magazene'(editor, Mr.B.V.Raman) under the caption "Vexed question of Ayanamsa" throws some light in the matter,for year 291 AD as zero year being a possibility.

The same article was published again in August 1999 issue of "Astrological Magazine" and in March 2019 issue of "Modern Astrology" edited by Gayatridevi Vasudev,Daughter of B.V.Raman (in response to the request from Mr.D.Senthilathiban) In fact many scholars had contributed on the same caption in the form of series of articles. The write–up by Mr.Ketkar is enclosed as **Annuxure–2** for information.

On this subject, Mr.Senthilathiban has made an interesting observation in his book (page 155).Sri KSK ,for the first time declared to the public to take year 291AD, as zero year for his system use, through his monthly magazene "Astrology and Athirshta ", Aug/Sep 1963 issue, just two months after the release of the said article by DV.Ketkar. In the absence of any self scientific explanation by him on his selection, it might be inferred that KSK banked upon Ketkar 's article to finalise the zero ayanamsa year as 291 AD.

POST 29

The Rate of Precession defined by Guruji.

KSK has declared that he follows Newcomb precession and advised to take the value as 50.2388475 sec.per year. In this connection it is to be understood that the figure mentioned by him (50.2388475) is not to be seen distinctively in Newcomb's research papers. However, we can deduce it from Newcomb precession formula as shown bellow.

Referring to post 18, wherein the Rate of Precession for Year B1850 was calculated to be 50.2453 sec. and hence, the formula for finding Rate of Precession for any Year (Y) based on B 1850 would be as follows.

ROP = 50.2453 + (Y – 1850) × 0.0002225 Seconds

50.2388475 = 50.2453+ (Y– 1850) × 0.0002225

(Y–1850) = (50.2388475 – 50.2453) ÷ (0.0002225)

= (–) (0.0064525) ÷ 0.0002225

= – 29

∴ Y = 1850 – 29 = 1821.

From the above derivation, we can understand that the value 50.2388475 seconds is the Rate of Precession for Year B 1821 and the same for Year B 2001 is 50.278822 seconds (using the same formula). If that is so, it is baffling why KSK has recommended a value meant for 1821 to be applied for years 2002 onwards. Further he has completely ignored the increment of 0.000222 seconds to be added every year, in the precession rate as per Newcomb theory. These discrepancies were not properly defended either by Mr.K.S.K in his time or by his followers after his time.

POST 30

Reader–1. Ayanamsa table as given by KSK.

1. The ayanamsa values given in the table contains upto degree and minutes regardless of the Month/ date for a particular year. (whether it is January or December).
2. This table was not constructed either truly applying NewComb rules with 291 AD as Zero Ayanamsa Year (21 st March 291) nor using the Rate of Precession value 50.2388475 sec. as advised by himself. The basis of this table creation is not known till date.
3. In connection with this table, Mr. Senthilathiban has brought to our attention, another interesting analogy. I have already pointed out in post 27 that Mr.C.G.Rajan first calculated the ayanamsa for the Year 1925 and then using NewComb rules, worked out ayanamsa for other years upto seconds accuracy and printed in his book. In addition, Considering the unavailability of any "Computational Aids" in his time(1933) to calculate values upto seconds, to ease the work of an astrologer, Mr.C.G.Rajan had shortened the table upto degree–minutes and tabulated the values for ayanamsa for years between 1840 and 2000.(This table is enclosed as annexure–6). For subsequent years, Mr.Rajan had advised the readers to refere to the formula in his book "Raja Jothida Ganitham".

Mr.K.S.K had given a table similar to the one of Mr.C.G.Rajan for years between 1840 and 2001 and advised the readers to add 50.2388475 seconds to every subsequent year. In the absence of proper explanation on the mode of calculation by him, leads one to speculate that KSK might have prepared the table by simply duplicating Rajan's table by adding 2 minutes to the value for each year, to accommodate for the difference in the zero ayanamsa years between him and Rajan.

Here Mr.Senthilathiban has recorded another interesting observation of KSK's small omission in judging the interval, in the zero ayanamsa year of himself and Rajan.He has shown by back working, Rajan 's zero ayanamsa year happened to fall at 17–02–295 (Page 39 of his book). KSK 's zero ayanamsa year falls on 21–03–291. Hence the time interval between these two dates is 3 years 10 months and 26 days. The ayanamsa difference between the same will work out to approximately 195 seconds. (Assuming 50 seconds/year in an average). So, it is evident that if KSK had added 3 minutes and 15 seconds to Rajan's table instead of 2 minutes, it could have fallen very close to Newcomb values (Following correct formula). This has been clearly discussed in detail vide pages 122 and 126 of Mr.Senthilathiban's book with scientific and mathematical support.

POST 31

Now let us Peruse few articles written by eminent KP astrologers about Ayanamsa, at different times in the post KSK period.

M.C.Khare's Article

One Mr.M.C.Khare, in his article under the caption "Ayanamsa– problem", published in "Astrology & Athirshta" magazene, October 1978 issue is enclosed as **Annexure–3**. In this, the author had recommended ayanamsa to be calculated, simply taking year 291 as zero year (starting year) and Precession value for every year as 50.2388475 seconds.

According to this, the formula to find Ayanamsa for any year Y would be
(Y – 291) × 50.2388475 seconds.
EX: The Ayanamsa for year, 2020 would be (2020 – 291) × 50.2388475 seconds. = 86862.97 = 24 d 07m 43s.

The reference date is ,15– 04 –2020. Further the author had provided a ready reckoner, to get value for any intermediate month/ day of the year.
This method of calculating Ayanamsa is accommodated in the present day softwares in the name of "KP Straight line" or "KP Refind'".

The deviation/defects observed in this mode of calculation is listed below.

(1) The value of 50.2388475 seconds pertains to the besselian year 1821AD as explained in post 29. But here, it is used right from year 291 AD.
(2) An yearly increment of 0.000222 sec in the rate of Precession per year, is not at all taken into account but a constant value of 50.2388475 sec for every year is applied.
(3) The Newcomb formula is based on besselian epoch only. In the above method calender year is used instead.
(4) The reference zero Ayanamsa date is taken as 15–04–291 instead of 21–03–291.
(5) Not recommend/ favoured by Sri.KSK (If it is otherwise, ksk could have very well prepared this simple table in Reader 1, accordingly.)

There will be about 4 to 5 minutes' difference in the Ayanamsa value, between one, computed using "Straight Line/Refined" method and true newcomb formula.
For example, for 15–04–2020, the value will work out to 24d 03m 31 through Newcomb as against a value of 24–07–43, through Straight Line/Refined.

As KP system is so structured that even a "second" difference in Ayanamsa value, can result in change of sub lord of a cusp, then you can very well understand the implications of 4 to 5 minutes' difference, in the prediction results. Subsequently Sri.MGG NAIR, a KP stalwart and mathematician, in his article published in may 1980 A&A, had advised the KP followers, to reject this Straight Line method. (His article is analysed next) but to no avail.one may wonder, how this one (Straight Line method), inspite of inherent flaws, could manage to find a place in astrological softwares. The reason, I have pointed out in my conclusion. (Part 4).

POST 32

M.G.G.Nair's Article

As I mentioned earlier, Nair was an eminent KP Astrologer and mathematician. He was a regular contributor to Astrology & Athirshta magazene, in those times. In his article published in May 1980 issue under the caption "Krishnamoorthi Ayanamsa", he clearly explained about the Newcomb Precession theory and corresponding mathematical formula to work out Ayanamsa value for any year based on Newcomb parameters. using that formula, he had worked out Ayanamsa value for the date 01–01–1900 and got it as 22–22–44.186. (I recall that we worked out for the same date and the answer was 22–22–44.38 vide Post 21, of Part 1)

Further, he has given a tabular column, in which he has compared Ayanamsa values of reader 1 and straight line method with what he derived using newcomb formula, for every 10 years'interval between 15–04–1900 and 15–04–2000.Based on these values, he has expressed his opinion that we can adopt reader 1 Ayanamsa as it is close to Newcomb Precession theory, that too only where accuracy is not essential. At the same time, for accurate results, he has recommended to consider only Newcomb model as worked out by himself. Also he has categorically stated to reject the Straight Line method.

Further, though he has recommended to use Ayanamsa givene in Reader–1 by KSK, he has not hesitated to point out, at the end of his article that he was, however, reluctant to revert to Krishnamoorthi Ayanamsa (Reader 1) until he found some scientific support for the Ayanamsa tabulated in Reader1.This statement by him implies that the values given in reader 1 by KSK, can not be validated scientifically.

In addition, Nair has briefly dealt with Nutation and its importance and need to consider the same for accurate casting of horoscope (True Ayanamsa) which element was ignored by KSK and subsequently by his followers also. (including most of the software developers)

Nair's above article is enclosed as Annexure–4 herewith.

POST 33

Now let me bring to the attention of all KP Astrologers, one important point.MGG Nair is the first person, I believe, to reveal to the KP community, the exact Newcomb Precession theory and formula to work out Ayanamsa using the same, through the article mentioned above, in the year 1980. Until then all KP astrologers (except a handful,who have had knowledge on astronomy) were not acquainted with the norms of Newcomb Precession theory but simply followed KSK 's instructions.So after the publication of Nair's article, all senior KP astrogers,at that time, should have come together, unanimously agreed and chosen a single correct Ayanamsa for use in KP system.But unfortunately, that did not happen, with the result, the two Ayanamsa (Straight Line and KSK reader value) were continued to be used by KP astrologers based on their own faith.

POST 34

In the meanwhile, Sri Hariharan, one of the sons of KSK, has published the "Universal table of houses" in the year 1975. It was prepared by the KP stalwart and son–in–law of KSK, Sri Balasundaram. In this book, he has used 285 AD (instead of 291) as year of coincidence of both zodiac (as clarified by Sri A.R.Raichur,the co–auther of the book) and Newcomb formula, to get Ayanamsa for any date.Hence there exists a difference of 4 to 5 minutes between KSK reader value and universal table of houses.

Some years later, (in 1985) Sri.K.Subramaniam another son of KSK, published his own Table of houses titled "KP Table of Houses". This was prepared by Dr.Balachandran, an eminent KP astrologer. The Ayanamsa adopted in this book is same as found in "Astrological Tables for All " by Eshwar Manu. The rate of Precession is taken at a constant value of 50 seconds per year. So the values given in this book differ slightly with reader 1.

With the advent above said two Ayanamsas from recognized quarters, the prevailing confusion among KP astrogers has compounded.

Sri Kuppu Ganapathy, from Delhi, a very senior KP astrologer and direct student of Sri KSK, made out an excellent and exhaustive case study on this subject of Ayanamsa in his article appeared in April & May 1994 issues of "KP & Astrology " magazine. (Being published by Sri K.Subramaniam). He expressed his concern over the existence of more than one Ayanamsa and made an appeal to the KP Community to unite together, come to proper conclusion after a thorough and thread bare discussion on scientific basis and resolve the issue once for all. Though his idea was welcomed by all, except for a rejoinder by the Editor K.Subramaniam, in June 94 issue, no further efforts were taken by KP fraternity.

POST 35

Around the period 1999–2000, Mr.Avneesh Sharma of Delhi, a KP astrologer, launched the Astrological software "Astro Works", first of it's kind for KP system. In the software he incorporated two Ayanamsa values one as per KP reader (1) under heading "KP Old" and the other as "KP Refined" which correspond to Straight Line method advocated by M.C.Khare and followed by eminent and notable personalities in KP circle Sri K.M.Subramaniam and Mr.Mohan, in those period of time.

Dr. Balachandran's Article

In the year 2003, Dr.Balachandran,an erudite KP scholar, having long association with Sri K.Subramaniam,presented an article in the annual issue of "KP & Astrology" under the caption "In defence of KP Ayanamsa"

In this he explained the mathematical steps involved, in finding ayanamsa value for any given time, using Newcomb formula and parameters advised by KSK, ie: 291 as year of coincidence and yearly rate of Precession as 50.2388475 seconds. Further, he worked out Ayanamsa values for years 1900 AD to 2052 AD and attached it as tabular column in the above article.

The following flaws are present in the above article.

(1) Balachandran has used a Precession value of 50.2388475 for the year 1900 to derive the formula to get Ayanamsa for any other year/date. As per New comb theory, it should be 50.2564 sec, as correctly applied by M.G.G.Nair. Further 50.2388475 corresponds to Besselian year 1821(as explained in Post–29) and not for 1900.

(2) He used Arithmetic series summation concept and also calender year base (not Besselian) as adopted by Nair, which is incorrect.

(3) Though his intention is to justify KSK, for the values given by him in reader 1 table, he has not made attempt to compare his values as against reader 1, which in fact varies from (–) 27 to +76 seconds.

The above article is attached as **Annexure–5**.

POST 36

Despite the aforesaid flaws in the above article, most of the KP followers at that time, simply believed that the values arrived at by Dr.Balachandran is the accurate one, as recommended by KSK, probably because he has used the parameters advised by KSK,ie: Year 291 and Precession rate 50.2388475 sec. in the Newcomb formula. Unfortunately, all of them had not been conversant with or ignorant of Newcomb theory and related mathematical process. with the result, most of them wanted to incorporate the Ayanamsa worked out by Balachandran in the softwares, they were using. In response to their request, the respective software developers introduced a new Ayanamsa in different names like "KP Enhanced", "KP New" etc.

So in all, about 5 or more KP Ayanamsas are at present available in Softwares/Table of Houses / Epymeris etc and the individual is forced to select one, out of his/her own conviction and faith. **Nevertheless, it is to be kept in mind that none of the aforesaid Ayanamsas displays the correct and accurate value as per original Newcomb theory**. They all differ from few seconds to few minutes as shown in the tabular column below, for two selected dates. The values are compared with original Newcomb's and difference is shown as (+) or (–).

System	Ayanamsa at 05 – 30 AM (IST)	
	15–04–1900	15–04–2000
NC	22 – 22 – 58	23 – 46 – 45
KPO	22 – 22 – 00 (– 58 Sec)	23 –46 – 00 (– 45 Sec
KPR	22 – 27 – 14 (+ 4 Min 16 Sec)	23 – 50 – 58 (+ 4 Min 13 Sec
KPE	22 – 22 –04 (– 54 Sec)	23 – 45 – 52 (– 43 Sec)
UTH	22 – 28 –10 (+ 5 Min 12 Sec)	23 – 51 – 57 (+ 5 Min 12 Sec)
KPTH	22 – 21 – 50 (– 1 Min 08 Sec)	23 – 45 –10 (– 1 Min 35 Sec)
Balachandar	22 – 22 – 30 (– 28 Sec)	23 – 46 –15 (– 30 Sec)
MGG.Nair	22 –22 – 58 (0)	23 – 46 – 45 (0)

NC : Newcomb

KPO : KP Old (As per Reader 1)

KPR : KP Straightline or KP Refind

KPE : KP Enhanced

UTH : Universal Table of Houses (By Hariharan)

KPTH : KP Table of Houses (By Subramaniam)

Apart from analysing the above mentioned Ayanamsa methods, Mr.Senthilathiban in his book, also discussed in detail about C.G.Rajan, N.C.Lahari and IENA (Rashtria panchang) Ayanamsa also and pointed out the error/discrepancies in each one of them.

(End of Part 2)

Annexure – 2

D.V.Ketkar's Article

The Vexed Question of Ayanamsa — Paper VIII

D.V.Ketkar

[The question of Ayanamsa assumes importance because Jyotisha or astrology is Sidereal or Nirayana. The value of Ayanamsa has not been resolved although two or three Ayanamsas are popular with most astrology students. A series of articles by well-known scholars was published in these columns on the subject of Ayanamsa in 1962 - '63. In deference to the wishes of a large number of our readers, these articles are being reproduced beginning from the June 1998 issue. We would, however, like our readers to note that ultimately the proof of the pudding lies in the eating. The correctness of a forecast based on a particular value of the Ayanamsa, without over-emphasis on the astronomical angle, therefore may be deemed as evidence of its correctness. — Editor]

Mathematically not Sound

The treatment of the subject of Ayanamsa in articles appearing in these columns is definitely logical, but the data (the back-bone) has the blemish of being questionable on account of its mathematical unsoundness. This has led to errors of omission and commission. To avoid these I will treat the question in a different way. Will the following questions help us solve the Ayanamsa problem ?

(a) Can the Siddhantic Sidereal Year help us ?

The answer is "No". The Siddhantic Sidereal Year is in excess of the true Sidereal Year. So the data wherein this erroneous Siddhantic Sidereal Year plays its part (as in **Suryasiddhanta** — *Meshasankramana* and *Chayarka* for instance) cannot be, on the face of it, acceptable.

(b) Can the Siddhantic Precession Motion help us ?

Here again, the answer is "No". The Siddhantic precession motion is in excess of the true precession motion. Thus the data wherein this incorrect motion operates deserve to be rejected.

(c) Can the Siddhantic Year of Zero-Ayanamsa help us ?

Here too the answer is a stern "No", because the years from 421 to 444 etc., are not based upon direct observation. They have been deduced after 700-800 years and with the help of incorrect precession motion. So this deserves to be discarded.

Siddhantic List

(d) Can the Siddhantic list of Nakshatra longitudes and latitudes help us solve the problem ?

The answer is a positive "No". The instruments used were rough and far from accurate, hence unacceptable.

What clue then is most helpful ?

Fortunately for us Varahamihira alone has recorded a good clue which is the result of his direct personal observation. He writes in **Brihat Samhita :**

आश्लेषार्धादृक्षिणमृक्तरमयनं रवेर्धनिष्टाद्यम् ।
नूनं कदाचिदासीत् येनोक्तं पूर्वशास्त्रेषु ॥
खांप्रतमयनं सवितु : कर्कटकाद्यं मृगादितश्चान्यत् ।
उक्ता भांशैः विकृति : प्रत्यक्षपरीक्षणैः व्यक्तिः ॥

He says : "The summer solstice occurred at the beginning of Dhanishta and the winter solstice occurred at half of Aslesha. This phenomenon must have really occurred and

hence the ancient Sastras have recorded them with care. At present the Sun turns South at the beginning of Karka (Cancer) and he turns North at the beginning of Makara (Capricorn). On this point, astronomers have **declared** a total displacement of 27 degrees from Aslesha half of **Vedanga Jyotisha** and the present time. My direct and personal observation confirms its truth" affirms Varaha.

In short Varaha means that from Aslesha half the precession has moved 27^0 backwards to Punarvasu half at present (Saka 451).

Similarly in **Panchasiddhantika** too he repeats :

आश्लेषार्धादासीत् यदा निवृत्तिः किलोष्ण किरणस्य ।
युक्तमयनं तदासीत् सांप्रतमयनं पुनर्वसुतः ॥

Punarvasuthah can be explained as follows :

Asleshardhat — ablative and Ardha.

Punarvasuthaha — ablative, therefore (Ardha).

Therefore *Punarvasuthah* means *Punarvasorardhat* half forced by previous Aslesha half. *Asleshardhat — Anurittibalath.* For instance (**Panchasiddhantika**),

उदगयनं मकरादौ . . . .
. . . . दाक्षिणमयनं च कर्कटकात्

Though we have simply *Karkatakath* (ablative) here, by the force of the previous *Makaradau, Karkatakath* means exactly *Karkatakadau Anuvritten* and nothing else. He means that the Sun turned South, at half of Aslesha and the Ayana was then alright. But at present, (*i.e.,* Saka 453) the Sun turns South from Punarvasu — that is Punarvasu half. (*Samprathamayanam Punarvasordhath*).

Feeble Objection

Some may argue that — **उक्ता भावे विकृतिः** is the manuscript reading and not **उक्ता भांशेः विकृतिः**

Bha = 27; *Bhama* = 27 degrees

Displacement (*Vikrithi*) = Irregularity.

Refutation

There are two manuscript copies of **Aryabhattiyam** with the commentary of Neelakantasomasuthwa. It has been published by the Trivandrum Sanskrit Series.

Neelakanta quotes twice the same verses of Varaha — of which the last line is (according to Neelakanta)

उक्ता भांशैः विकृतिः प्रत्यक्षपरीक्षणैः व्यक्ति :।

and makes a significant remark that — "the scrutinised result of the precession amount is (*Chalanaparimana*) stated here (by Varahamihira).

Neelakanta writes :-

तच्चलनपरिमाणस्य परीक्ष्य
निर्णयः प्रदर्शितः . . . इति

Neelakanta by *Chalanaparimana* refers exactly to *Bhamsaihi* only, because *Bhamsa* = 27^0, is the precession amount (*Parimana*). So the objection along with the erroneous reading — *Ukta Bhave* falls to the ground.

Merits of Varaha's Clue

1. The total displacement of 26^0 40' recorded by Varaha is not tainted by any incorrect motion of precession.
2. Nor is it based on the incorrect length of the Siddhantic Sidereal Year.
3. Nor is it deduced from the rough year of Zero-Ayanamsa of the **Siddhantas**.
4. Nor is it calculated with the help of the Siddhantic list of Nakshatra longitudes.
5. But it is the result of direct, unbiased personal observation of Varaha himself. Hence, it is entitled to be the only best clue — capable of satisfactorily solving the question of Ayanamsa.

The Subject on Hand

Varaha's statement of *Chalanaparimana* is clear cut. From the **Vedanga Jyotisha** age to

his time (Saka 453) the precession amount is 27 degrees.

His statement of the Nakshatra and the division (*viz.*, Aslesha half; Punarvasu half) is equally definite. Both these must harmonize. Harmonization gives the precessional displacement = 26^0 40'.

In the time of the **Vedanga Jyotisha** the Ayanamsa was 23^0 20'

Ayanamsa in Varaha's time =	$+3^0$ 20'
	Ayanamsa
Vedanga Jyotisha to Varaha (Saka 453)	$+ 26^0 40'$
Vedanga Jyotisha to Zero year	$- 23^0 20'$
In Varaha's time	$+ 3^0 20'$

विपरीतायनभागः — पंचसिद्धान्तिक

Here the above arc of $+3^0$ 20' Ayanamsa clearly points out that the Ayanamsa at the time of Varaha was $+3^0$ 20', which Varaha, himself, distinguishes by calling it *Vipareethayana-bhagaha in* **Panchasiddhantika**. This means that the *Bhaga* = *Charana* (Pada) = $3^0$20' had become *Vipareeta* — that is **plus,** because the Vernal Equinox had crossed the "First point of Aswini" of the Nirayana Zodiac, then current, without break, right from the **Taittireeya Samhita** of B.C. 2400. Reliable evidence too can be adduced.

Year of Zero Ayanamsa

According to modern accepted motions, 240 years are required to cover one *Bhaga* or *Charana* or Pada or 3^0 20'.

Therefore, Varaha's data	A.D.	531
	— Years	240
Year of Zero-Ayanamsa	A. D.	291
or		
Saka Year	=	213

It takes twenty years to build a reputation and five minutes to ruin it.

— *Warren Bulfet*

Ayanamsa on 3rd April 1963 :
A.D. 1963 **minus** 291 = 1672 years.
The Ayanamsa in 1672 years = 23°18'59"

Thus the Ayanamsa on 3rd April 1962 (from mean Equinox) = 23°18'59"

Significance of A.D. 291

The year A.D. 291 is the year of Zero Ayanamsa as shown above. It signifies that (for abbreviations see below) :

Nir KB = Nirayana Karka — beginning.

1. The Nir-Nak-Series and the tropical (Sayana series) one, become one and the same that time of the year.

2. The Tropical *K.B.* falls exactly on the *Nir K.B.*

3. The tropical Sun with 90 degrees turns South on reaching the *Nir K.B.* (with 90 degrees).

It is incredible that the great Poet Kalidasa in his **Raghuvamsha** has made an exact statement of No. 2 and 3 above, leading exactly to No. 1, *Viz.*, oneness of the Nirayana Nakshatra-Series and the Sayana one — a stage with which Kalidasa was familiar, and therefore, could give a place in his verses. Let us pursue this point.

Kalidasa actually mentions the characteristics of Zero-Ayana-Year.

Note : - (a) *Canopus* = *Agastya;* (b) The foot of the Latitude of *Canopus* = star — on the ecliptic = *Canopus* — mark on the ecliptic = *Agastyachinha* on the ecliptic. (c) *Nirayana Karka* beginning = *Nirayanakarkarambha* (d) Ancient **Surya Siddhanta** (*An. S.S.*) (P) *Nirayana K.B.* = fixed 90^0 (M) Tropical K.B. = moving 90^0.

The modern **Surya Siddhanta** places *Canopus* star on the *Nirayana K.B.* He himself says that his Sastra is based on the *An. S.S.* So the *An. S.S.* too placed *Canopus* on *Nirayana K.B.* It is obvious that *Canopus*-mark (*Agastya-chinha*) stands on *Nirayana K.B.*, because the

star *Canopus* is fixed, its longitudes and latitudes are fixed and therefore, the mark (*chinha*) too is bound to be fixed.

Now mark what Kalidasa in **Raghuvamsa,** Sarga 16, verse 44, says —

भास्वति अगस्त्यचिह्नात् अयनात् निवृत्ते सति
उत्तरा, शीतां हिमस्रुतिं ससर्ज (आनंदेन)

Note — (e) *Agastyachinhath* = *Agastyachinham prapya* = reaching the *Canopus* mark.

(f) *Ayanath* = *Uttarayanath* because of the melting of ice. Kalidasa means —

भास्वति अगस्त्यचिन्हात् (अगस्त्यचिन्हं प्राप्य) अयनात् उदगयनात् (snowy tears) **निवृत्ते सति** (Summer solstice because of the melting of ice.)

The Sun turned South on reaching the fixed *Agastyachinha* or the *Canopus* mark. This obviously means that the Tropical Sun with 90^0 reached the *Nirayana Agastyachinha* with 90^0 and turned South.

Thus the Sun, on *Tropical K.B.* touched the *Canopus* mark on *Nirayana K.B.* and turned South. Thus Kalidasa states that the *Tropical K.B.* and the *Nirayana K.B.* became one. When these two (*Nirayana K.B.* and *Tropical K.B.*) become one, the Ayanamsa is zero.

Zero Year A.D. 280

On calculating, we get A.D. 280, when *Canopus* mark with Nirayana 90^0 became equal to Tropical 90^0.

The Zero-year A.D. 280 is very near A.D. 291 deduced above.

This result (namely Zero-years between 280 and 291) clearly proves that the Zero-year of Indian astronomers lies between 280 and 291 years. Other values than these will have to be rejected as belonging to a Zodiac arising out of ignorance or rejection of the *Ayana-chalata.*

Another Grand Result

In A.D. 280, Kalidasa was busy with **Raghuvamsa** and was very near its end. This was his last work because he left it incomplete. So he did not live long after 280 A.D. This means that the whole of his previous career belonged to a period before 280 A.D. Hence it is easy to understand that Kalidasa flourished between 200 and 300 A.D. *i.e.,* the third century A.D.

Summary

(1) The Zero-Ayanamsa year is 291.

(2) Ayanamsa on 3-4-1963 = 23^0 19'.

(3) Zero-year is 280 according to Kalidasa the poet and lastly.

(4) Kalidasa flourished in the 3rd Century A.D.

Merits of Kalidasa's Clue

I have already enumerated the merits of Varaha's clue. Even the fresh clue, supplied by the poet, though fortuitous, is more meritorious because it is absolutely free from any blemish whatever. On the contrary, it amounts to and counts as observational evidence. Thus, these two clues, independent and far separated, are strikingly supplementary. (*Reproduced from* THE ASTROLOGICAL MAGAZINE, *May 1963*) ●

Annexure – 3

M.C.Khare's Article

sub is important. Saturn owns 2 and occupies its Moolatrikonasthana in 2. Saturn owns the constellation on the cusp of 11 (the house of reunion) and is aspecting 11. Saturn is in the constellation of Rahu, the node, who owns the sub on the cusp of 7 and is under the strong aspect of Moon, the lord of 7 in 7 in Swakshetra. Moon is in the constellation of Saturn, thus strongly signifying 2 and 11 as well. Saturn is in the sub of Venus, the Sub-lord of the 11th cusp and Dasanstha. Saturn is thus next in importance. It may also be noted that Saturn is in auspicious Tredecile aspect with Venus. It was, therefore, suggested that, by God's Grace, thaw in relationship might be expected soon in Venus

until June 1978, when he called on me to break the news of his happy reunion with his partner and to consult me on the horoscope of his daughter. The reunion occured in May 1978, when the native was running Venus Dasa Venus Bhukti, Saturn Antara.

Irrespective of the protests of biassed or blind critics, it is a fact as clear as the Sun in the cloudless sky, that there is no scope for such minute, Scientific and critical analysis in any system of Astrology other than the one vouchsafed to our late revered Guruji by the Omniscient Lord-viz Krishnamurti Padhdhati.

GOOD LUCK

—(:o:)—

A&A OCT 1978

AYANAMSA - PROBLEM ?

By M. C. KHARE

In his works Krishnamurti Padhdhati (Vol 1. Page 139) our revered Guruji Late Prof K.S. Krishnamurti expressed his earnest desire, saying "I have achieved one of my objects, only when the horoscopes cast for any moment by any astrologer is the same and the Dasa balance is also the same."

The differences in Ayanamsa was his bitter feeling as he says in the same text "what happens when the Ayanamsa is different ? It is a Hell". People lose faith in Astrology if for the same moment of birth for the same person (by refering to various panchangas) the astrologers calculate and note down the planets in different signs and also give varieties of results for the balance of the Dasa at birth.

He further commanded his followers, the K.P. students, saying "you must use Krishnamurti Ayanamsa. If you use any other Ayanamsa, Dasa bhukti will change. The dates of transit in a particular sub will also change. By using any other Ayanamsa and house division, do not make attempt to use this method. If you follow strictly what I say, you will find that this system (KP system) introduced by me is marvellous, and correct and this proves that my Ayanamsa is to be followed. For any other Ayanamsa, steller Astrology will not come correct." (KP Reader V. Page 178).

At page 8 of the Krishnamurti's Ephemeris (1957-1970) first edition of Feb 1970, Late Shri KSK writes..." "At one time,

however the point of commencement of the Western and Hindu Zodiacs was the same. It is widely believed that this happened in the year 291 A.D.—Ayanamsa is the accumulated amount of precession of Equinoxes since the time of coincidence of the western (Tropical) Zodiac and the Indian (Sidereal) Zodiac—It is also necessary to know the exact rate of precession every year so as to determine the Ayanamsa correctly.

"Newcomb gives this rate as 50·2388475 seconds every year and Krishnamurti follows an Ayanamsa based on this figure, and the results obtained in predictive astrology by the author (Sri KSK) using this Ayanamsa have testified to its accuracy."

To arrive at the correct Ayanamsa applicable for Krishnamurti Padhdhati the following points are to be kept in mind, viz:—

(1) One should know when the fixed Zodiac and the Sayana Zodiac were in the same degree ie. when both coincided.

(2) The rate at which the moving Zodiac moves backwards, and

(3) which is the point to be taken as the first point of Aries according to Hindu method i.e. Nirayana Zodiac.

The answer to the above is derived from Krishnamurti Padhdhati (Vol I) as under :— (1) 291 A.D. (2) 50.2388475 sec. per year and (3) 15 April of English year.

Subsequent publications viz (1) Astrological Tables for All by Shri R. E. Manu and (2) Universal Tables of Houses by Shri S. Balasundaram and Bala have shown some different position of yearly Ayanamsa in their Ayanamsa Tables apart from that published in K.P. Readers and K.P. Ephemeris. This has caused certain confusion to some K.P. followers as to which Ayanamsa they should follow. For example let us quote the position of K.P. Ayanamsa published in different K.P. literature for the year 1978 ;—

		Deg	mts	Sec.
(1)	K.P. Readers and K.P. Ephemeris	23	27	00
(2)	R.E. Manu's Ready Reckoner	23	26	50
(3)	Universal Table of Houses (Position on 15th April)	23	33	30
(4)	Ayanamsa calculated as per given date according to Prof KSK	23	32	32
(5)	Ayanamsa recommended under Drik system (position on 15th April)	23	33	14

Let us clear our doubt which of the above is accurate in terms of the data approved by late Guruji for working the Ayanamsa. Our Guruji has accepted the year of coincidence as 291 A.D and the rate of precession as 50.2388475 sec. per year. The Ayanamsa for the year 1978 would therefore be worked out as under:—

Requisite year	=	1978
Less, the year of coincidence	=	291
=No of years elapsed		1687

Multiplied by the rate of precession, thus:

50.2388475 × 1687

351.6719325
4019.1078000
30143.0850
50238.8477

= 84752.9357325 Seconds

= 23 Degrees—32 minutes—32.9357325 Sec.

The figure, thus arrived, is quite nearest to that published in the Universal Tables of houses and, therefore can be safely applied to Krishnamurti Padhdhati as advocated by late Guruji thereby eliminating the chances of predictive failures. Apperantly there is a fluctuation of nearly 6 mts between the Ayanamsa published in K.P. readers and Ephemeris

and that of Universal Tables of houses, and this fluctutation cannot be treated as negligible, because there will be a considerable variation in vimshottari Balance with this 6 mts difference of Ayanamsa as detailed below for ready reference of the readers :—

Fluctuation of 6 minutes of Ayanamsa resulting in Variation of Dasa Balance.

Dasa Lord	Variation		
	Month	Days	Hours	Mts.
Ketu/Mars	00	18	21	36
Venus	1	24	00	00
Sun	0	16	04	48
Moon	0	27	00	00
Rahu	1	18	14	24
Jupiter	1	13	04	48
Saturn	1	21	07	12
Mercury	1	15	21	36

K.P. followers are, therefore, requested to adopt the Ayanamsa given in the Table of houses for more accurate results. The difficulty may, however, arise to work out the accurate Ayanamsa for any requisite date, as the annual position for 15th April alone have been given in the Table of Ayanamsa with the following footnote therein :—

"These figures refers to the Ayanamsa on April 15 every year and these can be adjusted to any other period of the year by adding or subtracting the proportionate amount of Ayanamsa."

For the convenience of learned readers I would like to append below the proportionate motion of Ayanamsa at the rate of 50.2388475 seconds per year; Table number (1) relates to the motion from 15th April as on First day of each month, and Table No (2) indicates the daily motion from 1st to the last date of the month with the help of these tables Ayanamsa position for any date of any month can easily be calculated. Care must, however, be taken that when the Ayanamsa for any date prior to 15th April is to be ascertained, the figure of the previous year should be taken to account and then subsequent position should be added with the help of Table (1) and (2).

Table (1)

Add the following motion to the position of 15th April to get the Ayanamsa as on 1st day of the requisite month :—

Month	*Motion in Sec and decimal points*
May	2 . 0 6 4 6
June	6 . 3 3 1 4
July	10 . 4 6 0 6
August	14 . 7 2 7 5
September	18 . 9 9 4 4
October	23 . 1 2 3 6
November	27 . 3 9 0 4
December	31 . 5 1 9 6
January	35 . 7 8 6 5
February	40 . 0 5 3 4
March	43 . 9 0 7 3
April	48 . 1 7 4 2

Table (2)

Add the following motion to the position of the 1st day of requesite month to obtain Ayanamsa position on any day of the month. For position between 16th and 30th April, the number of days elapsed from 15th April, should be taken from this Table and added to the position of 15th April.

No of days elapsed	Motion in Seconds and decimal points	No of days elapsed	Motion in Seconds and decimal points
1	0 . 1 3 7 6	16	2 . 2 0 2 2
2	0 . 2 7 5 2	17	2 . 3 3 9 8
3	0 . 4 1 2 9	18	2 . 4 7 7 5
4	0 . 5 5 0 5	19	2 . 6 1 5 1
5	0 . 6 8 8 2	20	2 . 7 5 2 8
6	0 . 8 2 5 8	21	2 . 8 9 0 4
7	0 . 9 6 3 4	22	3 . 0 2 8 0
8	1 . 1 0 1 1	23	3 . 1 6 5 7
9	1 . 2 3 8 7	24	3 . 3 0 3 3
10	1 . 3 7 6 4	25	3 . 4 4 1 0
11	1 . 5 1 4 0	26	3 . 5 7 0 6
12	1 . 6 5 1 6	27	3 . 7 1 6 2
13	1 . 7 0 9 3	28	3 . 0 5 3 9
14	1 . 9 2 6 9	29	3 . 9 9 1 9
15	2 . 0 6 4 6	30	4 . 1 2 9 2
		31	4 . 2 6 6 8

Annexure – 4

M.G.G.Nair's Article

May 1980 ARA

KRISHNAMURTI AYANAMSA

by Sri M. G. G. NAYAR, Madras-600 031.

Let us in this article have a fresh review of the moot problem of Ayanamsa in the light of the decisive views of our revered Guruji Prof. Krishnamurti on the subject.

Celestial longitudes are measured along the ecliptic from the vernal equinoctial point viz. the vernal point of intersection of the ecliptic and equator. The vernal equinoctial point is slowly moving backward at a nearly uniform rate of about 50".3 per year on account of the precession of equinoxes. In the Nirayana Hindu Astronomy (Astrology), however, Longitudes are reckoned from a fixed initial point on the ecliptic. The Ayanamsa, which is the angular distance between the fixed initial point and the vernal equinoctial point in thus the tropical longitude of the fixed initial point of the fixed Hindu Zodiac.

The fixed initial point used to be referred to one of the prominent fixed ecliptic stars by the Indian Astronomers. In "chaitrapaksha" the bright star Spica which marks the middle of the chitra group of stars was assigned a Nirayana longitude of 180° and the point exactly 180° from it considered as the fixed initial point of the Nirayana Zodiac. Stars have got proper motion and the longitudes of fixed stars undergo changes however gradually. For this reason the choice of Spica (or any other star) to indicate a fixed initial point is not sound in principle. It is advisable to adopt the vernal equinoctial point of any specified date to indicate the fixed initial point. The renowned Indian Astronomer Ganitacharya, Ganitakalanidhi Sri N.C. Lahiri M.A. has adopted the mean vernal equinoctial point of the mean vernal equinox day of the year 285 A.D as the fixed initial point. The Indian Ephemeris and Nautical Almanac published on the recommendations of the Calendar Reforms Committee set up by our late Prime Minister, Pundit Jawaharlal Nehru also adopts the above epoch as the Zero Ayanamsa epoch. Sri Lahiri was member-secretary of the Calender Reforms Committee and is largely responsible for the planning and preparation of the IENA.

Our revered Guruji Prof. Krishnamurti has adopted 291 A.D. as the year of coincidence of tropical and sidereal zodiacs. While doing so he was fully aware of the considerations and decisions of the Calender Reforms Committee (vide-his remarks in the preface dated 1-11-1969 to the Krishnamurti Ephemeris for the years 1957 to 1970 and the chapter on Ayanamsa in Krishnamurti Padhdhati Reader I). Prof. Krishnamurti did not thing in terms of conformity with the views of the Astronomer Sri Lahiri or the decisions of the Calendar Reforms Committee. Instead, while saying that the difference between his Ayanamsa and those followed by Sri Lahiri and Sri C. G. Rajan (the well-known south Indian author of the very valuable work "Planetary Tables or Raja Jyothida Ganitham" based on modern Astronomical calculations) is neglible, Prof. Krishnamurti emphatically advises his followers to adopt his Ayanamsa and adds that no other Ayanamsa will yield results with the same remarkable accuracy as his Ayanamsa, when applied to the Stellar technique evolved by him. Evidently his choice of the year of coincidence has the support of his high intuition and abundant research experience. The difference of about 5' between the Krishnamurti Ayanamsa and that of Sri Lahiri, though small from the

point of view of minutes of arc, is not really negligible, as it means an appreciable difference in the balance of Janmadasa at birth, especially when the Janmadasa is ruled by Rahu, Jupiter, Saturn, Mercury or Venus. The reason for Prof. Krishnamurti's insistence is thus clear.

As regards the rate of precession, Prof. Krishnamurti accepts the average rate of precession, viz. 50".2388475 given by the celebrated American Astronomer Prof. Simon Newcomb. Prof. Krishnamurti has tabulated the Ayanamsa values for the years from 1840 to 2001 on page 58 of Krishnamurti Padhdhati Reader I. If one tests these values, one finds that a value appreciably lower than the average rate of Prof. Newcomb (viz. 50".2388475) has been used in the tabulation. And yet Prof. Krishnamurti identifies the tabulated Ayanamsa as his Ayanamsa. One is confronted with the doubt whether to adopt the Ayanamsa tabulated in Krishnamurti Padhdhati Readers as it is or to adjust it to Prof. Newcomb's average rate viz. 50".2388475 recommended by Prof. Krishnamurti, a doubt which cannot be dissolved in blind faith. Let us, therefore, have a fresh look at the problem.

Prof. Simon Newcomb's monumental work "Tables of the Sun" is noted for its high standard of accuracy and is being used even now in the computation of longitudes etc. of the Sun in the Nautical Almanacs of different countries. The accurate actual value of general precession in longitude per tropical (ordinary) year of 365.2422 mean solar days as given by Prof. Newcomb and adopted in the Nautical Almanacs is 50".2564+0.000222 t, where t is measured in tropical years from 1900.0 A.D. We shall see what exactly 1900.0 A.D. means later. The tropical and sidereal zodiacs coincided at a particular instant on a particular day in 291 A.D. The Sayana zodiac is the basis of actual calculations and observations in modern Astronomy. As such, to be sound in principle, the coincidence of the tropical and sidereal zodiacs should be related to the vernal equinoctial point and the Sayana Sun. Let us, therefore, adopt the vernal equinoctial point of the mean Vernal equinox of 291 A.D. as the epoch of coincidence of the tropical and Sideral Zodiacs. According to Ganitacharya Sri Lahiri's "Tables of the Sun" based in Prof. Newcomb's accurate values, the longitude of the Sayana Mean Sun would be exactly 360° (or 0°) at 4 Hours 41 Minutes 18 Seconds Ephemeris Time or 2 Hours 51 Minutes Universal Time or 8 Hours 21 Minutes Indian Standard Time on the 23rd March of 291 A.D. (Saka Era 213). That is to say, the Mean Vernal equinox of 291 A.D. occurred at that epoch which we shall treat as the epoch of coinidence of the tropical and sidereal zodiacs or the epoch of Zero Ayanamsa. The Julian Day Number shows that the day was a Monday. The mean elongation of the Moon at that epoch is 66°-79', the mean Tithi (Madhya Tithi) being Suklapaksha Shashti.

According to Sri Lahiri there is a positive Ayanamsa of 4' 59".31 at our Zero Ayanamsa epoch (viz. 4 Hours 41 Minutes 18 Seconds on the 23rd March of 291 A.D.)

Prof. Newcomb's accurate actual rate of precession at 1900.0 A.D. being 50".2564, the accurate actual rate of precession at 291.0 A.D. would be (50".2564-0.000222 1900.0-291.0) on 49".899202. Prof. Newcomb's accurate actual rate of precession expressed in terms of the year 291 A.D. would be (49".899202+0.000222 t) where t is measured in tropical years from 291 A.D.

Bessel's fictitious year commences when the Sayana Mean Longitude of the Sun corrected for aberration of light (by (−) 20".5) is exactly 280°0'0". The Besselian year is of the same length as the tropical year. The year 1900.0 A.D. referred to above is the commencement of the Besselian year 1900 A.D. The longitude of the Sayana Mean Sun at our

Zero Ayanamsa epoch corrected for aberration is 359°.994. Our Zero Ayanamsa epoch (viz 4 Hours 41 Minutes 18 Seconds Ephemeris Time on the 23rd March of 291 A.D.) expressed in terms of the Besselian Year is 291.0 plus $\frac{(395°.994-280°.0)}{360}$ or 291.2222 A.D. The rate of precession being (49".899202+0.000222 t), the accumulated Ayanamsa for "t" tropical years from 291.2222 A.D. would be the sum of (49".899202+0.000222 t) to "t" terms which again is the sum of an arithmetical series of which the first term "a" is (49.899202 +0.000222 × 1) or 49".899424 and the common difference "d" is (+) 0.000222. The sum of an arithmetical series is given by the formula:

$$\frac{n}{2}(2a+(n-1)\,d)$$

which when reduced is:

$$\left(a-\frac{d}{2}\right)n+dn^2$$

substituting the values. 49"899424 for "a". (+)0.000222 for "d" and "t" for "n", the accumulated Ayanamsa after "t" tropical years from the epoch of coinicidence of the two zodiacs (viz.291.2222 A.D.) is given by the formula:

$$(49".899424-0.000111)\,t+0.000111\,t^2 \text{ or}$$

$$49".899313t+0.000111t^2 \text{ (Formula F)}$$

The epoch 1900.0 A.D. is (1900.0—291.2222) or 1608.7778 tropical years from the Zero Ayanamsa epoch (viz 291.2222 A.D.) Applying formula F, the Ayanamsa at the epoch 1900.0 A.D. based on 291.2222 A.D. as the Zero Ayanamsa epoch and the accurate actual rate of general precession of Prof. New comb would be 22°22'44".186. Sri Lahiri's Ayanamsa for 1900.0 A.D. is 22°27' 3"51, the difference being 4'59".3. The general precession reckoned from 1900.0 A.D. is 50".2564+0.000222 t, as we know. Applying the formula for the summation of an arithmetical series again, the Ayanamsa at any epoch after 1900.0 A.D. measuring "t" tropical years from 1900.0 A.D. will be given by the formula:

$$22°22'44",186+50".256511\,t+0.000111t^2$$
(Formula G)

The epoch O hour Universal Time or 5-30 a.m. Indian Standard Time on 15-4-1900 corresponds to 1900-2812 A.D. That is to say, it is 0.2812 tropical years from 1900.0 A.D. Substituting the value 0.2812 for "t" in formula G, the Ayanamsa (based on 291. 2222 A.D. as the Zero Ayanamsa epoch and Prof. Newcomb's accurate actual rate of general precession) for the epoch 5-30 a.m. I.S.T. on 15-4-1900 would work out to 22°22'58".3181. Let us denote the Ayanamsa based on 291.2222 A.D. as the Zero Ayanamsa epoch and the accurate actual rate of general precession of Prof. Newcomb by the letter "N" and tabulate the relative values of "N", Sri Lahiri's Ayanamsa and the Ayanamsa of the Universal Tables of Houses side by side:

Epoch $\frac{15-4-1900}{5.30\text{a.m. IST}}$	*N*
Lahiri 22°27'57".64	22°22'58".3181
	U.T.O.H. 22°28'10".1535

As the rate of general precession adopted by ourselves, Sri, Lahiri and the learned author of the Universal Tables of Houses is the same viz, the accurate actual rate due to Prof. Newcomb, the disagreement being only in the Zero Ayanamsa epoch, there will be a fixed correspondence between the values of "N", Sri Lahiri's Ayanamsa and the U.T.O.H Ayanamsa at any epoch. That is to say, the value of "N", at any epoch can be derived by subtracting 4'59".3 from the Lahiri ayanamsa or 5'11".8 from the U.T.O.H. Ayanamsa at the same epoch.

Now let us denote the Ayanamsa based on 291 A.D. as the year of coincidence of the tropical and sidereal Zodiacs and Prof Newcombs "average" annual rate of precession of 50".2388475 by the letter "A" and tabulate the relative values of "N", Krishnamurti Ayanamsa (as given in his Readers) and "A" for the 15th April of several years side by side,

Epoch	*N*	*Krishna-murti Ayanamsa*	*A*
15-4-1900	22°22′58″-3	22°22′	22°27′-2
15-4-1910	22°31′20″-9	22°31′	22°35′-6
15-4-1920	22°39′43″-5	22°39′	22°43′-9
15-4-1930	22°48′06″-1	22°47′	22°52′-4
15-4-1940	22°56′28″-8	22°55′	23°00′-7
15-4-1950	23°04′51″-4	23°04′	23°09′-1
15-4-1960	23°13′14″-1	23°12′	23°17′-5
15-4-1970	23°21′36″-8	23°20′	23°25′-9
15-4-1980	23°29′59″-6	23°29′	23°34′-2
15-4-1990	23°38′22″-3	23°37′	23°42′-6
15-4-2000	23°46′45″-1	23°46′	23°50′-9

It will be noticed that there is a striking agreement between the Krishnamurti Ayanamsa (as tabulated in his Readers) and the Ayanamsa "N" based on 291-2222 A.D. as the epoch of coincidence of the tropical and sidereal zodiacs and Prof. Newcomb's accurate actual rate of annual general procession. The doubt whether the tabulated Krishnamurti Ayanamsa or the value based on Prof. Newcomb's "average" annual rate of precession of 50″-2388475 is the correct Ayanamsa meant by Prof. Krishnamurti is thus set at rest. The Krishnamurti Ayanamsa as tabulated in his Readers can, without any doubt, be adopted straight away for all ordinary work forgetting Prof. Newcomb's average rate of 50″.2388475 per year altogether. For accurate work, however, the value "N" (based on 291.2222 A.D. as the Zero Ayanamsa epoch and Prof. Newcomb's accurate "actual" rate of general precession) may be considered. The value "N" in seconds for any epoch can be obtained by simply subtracting 5′11″.8 from the exact U.T.O.H. Ayanamsa or 4′59″.3 from the exact mean Ayanamsa of Sri Lahiri for the same epoch, as we have seen earlier.

Hitherto we have been discussing the mean Ayanamsa (based on general precession only). There remains the correction for Nutation in longitude. Apart from the gradual retrograde motion due to precession of the equinoxes, the vernal equinoctial point (the First point of Aries) suffers a small periodic oscillatory displacement about its mean position along the ecliptic due to Nutation. This gives rise to the mean equinox of date and the true or apparent equinox. The exact sayana longitudes of planets (true or apparent) given in Seconds in the Indian Ephemeris and Nautical Almanac and other Sayana Ephemerides are referred to the true equinox. To obtain the exact true Nirayana longitudes of planets in Seconds, therefore, the Ayanamsa that is to be deducted is the true Ayanamsa which is obtained from the exact mean Ayanamsa by applying the correction for Nutation. In work using an ephemeris which gives the planetary positions correct to the minute only, however, the correction to mean Ayanamsa for Nutation is not called for, as the total correct for Nutation is only about 19″ (plus or minus)

Nutation has a solar element and a lunar one. Stripped of the very negligible components solar and lunar Nutation are given by the following formulae :

Solar Nutation :

(— 1.27 Sin 2L

Where L is the Sayana mean Longitude of the Sun at the epoch in question. As the maximum value of solar Nutation is just a little over a second of arc (plus or minus), it may even be omitted.

Lunar Nutation :

(—) 17″.23 Sin R

Where R is the Sayana mean longitude of Rahu at the epoch in question which can be readily had from the ephemeris.

The mean Ayanamsa (N) for any desired epoch derived as discussed above corrected for total Nutation will give the true. Ayanamsa for the epoch correct to

the second which will be of use in critical research on sub-sub-subs and sookshmas. The learned Sri. N. Krishnamurti of Nanganallur, Madras has laid the followers of Krishnamurti Padhdhati under deep debt of gratitude by tabulating the sub-sub-subs for all sub-subs in each sub through the columns of the issues of this esteemed Magazine for the months December '76, January '77, April '77, June '77 and July '77. We wish he brings out a comprehensive Table of subs, sub subs, sub-sub-subs for the benefit of Krishnamurti Padhdhati followers. Sri. N. Krishnamurti has also given us the "semi-arc" method of bringing house-cusps obtained from the Table of Houses correct to the second in his excellent article "casting an accurate horoscope without Table of Houses" in the May 1978 (Annual) issue of this esteemed Magazine. It is thus possible to have the house-cusps (especially in Horary charts) and planets in seconds of arc for critical research.

The mean Ayanamsa adopted in the Indian Ephemeris and Nautical Almanac is less than that of Sri. Lahiri by 5".7 Sri Lahiri has been using the IENA Ayanamsa in his Ephemeris from 1960 onwards. The IENA tabulates the true Ayanamsa (including total Nutation) for every third day of the year. The true Ayanamsa for any epoch based on 291-2222 A. D as the Zero Ayanamsa epoch and Prof. Newcomb's actual rate of precession can be obtained directly from the IENA by simply subtracting 4' 53".6 from the IENA true Ayanamsa for the nearest date.

Since the publication of the Universal Tables of Houses one had been using the U.T.O.H. Ayanamsa in my work with fairly good results. However, in certain charts based on the U.T.O.H. Ayanamsa the Anthara did not explain the event under examination quite properly. On adjusting the charts to Krishnamurti Ayanamsa the Anthara lord was found to conform strictly to the principles of choice of significators according to Krishnamurti Padhdhati. I was thus thinking of reverting to Krishnamurti Ayanasma. It was at that time that an esteemed friend of mine in Sri Lanka, to whom one had occassion to refer in my article on the horoscope of our revered Guruji in the January '80 issue of "Astrology and Athrishta" wrote to me pointing out that our Guruji was aware of the calendar Reforms Committee and its decisions when he insisted on his Ayanamsa. I was also reminded of the article "The anomaly of Ayanamsa" of the learned Mr. Gerhard Zinn of Spain on the opening page of the August '79 issue of this esteemed Magazine strongly suggesting the adoption of Krishnamurti Ayanamsa. I felt the unseen influence of Guruji in all this. I was, however, reluctant to revert to Krishnamurti Ayanamsa until I found some scientific support for the Ayanamsa tabulated in the Krishnamurti Padhdhati Readers. I felt guided to examine the problem adopting the mean vernal equinox of 291 A.D. as the Zero Ayanamsa epoch and Prof. Newcomb's accurate actual rate for precession. This article is the result of the investigation. Let me close with humble respects to Guruji.

GOOD LUCK

Annexure – 5

Dr.Balachandran's Article

IN DEFENCE OF KP AYANAMSA
Based on M.G.G. Nair's article - May 1980 in A & A

By

PROF. K. BALACHANDRAN

The tropical and sidereal Zodiacs coincided at a particular instant on a particular day in 291 A.D. In modern Astronomy, the Sayana Zodiac is the basis of actual calculations and observations. As such the coinciding zodiac (based on sayana zodiac) should therefore be logically related to the vernal equinoctial point and the Sayana Sun. We should therefore adopt the vernal equinoctial point of the mean Vernal Equinox of 291 A.D. as the epoch of coincidence of the tropical and Sidereal Zodiacs. According to Shri. Lahiri's Tables of the Sun based on Prof. New combs accurate values, the longtitude of the Sayana mean Sun would be exactly 360° or 0' (Aries) at 4 Hours 41 Minutes 18 Seconds Ephemeris time or 2 Hours 51 minutes universal time or 8 Hours 21 Minutes Indian Standard Time on the 23rd March of 291 A.D. That is to say, the mean vernal equinox of 291 A.D. occured at that epoch which we shall treat as the Epoch of coincidence of the tropical and sidereal Zodiacs or the Zero Epoch of Zero Ayanamsa.

"According to Shri Lahiri, there is a positive ayanamsa of 4'59".31 at our zero Ayanamsa epoch (viz. 4 Hours 41 Minutes 18 Seconds) on the 23rd March 291 A.D.) (SAKA ERA 213)"

Bessel's fictitious year commences when the Sayana moon longitude of the Sun corrected for aberration of light by (-20".5) is exactly 280*. The Besselian year is of the same length as the tropical year. The year 1900 A.D. in our calculation is also the commencement of the Besselian year 1900 A.D. The longtitude of the Sayana mean Sun at our zero ayanamsa epoch corrected for aberration of light is 360* - 20".5 = 359*.994. Our zero ayanamsa epoch (viz. 4 Hours 41 Minutes 18 Seconds Ephemeris time on the 23rd March 291 A.D. expressed in terms of the Besselian year is therefore $291 + \frac{359°.994-280}{360}$ or 291.2222 A.D.

Professor New Combs accurate actual rate of general precession at 1900 A.D. being 50.2388475, the actual rate of precession at 291 A.D. would be 50.2388475 - 0.0002222 x (1900 - 291)

ie. 50.2388475 - 0.357198 = 49.8816495 seconds.

Hence Prof. New Comb's accurate, actual precession expressed in terms of 291 A.D.would be 49".8816495 + 0.000222t where 't' is measured in tropical years from 291 A.D.

The rate of precession being (49".8816495 + 0.000222t, the accumulated ayanamsa for 't' tropical years from 291.2222 A.D. (zero epoch) would be the sum (49".8816495 +

0.000222t) to 't' terms which again is the sum of an Arithmetic series of which the first term "a' is 49.8816495 + 0.000222 X 1 (ie. t Value = 1) or 49.8818715.

The sum of an arithmetical series is given by the formula

$$\frac{n}{2}(2an + (n-1)d)$$

which can be reduced further as indicated below. Multiplying

$$\frac{2an}{2} + \frac{n(n-1)\,d}{2}$$

$$= an + \frac{n^2d}{2} - \frac{dn}{2}$$

$$= an - \frac{dn}{2} + \frac{n^2d}{2}$$

$$= n\left(a - \frac{d}{2}\right) + \frac{dn^2}{2}$$

$$= \left(a - \frac{d}{2}\right)^n + \frac{dn^2}{2} \text{ or } \left(a - \frac{d}{2}\right) t$$

$$t + \frac{dt^2}{2}$$ by replacing 'n' by t

Where a is the first term, d is the common difference t = 0.000222 and 't' is the a = 49".8818715 tropical years from the epoch of coincidency of the two zodiacs viz 291.2222 A.D.

∴ The accumulated ayanamsa for 't' tropical years.

$$= \left(49."8818715 - \frac{0.000222}{2}\right) t + \frac{0.000222}{2} t^2$$

$$= (49."8818715 - 0.000111)\, t + 0.000111t^2$$

$$= 49.8817605t + 0.000111t^2 \text{ (Formula 'A')}$$

The Epoch 1900 A.D. is (1900 - 291.2222) or 1608.7778 tropical years from the zero Ayanamsa epoch of 291.2222 A.D.)

Applying formula 'A' above, the ayanamsa at the Epoch based on 291.2222 A.D. as the zero Ayanamsa Epoch and the accurate / actual precession of New comb would be.

$$49.8817605 \times 1608.7778 + 0.000111 \times (1608.7778)^2$$

Where t = 1608.7778'

$$= 22°.29129692 + 0°.079801785$$

$$= 22°\text{-}22'\text{-}15.96"$$

The general precession reckoned from 1900 A.D. is 50".2388475 + 0.000222t Applying formula 'A' for the summation of anAithmetical progression again, the ayanamsa of any epoch after 1900 A.D. measuring 't' tropical years from 1900 A.D. would be given by the formula.

$$22°22'15".96 + 50".2388475 + 0.000111t^2$$ (Formula B.)

The Epoch 0°Hour U.T. or 5.30 A.M. I.S.T. on 15.4.1900 would correspond to 1900.2812 A.D. (i.e. to say it is 0.2812 tropical years from 1900 A.D.

Substituting the value of 0.2812 for 't' in the formula 'B', the ayanamsa based on 291.2222A.D. as the Zero ayanamsa Epoch and Prof. New comb's accurate average general rate of precession of 50".2388475 for the Epoch 5.30 a.m. ISTof 1900 A.D. would work out to

$$22°22'15".96 + 50".2388475 \times 0.2812 + 0.000111 \times (0.2812)2$$

$$= 22°22'15".96 + 0°\text{-}0'\text{-}14."127 + 0°\text{-}0'\text{-}0".03$$

$$= 22°22'30."117 \text{ or Say } 22°22'30"$$

∴ Ayanamsa for the year 15-4-1900 ⟶ 22°22'30"

by adoption of New combs rate of precession 50".2388475 seconds.

Now we have calculated Ayanamsa for 5.30 A.M. IST on 15.4.1900 corres ponding to 1900. 2812 A.D. (it is 0.2812 tropical years from 1900) A.D.

To calculate Ayanamsa for any tropical year after 1900, the formula would be.

Value of Ayanamsa for

$$1900.2812 + \frac{(t-1900) \times 50.2388475}{3600} + \frac{0.000111 \times (t-1900)^2}{3600}$$

The factor 0.000111 x (t-1900)2 occuring in the above formula cannot be safely ignored as the value will be zero for most of the years and for values of 100 or more years above the value will be about 1.11 seconds. However as our aim is to secure precisional values of ayanamsa we can retain the factor in the formula as the value for 100 years and more will be of the order of 1 or 2 Secs.

So the formula is

$$\text{Value of Ayanamsa for 1900.2812 A.D.} + \frac{50.2388475 \times (t-1900)}{3600} + \frac{(t-1900)^2 \times 0.000111}{3600}$$

Corresponding to 5.30 a.m. on 15-4-1900 A.D(tropical)

The value obtained for Ayanamsa at 5.30 a.m. on 15-4-1900 is 22°22"30"117 say 22°-22'-30

For facility of calculation we can split up the values as 22°+0°22'-30"

The value 0°-22'-30" when connected into seconds is 22x60+30 = 1350 seconds.

So the full formula is

$$= 22° + \frac{1350 + (t-1900) \times 50.2388475}{3600} + \frac{(t-1900)^2 \times 0.000111)}{3600}$$

(1°=3600 seconds) and so the seconds are divided by 3600 to get degrees.

Example I :

Let us calculate Ayanamsa for 1920 :

Put 't' = 1920 in the above formula & calculate

So the value

$$= 22° + \frac{1350 + (1920 - 1900) \times 50.2388475}{3600} + \frac{(1920 - 1900)^2 \times 0.000111}{3600}$$

$$= 22° + \frac{1350 + 20 \times 50.2388475}{3600} + \frac{20^2 \times 0.000111}{3600}$$

$$= 22° + 0°-39'-14."78 + 0-0-0.04$$

$$= \textbf{22-39-14.82 or 22°-39'-15"}$$

Example II :

Calculation of Ayanamsa for 1950 :

Put 't' = 1950 in the formula

So ayanamsa for 1950

$$= 22° + \frac{1350 + (1950 - 1900) \times 50.2388475}{3600} + \frac{(1950 - 1900)^2 \times 0.000111}{3600}$$

$$= 22° + \frac{1350 + 2511.942375}{3600} + \frac{50^2 \times 0.000111}{3600}$$

$$= 22° + \frac{3861.942375}{3600} + \frac{2500 \times 0.000111}{3600}$$

$$= 22°+1°-4'-21".94 + 0°-0'-0."28$$

$$= \textbf{23°-4'-22".22 or 23°-4'-22"}$$

Example III :

Calculation of Ayanamsa for 1980 :

't' = 1980

Ayanamsa

$$= 22° + \frac{1350 + (1980 - 1900) \times 50.2388475}{3600} + \frac{(1980 - 1900)^2 \times 0.000111}{3600}$$

$$= 22° + \frac{5369.1078}{3600}$$

= 22° + 1°-29'-29."11 + 0°-0'-0".71

= ***23°-29'-29".82 or 23° - 29' - 30"***

Example IV :

Calculate Ayanamsa for 2049 :

Put t = 2049 and Calculate

Ayanamsa

$$= 22° + 1350 + \frac{(2049-1900) \times 50.2388475}{3600} + \frac{(2049-1900)2 \times 0.000111}{3600}$$

= 22°+2°-27'-15".59 + 0-0-2".46

= ***24°-27'-18".05 or 24°27'18"***

Note : *The values of ayanamsa obtained by the above formula pertain to 5.30 a.m. of 15th April of every year. For any other date, the values have to be obtained by interpolation.*

I remain ever grateful to Sri. M.G.G. Nair, a great learned erudite, K.P. scholar and an outstanding exponent of K.P. sub theory in all his faces (mathematical, technical, and astrological aspects) from whose very educative article I have liberally copied chapter and verse to write this article, of course, "Mutatis Mutandis".

Good Luck ✍

Table of K.P. Ayanamsa for the years 1900 to 2052 A.D.

Year	Deg.	Min.	Sec.
1900	22	22	30
1901	22	23	20
1902	22	24	11
1903	22	25	01
1904	22	25	51
1905	22	26	41
1906	22	27	32
1907	22	28	22
1908	22	29	12
1909	22	30	02
1910	22	30	53
1911	22	31	43
1912	22	32	33
1913	22	33	23
1914	22	34	13
1915	22	35	04
1916	22	35	54
1917	22	36	44
1918	22	37	34
1919	22	38	25
1920	22	39	15
1921	22	40	05
1922	22	40	55
1923	22	41	46
1924	22	42	36
1925	22	43	26
1926	22	44	16
1927	22	45	07
1928	22	45	57
1929	22	46	47
1930	22	47	37
1931	22	48	28
1932	22	49	18
1933	22	50	08
1934	22	50	58
1935	22	51	49
1936	22	52	39
1937	22	53	29
1938	22	54	19
1939	22	55	10
1940	22	56	00
1941	22	56	50
1942	22	57	40
1943	22	58	31
1944	22	59	21
1945	23	0	11
1946	23	01	01
1947	23	01	52
1948	23	02	42
1949	23	03	32
1950	23	04	22
1951	23	05	13
1952	23	06	03
1953	23	06	53
1954	23	07	43
1955	23	08	34
1956	23	09	24
1957	23	10	14
1958	23	11	04
1959	23	11	55
1960	23	12	45
1961	23	13	35
1962	23	14	25
1963	23	15	16
1964	23	16	06
1965	23	16	56
1966	23	17	46
1967	23	18	37
1968	23	19	27
1969	23	20	17
1970	23	21	07
1971	23	21	58
1972	23	22	48
1973	23	23	38
1974	23	24	28
1975	23	25	19
1976	23	26	09
1977	23	26	59
1978	23	27	49

1979	23	28	40
1980	23	29	30
1981	23	30	20
1982	23	31	10
1983	23	32	01
1984	23	32	51
1985	23	33	41
1986	23	34	31
1987	23	35	22
1988	23	36	12
1989	23	37	02
1990	23	37	53
1991	23	38	43
1992	23	39	33
1993	23	40	23
1994	23	41	14
1995	23	42	04
1996	23	42	54
1997	23	43	44
1998	23	44	35
1999	23	45	25
2000	23	46	15
2001	23	47	05
2002	23	47	56
2003	23	48	46
2004	23	49	36
2005	23	50	26
2006	23	51	17
2007	23	52	07
2008	23	52	57
2009	23	53	47
2010	23	54	38
2011	23	55	28
2012	23	56	18
2013	23	57	09
2014	23	57	59
2015	23	58	49
2016	23	59	39
2017	24	00	30
2018	24	01	20
2019	24	02	10
2020	24	03	00
2021	24	03	51
2022	24	04	41
2023	24	05	31
2024	24	06	21
2025	24	07	12
2026	24	08	02
2027	24	08	52
2028	24	09	43
2029	24	10	33
2030	24	11	23
2031	24	12	13
2032	24	13	04
2033	24	13	54
2034	24	14	44
2035	24	15	34
2036	24	16	25
2037	24	17	15
2038	24	18	05
2039	24	18	55
2040	24	19	46
2041	24	20	36
2042	24	21	26
2043	24	22	17
2044	24	23	07
2045	24	23	57
2046	24	24	47
2047	24	25	38
2048	24	26	28
2049	24	27	18
2050	24	28	08
2051	24	28	59
2052	24	29	49

Note (1) *The figures given in these tables refer to the Ayanamsa on April 15 every year and these can be adjusted to any other period of the year by adding or subtracting the proportionate amount of Ayanamsa.*

Note (2) *The Ayanamsa values are based on new comb's rate of precession of 50.2388475 seconds per annum.*

Annexure – 6

C.G.Rajan's Ayanamsa Table

(From 1840 AD To 2000 AD)

Ayanamsa on the 1st of Chitra (*i.e.* on the 13th or 14th April.)
சித்திரை மீ 1உ அயன ஸ்புடம் அல்லது அயனாம்சம்

English year இங்கி லீஷ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை	English year இங்கி லீஷ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை	English year இங்கி லீஷ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை
1840	21—29	1872	21—56	1904	22—23
1841	21—30	1873	21—57	1905	22—24
1842	21—31	1874	21—58	1906	22—25
1843	21—32	1875	21—59	1907	22—26
1844	21—33	1876	22— 0	1908	22—26
1845	21—34	1877	22— 0	1909	22—27
1846	21—35	1878	22— 1	1910	22—28
1847	21—35	1879	22— 2	1911	22—29
1848	21—36	1880	22— 3	1912	22—30
1849	21—37	1881	22— 4	1913	22—31
1850	21—38	1882	22— 5	1914	22—31
1851	21—39	1883	22— 6	1915	23—32
1852	21—40	1884	22— 6	1916	22—33
1853	21—40	1885	22— 7	1917	22—34
1854	21—41	1886	22— 8	1918	22—35
1855	21—42	1887	22— 9	1919	22—36
1856	21—43	1888	22—10	1920	22—37
1857	21—44	1889	22—11	1921	22—37
1858	21—45	1890	22—11	1922	22—38
1859	21—45	1891	22—12	1923	22—39
1860	21—46	1892	22—13	1924	22—40
1861	21—47	1893	22—14	1925	22—41
1862	21—48	1894	22—15	1926	22—42
1863	21—49	1895	22—16	1927	22—42
1864	21—50	1896	22—16	1928	22—43
1865	21—50	1897	22—17	1929	22—44
1866	21—51	1898	22—18	1930	22—45
1867	21—52	1899	22—19	1931	22—46
1868	21—53	1900	22—20	1932	22—47
1869	21—54	1901	22—21	1933	22—47
1870	21—55	1902	22—21	1934	22—48
1871	21—55	1903	22—22	1935	22—49

Ayanamsa on the 1st of Chitra (*i.e.* the 13th or 14th April)

சித்திரை மீ 1உ அயன ஸ்புடம் அல்லது அயனாம்சம் —தொடர்ச்சி

English years இங்கி லீஸ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை	English years இங்கி லீஷ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை	English years இங்கி லீஸ் வருஷம்	Ayanamsa Longitude அயன ஸ்புடம் பாகை—கலை
1936	22—50	1958	23—08	1980	23—27
1937	22—51	1959	23—09	1981	23—28
1938	22—52	1960	23—10	1982	23—28
1939	22—53	1961	23—11	1983	23—29
1940	22—53	1962	23—12	1984	23—30
1941	22—54	1963	23—13	1985	23—31
1942	22—55	1964	23—13	1986	23—32
1943	22—56	1965	23—14	1987	23—33
1944	22—57	1966	23—15	1988	23—33
1945	22—57	1967	23—16	1989	23—34
1946	22—58	1968	23—17	1990	23—35
1947	22—59	1969	23—18	1991	23—36
1948	23—00	1970	23—18	1992	23—37
1949	23—01	1971	23—19	1993	23—38
1950	23—02	1972	23—20	1994	23—39
1951	23—02	1973	23—21	2995	23—39
1952	23—03	1974	23—22	1996	23—40
1953	23—04	1975	23—23	1997	23—41
1954	23—05	1976	23—23	1998	23—42
1955	23—06	1977	23—24	1999	23—43
1956	23—07	1978	23—25	2000	23—44
1957	23—08	1979	23—26		

KP Ayanamsa – An Analysis

V.Subramanian

KP Astrologer, Chennai–92

Part – 3

Contents (Part 3)

POST 37

In this part, let us know about IAU and its recommendations on Precession/ Nutation at different periods.

International Astronomical Union (IAU) was founded in the year 1919, with a mission of promoting and safeguarding the science of astronomy in all its aspects. Its members are professional astronomers from all over the world, currently having a membership of above 14000 and operating from Paris/France as headquarters. Visit the related website for more details on IAU.

POST 38

IAU 1976 Precession model

IAU, announced a Precession formula in the year 1976 (which is referred to as "IAU 1976 model' in Senthilathiban's book) based on the research papers of J.H.Lieske. Further, the Besselian epoch system Which was in existence till then, was replaced by Julian Epoch, with year J2000, as reference epoch. (J stands for Julian) and time duration in Julian centuries.

As per their recommendation the equation for Precession (IAU 1976 modal) for any year would be as follows:

$P = C + (5029.0966 \times T) + (1.11113 \times T \times T) - (0.000006 \times T \times T \times T)$ wherein

P = Ayanamsa (Precession) for any
required Year (date/time)

C = Ayanamsa value for J 2000
(01-01-2000, 12.00 hr UT)in sec.

T = the time interval between J 2000
and the year for which Ayanamsa
is required, in Julian centuries.

American Ephemeris & Nautical Almanac (AENA) have adopted the precession value mentioned above (IAU 1986 model) from year1984 onwards, in the preparation of their Almanac.

Additional information

Incidentally, J.H.Lieske has provided an updated version of Newcomb precession, in his research paper, using which , the formula to find Ayanamsa for any year would work out as below.

P = C + (5029.0966× T) + (1.11161× T×T) - (0.000113 ×T×T×T) seconds.
C = Precession value for J 2000 in sec.
T = interval between required year and J 2000 in Julian centuries.

It is reliably learnt that Indian Astronomical Ephemeris (IAE) have adopted the above formula from year 1985 onwards (omitting the third component i.e.: 0.000113×T×T×T, the value being insignificant) for calculating mean Ayanamsa, for use in their Ephemeris, taking C value as 85885.53192 seconds. To know about what they have followed prior to 1985, please refer Senthilathiban's book.

I intend to defer further elaboration on IAU 1976 model, as it has been superseded by IAU 2006 model.

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POST 39

IAU 2006 Precession Model:

IAU announced a Precession formula (update to its 1976 model) in the year 2006, which remains the latest as on date. It is referred to as " IAU 2006 " in Senthilathiban's book. The formula is given below.

P = C + (5028.796195 × T) +(1.1054348 × T×T) + (0.000079640×T×T×T) -

(0.000023857×T×T×T×T) - (0.000000038300×T×T×T×T×T)

In which

P = Precession (Mean Ayanamsa) for any required year (time) in second

C = Ayanamsa for J 2000 (As on 01-01-2000,12.00 UT (05-30 pm IST) in seconds.

T = interval between the date for which P is required and J 2000, in Julian centuries. (value will be minus for years before J2000 and plus for years after J2000.)

In the above formula, the value of C

(Ayanamsa on 01-01-2000,05-30 pm IST) will depend upon the zero Ayanamsa date. For KP system it has to be worked out from 21-03-291, 09-39 (IST) (04-09 UT).

Let us find out 'C' for KP system.

To use the formula, we have to first find out ' T '. There are three ways to find T.

First Method:

(1) go to website http://www.onlineconversion.com/days_between_advanced.htm

Input the two date and time ("from" date and "to" date). It will give the answer in hours, which can be converted to 'days' by dividing it by 24 and then by 36525 to get in Julian centuries.

Second Method:

In the website, mentioned below, if you input any date and time, it will give the corresponding Julian days and vice versa. using this, we can know the Julian days for 21-03-291,04-09 UT and for 01-01-2000,12.00 respectively. Difference in Julian days between these two figures divided by 36525 will give value of T in Julian centuries.

In General T = (Julian days for required year (-) Julian days for reference year J 2000) ÷ 36525.

Website: http://www.online conversion.com/Julian_date.htm

(Time should be fed only in UT and not IST).

Third Method:
You can work out manually also, number of years/ months/ days elapsed between two dates (keeping in mind intermittent leap year) and calculate T, if you are good enough in mathematics.

POST 40

NB: IAE 2006 formula is published in page no: 25 of Senthilathiban's book, wherein the symbol for last two terms is noted as + (plus). Readers may please note that It is a typographical error and it should be read as - (minus).

Now let us calculate value of T (for KP) using second method mentioned above.
Accordingly, the Julian days for the date 21-03-291,04.09 UT (09.39 IST)
= 1827424.67292. The same for 01-01-2000, 12.00 UT (05.30 pm IST)
= 2451545 days.

Assuming that Ayanamsa for year 291 is to be found out (Required year), using the formula given above, then T = (Julian days for required year (-) Julian days for J 2000) ÷ 36525
= (1827424.67292 - 2451545) ÷ 36525
= (-) 17.08748328761 Julian centuries.

So substituting this T value of (-)17.08748328761, in the equation shown in post 3 (IAU 2006) we get

P = C + (5028.796195) × (- 17.08) +
{(1.1054348) × (- 17.08) × (-1708)} + {(0.000079640) × (-17.08) × (-17.08) × (-17.08)} - {(0.000023857) × (-17.08) × (-17.08) × (-17.08) × (-17.08)} - {(0.0000000383) × (-17.08) × (-17.08) × (-17.08) × (-17.08) × (-17.08)}

P = C + (- 85609.0792234350)

Now we know P (Ayanamsa for 291)

= zero.

∴ 0 = C + (- 85609.0792234350)

C = 85609.0792234350 seconds.

(23 D 46 M 49.08 Sec)

Hence the formula for calculating Ayanamsa for any year (date) as per IAU 2006 with J2000 as reference epoch would be as follows.

P = 85609.079223435 +

(5028.796195 × T)

+ (1.1054348 × T × T)

+ (0.000079640 × T × T × T)

- (0.000023857 × T × T × T × T)

- (0.0000000383 × T × T × T × T × T)

Where

P = Ayanamsa for any required year(date) in seconds.

T = Time interval between the required date and J 2000, in Julian century.

POST 41

Summary of post 39 and 40.

General Precession formula to find Ayanamsa for any date using IAU 2006 model (applicable to any system) is

P = A0 + (A1×T) + (A2 T×T) + (A3 × T × T × T) + (A4 ×T×T×T×T) + (A5 × T × T × T×T×T)

where

P = Precession (Ayanamsa) for required date in seconds

A0 = constant representing Ayanamsa for reference epoch J 2000.in sec

A1, A2, A3, A4, A5 = coefficient of terms T1 to T5 respectively.

T = time interval between the date for which Ayanamsa required and J 2000 in Julian centuries.

Coefficient values

A1 = 5028.796195

A2 = 1.1054348

A3 = 0.000079640

A4 = (-)0.000023857

A5 = (-)0.0000000383

It may be noted that Mr.Senthilathiban
has taken into account T up to two terms only in the above formula, in his book for analysis and comparison with various Ayanamsa systems, for the sake of simplicity. This has resulted in a small difference in value for A0. (KP system)

His value = 85606.70378147 (page no 26 of his book, with 2 terms only)

Our value = 85609.079223535 with 5 terms. (post 4) a difference of 2.375441965 seconds.

However, in practice, for accurate value, all 5 terms must be considered.

Mean Ayanamsa, taking into account all 5 terms, has been calculated for the years 1800 AD to 2399 AD by Senthilathipan and attached as **Annexure-7** herewith for your ready reference.

POST 42

Practical Exercise

Now let us calculate Ayanamsa for the date 01-01-2019, 21.00 IST (15-30 UT)
as per IAU 2006 model.

(1) Julian days for 01-01-2019, 15-30 = 2458485.14583

(2) Julian days for J 2000 = 2451545

(3) ஃ T = (1 - 2) ÷ 36525

= 0.1900108372 Julian century

For clarity and easy understanding

let me calculate separately each term

of the formula.

(4) 5028.796195 × T = 955.525775120

(5) 1.1054348 × T × T = 0.0399107487

(6)0.00007964 × T × T × T= 0.0000005463

(7)0,00023857 × T × T × T × T=0.000000031

(8) 0.0000000383× T*5 = 9.48616E -12

So substituting

P = 85609.079223435 + (4+5+6 above)

- (7+8 above)

We get P = 86564.64491 seconds.

Thus Ayanamsa on 01-01-2019, 21.00 (IST) = 86564.64491 seconds

= 24 D- 00 M- 05 Sec

Hope the steps and derivations are clear to the readers.

Post 43

The general formula for calculating mean obliquity as per IAU 2006 model is given below.

Mean obliquity (MO): (C) + (C1×T) + (C2 ×T×T) + (C3 ×T×T×T)

= (84381.4060) + (- 46.836769 × T) + (- 0.0001831× T×T) + (0.0020034 × T ×T × T) seconds.

where T = time interval between the required date and J 2000 in Julian centuries.

Now we will work out mean obliquity for the same date. (01-01-2019,09 pm)

T = 0.1900108372 (already derived)

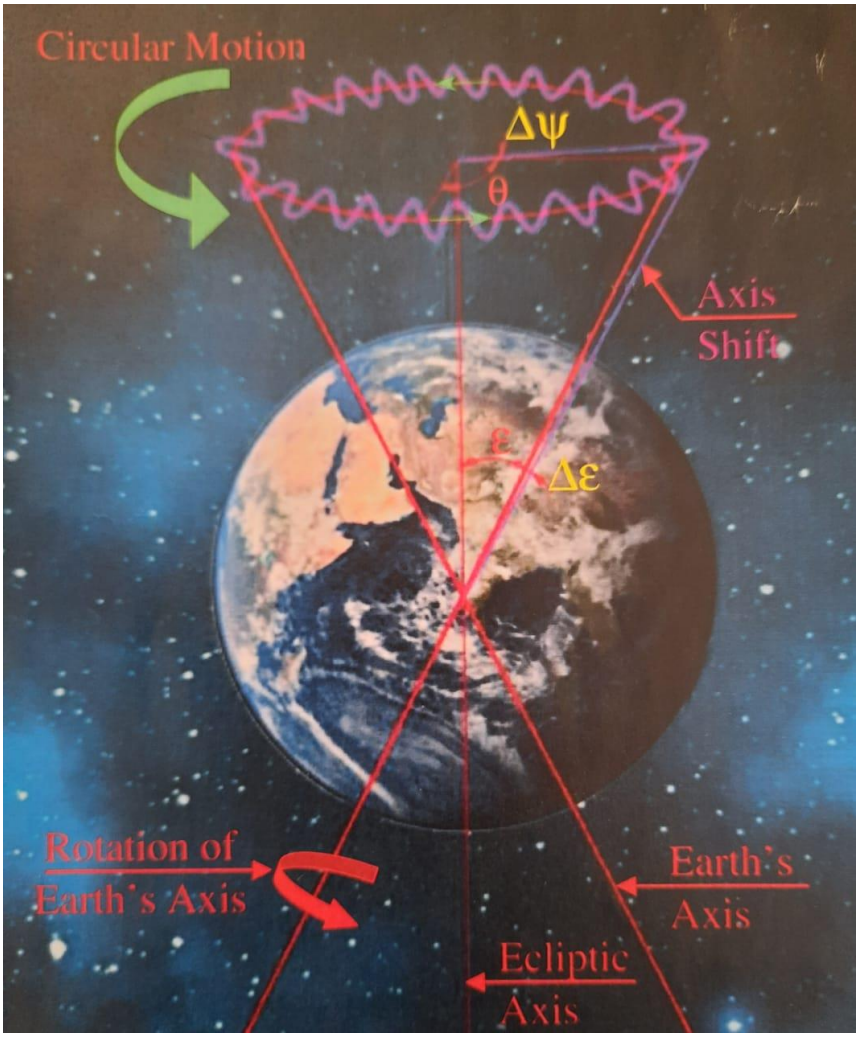
-46.836769 × T = (-)8.8994936894
-0.0001831×T×T = (-)0.0000066107
0.0020034×T×T×T = 0.00001374

∴ MO = (84381.4060) - (8.8994936894) - (0.0000066107) + (0.00001374)
= 84372.5065 seconds.
= 23 D - 26 m -12.5065 Sec.

Post 44 - Nutation

All the celestial objects encircling the sun including the planets known to us, exert some force (Gravitational Pull) on the spinning earth. The resultant force causes some change on the motion of earth (wobbling) which is called as 'Nutation' (See fig. below)

The Nutation effect is twofold. i.e.:
(1) Nutation in longitude
(2) Nutation in obliquity.



Nutation in longitude (Δψ)

Apart from the gradual retrograde motion due to the Precession of equinoxes, (otherwise called Ayanamsa) the vernal equinoctial point suffers a small periodic oscillatory displacement about its mean position along the ecliptic as a result of Nutation. This value is called 'Nutation in longitude', the magnitude of which will vary from +19.3 seconds to -19.3 seconds during the period of any year. It has to be derived for the required moment and not to be tabulated as a ready reckoner. Regarding Ayanamsa, derived through formula and indicated normally in Ephemeris is only ' mean Ayanamsa. when 'Nutation in longitude' is added to mean value, it gives 'True Ayanamsa'.

Nutation in obliquity (Δε)

As I mentioned above, the wobbling of earth due to Nutation, causes the orientation of the axis, vary over time. This change in angle (from the mean) is called 'Nutation in Obliquity' which amounts to + 9.8388 to - 9.8388 seconds max. This Nutation in obliquity when added to mean value gives 'True Obliquity'. Obliquity is correlated to sayana (Tropical longitude) of twelve cuspal positions of horoscopic charts. Hence any change in obliquity value obviously reflect in the cuspal position angles.

It is to be noted that for accurate casting of a horoscope, only true Ayanamsa and true obliquity alone have to be considered. It may be recalled that both Sri C.G.Rajan and MGG.Nayar have emphasized this point.

Post 45

One Mr.James Bradley,an astronomer from England, is the first person to discover and declare the shift in the angle of earth's axis of rotation due to Nutation in the year 1728. Subsequently, Scientists/Astronomers continued their research over the years and fine-tuned the Nutation theory in course of time. Following are some of the models developed and adopted at different periods.

(1) Newcomb's Nutation theory in the year 1895 consisting of 26 luni-solar terms.

(2) By E.W.Woolard in 1953, an improved version of Newcomb with 69 luni-solar terms. Based on this theory IAU developed it's model IAU 1964. IENA 1960 Nutation model is also based on this theory only.

(3) IAU 1980 Nutation model with 106 luni-solar terms based on theory developed by Mr.Wahr.

(4) Last and latest one is IAU 2000 A model containing 1365 terms, developed by Mr.Mathews.

We will discuss in detail only the last one as it is the latest accurate one declared by IAU, superseding previous models.

Though it contains many terms, for our practical purpose, it is enough that we consider important 10 terms only which would give fairly accurate value for our astrological purpose, leaving aside other terms whose value would be less than one milli second (arc)and hence insignificant.

Keeping this in mind, Mr.Senthilathiban has selected those significant 10 items and shown in yellow color as table 18 in page 93 of his book.

Post 46

For the sake of convenience of readers, a table (Table-1), to calculate Nutation (both longitude and obliquity) containing 10 terms only is given below. This is prepared as per IAU 2000 A model, with Julian year j2000 as reference year.

Each term represents an angle value PHI (Φ). Out of ten terms, I, I', F, D, and Omega are called "Fundamental Argument" and their corresponding “Angle co- efficient" constants i.e.: DO, D1, D2, D3 are fixed and given by IAU. Same values for the remaining 5 terms can be derived or manipulated from the above five terms. (Note: Though more than five "Fundamental Arguments" are mentioned in IAU 2000A model, only five terms, found commonly in all models have been selected, which is sufficient for our astrological purpose.)

Table1:Coefficients Values for IAU2000A Nutation Model (Ref.Table2.18, 23 & 32 in the book)

Term	Angle (in Terms of Fundamental arguments)	(Ref. Book Table 32) Angle Coefficients (D_i) (in Seconds)				(Ref. Book Table 18 & 23) Nutation Coefficient (in Seconds) for	
i	ϕi	D_0	D_1	D_2	D_3	Longitude (C_i)	Obliquity(C'_i)
1	Ω	450160.398036	-6962890.5431	7.4722	0.007702	-17.2064161	9.2052331
2	2(F- D + Ω)	723358.441156	259205542.1914	2.1832	0.000144	-1.3170906	0.5730336
3	2(F + Ω)	275879.848536	3465128744.6094	-10.5580	0.013330	-0.2276413	0.0978459
4	2Ω	900320.796072	-13925781.0862	14.9444	0.015404	0.2074554	-0.0897492
5	l'	1287104.793050	129596581.0481	-0.5532	0.000136	0.1475877	0.0073871
6	l	485868.249036	1717915923.2178	31.8792	0.051635	0.0711159	-0.000675
7	l'+2(F- D + Ω)	714463.234206	388802123.2395	1.6300	0.000280	-0.0516821	0.0224386
8	2F + Ω	1121719.450500	3472091635.1525	-18.0302	0.005628	-0.0387298	0.0200728
9	l+2(F + Ω)	761748.097572	5183044667.8272	21.3212	0.064965	-0.0301461	0.0129025
10	-l'+2(F- D + Ω)	732253.648106	129608961.1433	2.7364	0.000008	0.0215829	-0.0095929

Note:

1. All the above equation gives Angle for respective Terms in Seconds.
2. For Example, Angle for Term1 (ϕ1) from J2000 (IAU 2000A Nutation Model) is given by

$$\phi_1 = 450160.398036 - 6962890.5431 * T + 7.4722 * T^2 + 0.007702 * T^3$$

Using the above table, the general formula to find Nutation for any given date/ time, is as follows.

¢ = (D0) + (D1×T) + (D2×T×T) +

(D3×T×T×T) in seconds. where

T= the interval between the required

date and J 2000, in Julian centuries.

Steps

(1) Using above formula, we have to calculate angle ¢, separately for each term.

(2) ' Nutation in longitude' is equal to

SIN ¢ × Nutation co- efficient for

longitude (Ci)

(3) Nutation in obliquity is equal to

COS¢ × Nutation coefficient for

Obliquity (C' i).

(4) Algebraic sum of all the 10 terms

gives the required value of Nutation in longitude/ Nutation in obliquity respectively for the selected date.

Post 47

Now let us consider a practical example of calculating Nutation value (both longitude and obliquity) for the date/ time 01-01-2019, 09 am(IST).

Step 1: To find T

T = the interval between 01-01-2019,09 am and 01-01-2000,05-30 pm (J2000)

= 0.1899971480176 Julian centuries.

(Refer post 3 of part 2 for steps to find T)

Step 2: find ¢ for the first term (¢1).

(a) D0 = 450160.398036 sec

(b) D1× T = (-)6962890.5431× 0.189997148072 = (-)1322929.3457214 sec.

(c) D2 × T×T = 7.4722× T × T = 0.2697383223 sec

(d) D3×T×T×T = 0.007702 × T × T × T = 0.0000528256 sec.

∴ (a) + (b) + (c) + (d) = (-) 872768.677894 seconds. = (-) 242.4357 degree.

Step 3: Sine (¢) = Sine(-) 242.4357 = (+) 0.886492078.

Step 4: Cos (¢) = Cos(-) 242.4357 = (-) 0.462743092.

Step 5: similarly, ¢ for the remaining 9 terms (¢2 to ¢10) have to be calculated.

Step 6: Nutation in longitude for first term = Sin¢1 × longitudinal coefficient of term1(C1)

= 0.886492078 × (-) 17.2064161 = (-) 15.2534 sec. (restricted to 4 decimals)

Step 7: Nutation in obliquity for first term = Cos¢1 × obliquity co- efficient of term 1(C1)

= (-)0.462743092 × 9.2052331 = (-) 4.2597 seconds.

In the same way Nutation in longitude and Nutation in obliquity for all terms have been worked out and given below as table 2 and 3 respectively.

Table 2 :(Nutation in longitude)

Table:2 ……

Term No.	(ϕ) (in Deg.)	(C_i) (Coefficient)	Sin(ϕ)	(Δψ)(Sec.) [(3)x (4)]
(1)	(2)	(3)	(4)	(5)
1	117.5642563	-17.2064161	0.886492432	-15.2534
2	201.0200784	-1.3170906	-0.358695086	0.4724
3	75.68288781	-0.2276413	0.968941918	-0.2206
4	235.1285127	0.2074554	-0.820436497	-0.1702
5	357.2459897	0.1475877	-0.048048041	-0.0071
6	81.38758761	0.0711159	0.988723963	0.0703
7	198.266068	-0.0516821	-0.313430127	0.0162
8	318.1186314	-0.0387298	-0.667590485	0.0259
9	157.0704754	-0.0301461	0.389598586	-0.0117
10	203.7740887	0.0215829	-0.403131476	-0.0087
			(Σ Δψ)=	-15.0869

Table 3 (Nutation in obliquity)

Table:3 ……

Term No.	(ϕ) (in Deg.)	(C'_i) (Coefficient)	Cos(ϕ)	(Δε) (Sec.) [(3) x (4)]
(1)	(2)	(3)	(4)	(5)
1	117.5642563	9.2052331	-0.462743092	-4.2597
2	201.0200784	0.5730336	-0.933454785	-0.5349
3	75.68288781	0.0978459	0.247288412	0.0242
4	235.1285127	-0.0897492	-0.571737662	0.0513
5	357.2459897	0.0073871	0.998845026	0.0074
6	81.38758761	-0.000675	0.149749541	-0.0001
7	198.266068	0.0224386	-0.949611265	-0.0213
8	318.1186314	0.0200728	0.744528673	0.0149
9	157.0704754	0.0129025	-0.920984767	-0.0119
10	203.7740887	-0.0095929	-0.915142072	0.0088
			(Σ Δε)=	-4.7212

Post 48

It is to be noted that

True Ayanamsa = Mean Ayanamsa + Nutation in longitude and

True obliquity = Mean Obliquity + Nutation in obliquity.

∴ for 01-01-2019, 09 AM

True Ayanamsa = 86546.5348 + (-15.0869) = 86531.4479 seconds.
= 24 D- 02m - 11 sec.

True obliquity = Mean obliquity + Nutation in obliquity.

Mean obliquity for 01-01-2019, 09 am
= (84381.4060) - (46.836769× T) - (0.0001831× T × T) + (0.0020034×T×T×T) (Refer post 6)
= 84372.50715 seconds
= 23° 26' 12.5072"

∴ True obliquity = (23-26-12.5072) + (- 4.7212) = 23 - 26 - 07.7860

For accurate casting of birth charts particularly in KP system, only True obliquity should be used for calculating Sayana longitudes of cusps and true Ayanamsa for the Nirayana longitude of planets.

NB: Mr.Senthilathiban has explained in detail the formula to get the Sayana longitude of 12 cusps for any required time, in an article titled "Trigonometry Behind the House Cusps" in an E magazine, "Journal for Advancement of Stellar Astrology"(JASA), vol-1, issue 2,

Sep- Oct 2011, page 43-77. Interested persons can access the concerned website and read.

Post 49

The impact of using true Ayanamsa / Obliquity over mean, in KP system can be better understood, by an example chart. Two charts have been worked for the following birth date/time, ie:

01-01-2013, 16-58-42 IST, Chennai,
one with mean Ayanamsa/obliquity and the other with true Ayanamsa/Obliquity.IAU 2006 precession model/ IAU 2000A Nutation model is used for preparation of charts.
(refer Page no 176 of Senthilathiban's book)

The particulars are given below.

Mean Ayanamsa = 23 - 57 - 40.5663.
Nutation in long. = (+) 00-00-14.6435
∴ True Ayanamsa = 23 - 57 - 55.2098.

Mean obliquity = 23 - 26 - 15.3163
Nutation in obliquity = (-) 00-00-5.9227
∴ True Obliquity. = 23 - 26 - 09.3936

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12 cuspal positions and planetary longitudes are tabulated below for both the charts with case 'a' with mean Ayanamsa and mean obliquity and case 'b' with true Ayanamsa and true obliquity. On perusal of the table, it can be seen that for cusps 1,7,8 the sublord and sub sub lords have changed. For 3 planets sub sub have changed, though there is a difference of only about15 seconds in Ayanamsa and about 6 seconds in obliquity, between mean and true values.

Table 4: Cusps and Planets Details(date 01 Jan 2013@16:58:42 Hrs IST: Chennai)

Cusp/ Planet	Nirayana Longitude (dd:mm:ss)		Co-rulers (Sign:Star:Sub1:Sub2:Sub3)		Difference (Seconds)
(1)	(2) Case(a)	(3) Case(b)	(4) Case(a)	(5) Case(b)	(6)(3-2)
Cusp1	065:33:28	065:33:12	MER:MAR:MOO:MOO:MOO	MER:MAR:**SUN**:**VEN**:**KET**	-16.1642
Cusp2	091:13:33	091:13:18	MOO:JUP:MAR:VEN:KET	MOO:JUP:MAR:VEN:**MER**	-14.5454
Cusp3	118:31:05	118:30:51	MOO:MER:SAT:MER:SAT	MOO:MER:SAT:MER:SAT	-13.7152
Cusp4	149:12:44	149:12:30	SUN:SUN:MAR:MOO:VEN	SUN:SUN:MAR:MOO:VEN	-14.3405
Cusp5	182:28:48	182:28:32	VEN:MAR:KET:SAT:VEN	VEN:MAR:KET:SAT:**KET**	-15.9121
Cusp6	215:11:36	215:11:19	MAR:SAT:SAT:JUP:JUP	MAR:SAT:SAT:JUP:JUP	-16.6839
Cusp7	245:33:28	245:33:12	JUP:KET:RAH:RAH:RAH	JUP:KET:**MAR**:**MOO**:**SUN**	-16.1642
Cusp8	271:13:33	271:13:18	SAT:SUN:JUP:JUP:JUP	SAT:SUN:**RAH**:**MAR**:**MOO**	-14.5454
Cusp9	298:31:05	298:30:51	SAT:MAR:SAT:MER:SAT	SAT:MAR:SAT:MER:SAT	-13.7152
Cusp10	329:12:44	329:12:30	SAT:JUP:SUN:MER:MER	SAT:JUP:SUN:MER:MER	-14.3405
Cusp11	002:28:48	002:28:32	MAR:KET:VEN:SAT:RAH	MAR:KET:VEN:SAT:RAH	-15.9121
Cusp12	035:11:36	035:11:19	VEN:SUN:MER:MER:VEN	VEN:SUN:MER:MER:VEN	-16.6839
SUN	257:16:12	257:15:57	JUP:VEN:MOO:VEN:KET	JUP:VEN:MOO:VEN:**MER**	-14.6435
MOO	122:59:43	122:59:28	SUN:KET:VEN:KET:MER	SUN:KET:VEN:KET:MER	-14.6435
MAR	281:06:18	281:06:04	SAT:MOO:MOO:SUN:VEN	SAT:MOO:MOO:SUN:**KET**	-14.6435
MER	247:26:17	247:26:02	JUP:KET:RAH:MOO:SUN	JUP:KET:RAH:MOO:SUN	-14.6435
JUP	043:45:57	043:45:42	VEN:MOO:RAH:MOO:SUN	VEN:MOO:RAH:MOO:VEN	-14.6435
VEN	236:25:00	236:24:45	MAR:MER:JUP:SAT:MER	MAR:MER:JUP:SAT:MER	-14.6435
SAT	195:37:16	195:37:01	VEN:RAH:VEN:SUN:RAH	VEN:RAH:VEN:SUN:RAH	-14.6435
RAH	209:36:37	209:36:23	VEN:JUP:MOO:RAH:RAH	VEN:JUP:MOO:RAH:RAH	-14.6435
KET	029:36:37	029:36:23	MAR:SUN:RAH:JUP:MER	MAR:SUN:RAH:JUP:MER	-14.6435

Note:

1) Sign:Signlord, Star: Starlord, Sub1:Sublord, Sub2:Sub-Sub lord, Sub3:Sub-Sub-Sub lord.

2) Place Details: Chennai, INDIA (Geocentric latitude 13°N [13°04'00" N Geographic], Geographic longitude 80°17'00" E, Time Zone GMT + 5:30 Hrs) and Sidereal Time 23:34:56 Hrs.

3) Case(a) using KP Mean Ayanamsa and Mean Obliquity

4) Case(b) using KP True Ayanamsa and True Obliquity

Post 50 – True Rahu/ Kethu

We all know that Raghu and Kethu are the intersecting points of moon's orbit and Ecliptic. The position of these two points, gets altered by two components of forces.

(1) Due to Nutation in longitude.
(2) Due to several inequalities to which the node is subjected to.

The maximum value due to effect of part 1 above is + or - 19.093 seconds (arc) and due to point 2 above is + or -5426 seconds, totaling about + or - 5445.093 seconds or 01 D 30 M 45 Sec in all. When the value happens to be negative, the nodes appear to move in

forward direction for few days in a year, instead of their usual retrograde motion. If these two corrections are taken into account, it gives true position of Raghu and Kethu.

The formulae and procedure to calculate True Raghu, as given by Sri.C.G.Rajan is enclosed as annexure 8.As these rules are framed based on the condition existed in 1900 AD , it is prudent to use the latest formula recommended by IAU. Mr.Senthilathiban has not included this subject matter in his scope of the book.

I once again emphasize that only true Raghu/ Kethu has to be considered for accurate casting of horoscopes.

Post 51 - Conclusion

Dear readers we have come to the concluding part of this article.

In part 1, I have explained basics of Ayanamsa, given short history of certain celebrities like C.G.Rajan, B.V.Raman and Newcomb, Precession theory of Newcomb and formula to calculate KP Ayanamsa value for any date with worked example.

In part 2, I have analyzed various KP Ayanamsas existing in software that are commonly in use by most KP astrologers and brought to your attention the variations and discrepancies in each one of them. I have clearly shown how none of them conforms with original Newcomb formula.

In part 3, details about IAU, its latest Precession theory, formula to calculate Ayanamsas for any date using IAU' s latest theory, worked example based on that, Nutation and its effect on precession and obliquity, true Ayanamsa and true obliquity and its importance in casting accurate horoscope were all discussed in detail.

We, the KP astrologers are aware that the Ayanamsa problem is haunting us for the past 4 decades because of emergence of more than one Ayanamsa, in the post KSK period.

The founders of these Ayanamsas, having the advantage of proving to none, the scientific and mathematical correctness of their theory by virtue of their eminence or inheritance, could easily infuse them in the mainstream.

Blind acceptance of these various Ayanamsas by KP community, could be attributed to lack of sufficient knowledge on Newcomb precession rules and mathematical derivations involved therein. Now, after longtime, Mr.Senthilathiban, through his book, offers us, a golden opportunity not only to enrich our knowledge on the subject but also provides clarity to select the correct one.

Let us not forget that 'Ayanamsa' is purely an astronomical phenomenon, occurring in celestial sphere. Who else other than scientists (Astronomers), could provide us authentic and accurate updated information on the same. In this connection, I would like to bring to your attention Sri.KSK's guidance as given in his magazine "Astrology & Athirshta", 1963 issue.

Quote

"Our ancient astronomers had clearly mentioned in their treatises that Astronomers in future, have to revise the calculation from time to time, if and when found necessary. They have expressed that the result arrived at, should agree with the scientific ocular verification. They are of the opinion that if the position of planets is arrived at, by using a calculation, inconsistent with observational precision, the result is only approximate and rough."

Unquote

I trust that if the above words of Guruji is of any guidance to us, then there can be no hesitation on our part to adopt the ayanamsa recommended by the IAU, the universally recognized scientist forum.

Further, one of Guruji's expectations from his followers as expressed by him (in reader 1 page 57) is worth remembering here.

Quote

" I have achieved one of my objective only when the horoscopes cast for any moment by any astrologer, is the same and the dasa balance is also same ".

Unquote

Now, I feel the time has come for the KP fraternity to fulfill the dream of our Guruji by choosing only one correct Ayanamsa leaving aside all others. If this to fructify, everyone should come forward with open mind, (shedding their egos) and approach the problem not with passion but with wisdom, to arrive at a unanimous solution acceptable to all. This accomplishment alone could be considered as the real reverence shown and homage paid by KP followers, to the great and illustrious person Shri.K.S.Krishnamoorthy, who has left behind a very rich legacy to the astrological community.

Good Luck.

Annexure – 7

KP Ayanamsa Table (IAU-2006)

(Mean Ayanamsa Table)

D.Senthilathiban

Ayanamsa for every year between

1800 A.D and 2399 A.D at 05.30 AM

Table 5:Krishnamurti Mean Ayanamsa as on 1 January @00:00Hrs UT[05:30Hrs IST](Model:IAU2006)

Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss
1800	20°59'16.114"	**1850**	21°41'08.509"	**1900**	22°23'01.457"	**1950**	23°04'54.957"	**2000**	23°46'49.010"	**2050**	24°28'43.754"
1801	21°00'06.323"	**1851**	21°41'58.730"	**1901**	22°23'51.689"	**1951**	23°05'45.200"	**2001**	23°47'39.402"	**2051**	24°29'34.018"
1802	21°00'56.533"	**1852**	21°42'48.951"	**1902**	22°24'41.921"	**1952**	23°06'35.443"	**2002**	23°48'29.656"	**2052**	24°30'24.283"
1803	21°01'46.743"	**1853**	21°43'39.309"	**1903**	22°25'32.153"	**1953**	23°07'25.824"	**2003**	23°49'19.910"	**2053**	24°31'14.686"
1804	21°02'36.953"	**1854**	21°44'29.530"	**1904**	22°26'22.385"	**1954**	23°08'16.067"	**2004**	23°50'10.164"	**2054**	24°32'04.952"
1805	21°03'27.301"	**1855**	21°45'19.752"	**1905**	22°27'12.755"	**1955**	23°09'06.310"	**2005**	23°51'00.556"	**2055**	24°32'55.217"
1806	21°04'17.512"	**1856**	21°46'09.973"	**1906**	22°28'02.987"	**1956**	23°09'56.554"	**2006**	23°51'50.811"	**2056**	24°33'45.483"
1807	21°05'07.722"	**1857**	21°47'00.333"	**1907**	22°28'53.220"	**1957**	23°10'46.936"	**2007**	23°52'41.066"	**2057**	24°34'35.887"
1808	21°05'57.933"	**1858**	21°47'50.555"	**1908**	22°29'43.453"	**1958**	23°11'37.180"	**2008**	23°53'31.321"	**2058**	24°35'26.153"
1809	21°06'48.282"	**1859**	21°48'40.777"	**1909**	22°30'33.824"	**1959**	23°12'27.424"	**2009**	23°54'21.714"	**2059**	24°36'16.419"
1810	21°07'38.494"	**1860**	21°49'31.000"	**1910**	22°31'24.058"	**1960**	23°13'17.669"	**2010**	23°55'11.970"	**2060**	24°37'06.686"
1811	21°08'28.705"	**1861**	21°50'21.360"	**1911**	22°32'14.292"	**1961**	23°14'08.051"	**2011**	23°56'02.226"	**2061**	24°37'57.091"
1812	21°09'18.917"	**1862**	21°51'11.583"	**1912**	22°33'04.526"	**1962**	23°14'58.296"	**2012**	23°56'52.482"	**2062**	24°38'47.358"
1813	21°10'09.267"	**1863**	21°52'01.806"	**1913**	22°33'54.898"	**1963**	23°15'48.542"	**2013**	23°57'42.876"	**2063**	24°39'37.625"
1814	21°10'59.479"	**1864**	21°52'52.030"	**1914**	22°34'45.132"	**1964**	23°16'38.787"	**2014**	23°58'33.132"	**2064**	24°40'27.893"
1815	21°11'49.692"	**1865**	21°53'42.391"	**1915**	22°35'35.367"	**1965**	23°17'29.170"	**2015**	23°59'23.389"	**2065**	24°41'18.298"
1816	21°12'39.905"	**1866**	21°54'32.615"	**1916**	22°36'25.602"	**1966**	23°18'19.416"	**2016**	24°00'13.646"	**2066**	24°42'08.566"
1817	21°13'30.255"	**1867**	21°55'22.839"	**1917**	22°37'15.974"	**1967**	23°19'09.662"	**2017**	24°01'04.041"	**2067**	24°42'58.834"
1818	21°14'20.469"	**1868**	21°56'13.063"	**1918**	22°38'06.210"	**1968**	23°19'59.909"	**2018**	24°01'54.298"	**2068**	24°43'49.103"
1819	21°15'10.682"	**1869**	21°57'03.425"	**1919**	22°38'56.445"	**1969**	23°20'50.293"	**2019**	24°02'44.556"	**2069**	24°44'39.509"
1820	21°16'00.896"	**1870**	21°57'53.650"	**1920**	22°39'46.681"	**1970**	23°21'40.540"	**2020**	24°03'34.814"	**2070**	24°45'29.778"
1821	21°16'51.247"	**1871**	21°58'43.875"	**1921**	22°40'37.054"	**1971**	23°22'30.787"	**2021**	24°04'25.210"	**2071**	24°46'20.047"
1822	21°17'41.461"	**1872**	21°59'34.100"	**1922**	22°41'27.291"	**1972**	23°23'21.034"	**2022**	24°05'15.468"	**2072**	24°47'10.317"
1823	21°18'31.676"	**1873**	22°00'24.463"	**1923**	22°42'17.527"	**1973**	23°24'11.419"	**2023**	24°06'05.726"	**2073**	24°48'00.724"
1824	21°19'21.890"	**1874**	22°01'14.688"	**1924**	22°43'07.764"	**1974**	23°25'01.667"	**2024**	24°06'55.985"	**2074**	24°48'50.994"
1825	21°20'12.243"	**1875**	22°02'04.914"	**1925**	22°43'58.138"	**1975**	23°25'51.915"	**2025**	24°07'46.382"	**2075**	24°49'41.264"
1826	21°21'02.458"	**1876**	22°02'55.140"	**1926**	22°44'48.375"	**1976**	23°26'42.163"	**2026**	24°08'36.641"	**2076**	24°50'31.534"
1827	21°21'52.673"	**1877**	22°03'45.504"	**1927**	22°45'38.613"	**1977**	23°27'32.549"	**2027**	24°09'26.900"	**2077**	24°51'21.942"
1828	21°22'42.888"	**1878**	22°04'35.731"	**1928**	22°46'28.850"	**1978**	23°28'22.798"	**2028**	24°10'17.160"	**2078**	24°52'12.213"
1829	21°23'33.242"	**1879**	22°05'25.957"	**1929**	22°47'19.226"	**1979**	23°29'13.046"	**2029**	24°11'07.558"	**2079**	24°53'02.484"
1830	21°24'23.457"	**1880**	22°06'16.184"	**1930**	22°48'09.464"	**1980**	23°30'03.295"	**2030**	24°11'57.818"	**2080**	24°53'52.755"
1831	21°25'13.673"	**1881**	22°07'06.549"	**1931**	22°48'59.702"	**1981**	23°30'53.682"	**2031**	24°12'48.078"	**2081**	24°54'43.164"
1832	21°26'03.890"	**1882**	22°07'56.776"	**1932**	22°49'49.940"	**1982**	23°31'43.932"	**2032**	24°13'38.338"	**2082**	24°55'33.435"
1833	21°26'54.244"	**1883**	22°08'47.004"	**1933**	22°50'40.316"	**1983**	23°32'34.181"	**2033**	24°14'28.737"	**2083**	24°56'23.707"
1834	21°27'44.461"	**1884**	22°09'37.232"	**1934**	22°51'30.555"	**1984**	23°33'24.431"	**2034**	24°15'18.998"	**2084**	24°57'13.979"
1835	21°28'34.678"	**1885**	22°10'27.597"	**1935**	22°52'20.794"	**1985**	23°34'14.819"	**2035**	24°16'09.259"	**2085**	24°58'04.389"
1836	21°29'24.895"	**1886**	22°11'17.826"	**1936**	22°53'11.034"	**1986**	23°35'05.069"	**2036**	24°16'59.520"	**2086**	24°58'54.662"
1837	21°30'15.250"	**1887**	22°12'08.054"	**1937**	22°54'01.411"	**1987**	23°35'55.320"	**2037**	24°17'49.920"	**2087**	24°59'44.934"
1838	21°31'05.468"	**1888**	22°12'58.283"	**1938**	22°54'51.650"	**1988**	23°36'45.571"	**2038**	24°18'40.181"	**2088**	25°00'35.207"
1839	21°31'55.685"	**1889**	22°13'48.649"	**1939**	22°55'41.890"	**1989**	23°37'35.959"	**2039**	24°19'30.443"	**2089**	25°01'25.618"
1840	21°32'45.904"	**1890**	22°14'38.878"	**1940**	22°56'32.131"	**1990**	23°38'26.211"	**2040**	24°20'20.706"	**2090**	25°02'15.891"
1841	21°33'36.259"	**1891**	22°15'29.108"	**1941**	22°57'22.509"	**1991**	23°39'16.462"	**2041**	24°21'11.106"	**2091**	25°03'06.165"
1842	21°34'26.478"	**1892**	22°16'19.337"	**1942**	22°58'12.749"	**1992**	23°40'06.714"	**2042**	24°22'01.369"	**2092**	25°03'56.439"
1843	21°35'16.697"	**1893**	22°17'09.705"	**1943**	22°59'02.990"	**1993**	23°40'57.103"	**2043**	24°22'51.632"	**2093**	25°04'46.850"
1844	21°36'06.916"	**1894**	22°17'59.935"	**1944**	22°59'53.231"	**1994**	23°41'47.355"	**2044**	24°23'41.895"	**2094**	25°05'37.124"
1845	21°36'57.272"	**1895**	22°18'50.165"	**1945**	23°00'43.610"	**1995**	23°42'37.608"	**2045**	24°24'32.296"	**2095**	25°06'27.399"
1846	21°37'47.492"	**1896**	22°19'40.396"	**1946**	23°01'33.852"	**1996**	23°43'27.860"	**2046**	24°25'22.559"	**2096**	25°07'17.674"
1847	21°38'37.712"	**1897**	22°20'30.764"	**1947**	23°02'24.093"	**1997**	23°44'18.251"	**2047**	24°26'12.823"	**2097**	25°08'08.086"
1848	21°39'27.931"	**1898**	22°21'20.995"	**1948**	23°03'14.335"	**1998**	23°45'08.504"	**2048**	24°27'03.087"	**2098**	25°08'58.361"
1849	21°40'18.289"	**1899**	22°22'11.226"	**1949**	23°04'04.715"	**1999**	23°45'58.757"	**2049**	24°27'53.489"	**2099**	25°09'48.637"

Table 5:Krishnamurti Mean Ayanamsa as on 1 January @00:00Hrs UT[05:30Hrs IST](Model:IAU2006)

Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss	Year	dd:mm:ss
2100	25°10'38.912"	**2150**	25°52'34.623"	**2200**	26°34'30.887"	**2250**	27°16'27.703"	**2300**	27°58'25.072"	**2350**	28°40'22.994"
2101	25°11'29.188"	**2151**	25°53'24.910"	**2201**	26°35'21.185"	**2251**	27°17'18.012"	**2301**	27°59'15.392"	**2351**	28°41'13.325"
2102	25°12'19.464"	**2152**	25°54'15.197"	**2202**	26°36'11.483"	**2252**	27°18'08.321"	**2302**	28°00'05.712"	**2352**	28°42'03.656"
2103	25°13'09.740"	**2153**	25°55'05.622"	**2203**	26°37'01.781"	**2253**	27°18'58.768"	**2303**	28°00'56.033"	**2353**	28°42'54.125"
2104	25°14'00.016"	**2154**	25°55'55.909"	**2204**	26°37'52.080"	**2254**	27°19'49.078"	**2304**	28°01'46.353"	**2354**	28°43'44.457"
2105	25°14'50.431"	**2155**	25°56'46.197"	**2205**	26°38'42.516"	**2255**	27°20'39.388"	**2305**	28°02'36.812"	**2355**	28°44'34.789"
2106	25°15'40.708"	**2156**	25°57'36.485"	**2206**	26°39'32.815"	**2256**	27°21'29.698"	**2306**	28°03'27.133"	**2356**	28°45'25.121"
2107	25°16'30.985"	**2157**	25°58'26.911"	**2207**	26°40'23.114"	**2257**	27°22'20.146"	**2307**	28°04'17.454"	**2357**	28°46'15.591"
2108	25°17'21.262"	**2158**	25°59'17.199"	**2208**	26°41'13.414"	**2258**	27°23'10.456"	**2308**	28°05'07.776"	**2358**	28°47'05.923"
2109	25°18'11.677"	**2159**	26°00'07.488"	**2209**	26°42'03.851"	**2259**	27°24'00.767"	**2309**	28°05'58.235"	**2359**	28°47'56.256"
2110	25°19'01.955"	**2160**	26°00'57.777"	**2210**	26°42'54.151"	**2260**	27°24'51.078"	**2310**	28°06'48.557"	**2360**	28°48'46.589"
2111	25°19'52.233"	**2161**	26°01'48.203"	**2211**	26°43'44.451"	**2261**	27°25'41.527"	**2311**	28°07'38.879"	**2361**	28°49'37.060"
2112	25°20'42.511"	**2162**	26°02'38.493"	**2212**	26°44'34.751"	**2262**	27°26'31.838"	**2312**	28°08'29.202"	**2362**	28°50'27.393"
2113	25°21'32.927"	**2163**	26°03'28.782"	**2213**	26°45'25.189"	**2263**	27°27'22.150"	**2313**	28°09'19.662"	**2363**	28°51'17.727"
2114	25°22'23.206"	**2164**	26°04'19.072"	**2214**	26°46'15.490"	**2264**	27°28'12.461"	**2314**	28°10'09.985"	**2364**	28°52'08.061"
2115	25°23'13.485"	**2165**	26°05'09.499"	**2215**	26°47'05.791"	**2265**	27°29'02.911"	**2315**	28°11'00.308"	**2365**	28°52'58.533"
2116	25°24'03.764"	**2166**	26°05'59.789"	**2216**	26°47'56.092"	**2266**	27°29'53.223"	**2316**	28°11'50.631"	**2366**	28°53'48.867"
2117	25°24'54.181"	**2167**	26°06'50.080"	**2217**	26°48'46.531"	**2267**	27°30'43.536"	**2317**	28°12'41.093"	**2367**	28°54'39.202"
2118	25°25'44.460"	**2168**	26°07'40.370"	**2218**	26°49'36.833"	**2268**	27°31'33.848"	**2318**	28°13'31.416"	**2368**	28°55'29.536"
2119	25°26'34.740"	**2169**	26°08'30.799"	**2219**	26°50'27.135"	**2269**	27°32'24.299"	**2319**	28°14'21.740"	**2369**	28°56'20.009"
2120	25°27'25.020"	**2170**	26°09'21.090"	**2220**	26°51'17.437"	**2270**	27°33'14.612"	**2320**	28°15'12.064"	**2370**	28°57'10.344"
2121	25°28'15.438"	**2171**	26°10'11.381"	**2221**	26°52'07.877"	**2271**	27°34'04.925"	**2321**	28°16'02.526"	**2371**	28°58'00.680"
2122	25°29'05.718"	**2172**	26°11'01.673"	**2222**	26°52'58.179"	**2272**	27°34'55.239"	**2322**	28°16'52.851"	**2372**	28°58'51.015"
2123	25°29'55.999"	**2173**	26°11'52.102"	**2223**	26°53'48.482"	**2273**	27°35'45.691"	**2323**	28°17'43.176"	**2373**	28°59'41.489"
2124	25°30'46.280"	**2174**	26°12'42.394"	**2224**	26°54'38.785"	**2274**	27°36'36.005"	**2324**	28°18'33.501"	**2374**	29°00'31.825"
2125	25°31'36.698"	**2175**	26°13'32.686"	**2225**	26°55'29.226"	**2275**	27°37'26.319"	**2325**	28°19'23.964"	**2375**	29°01'22.161"
2126	25°32'26.980"	**2176**	26°14'22.978"	**2226**	26°56'19.529"	**2276**	27°38'16.633"	**2326**	28°20'14.289"	**2376**	29°02'12.498"
2127	25°33'17.261"	**2177**	26°15'13.409"	**2227**	26°57'09.833"	**2277**	27°39'07.086"	**2327**	28°21'04.615"	**2377**	29°03'02.972"
2128	25°34'07.543"	**2178**	26°16'03.701"	**2228**	26°58'00.137"	**2278**	27°39'57.400"	**2328**	28°21'54.941"	**2378**	29°03'53.309"
2129	25°34'57.963"	**2179**	26°16'53.994"	**2229**	26°58'50.579"	**2279**	27°40'47.716"	**2329**	28°22'45.405"	**2379**	29°04'43.647"
2130	25°35'48.245"	**2180**	26°17'44.288"	**2230**	26°59'40.883"	**2280**	27°41'38.031"	**2330**	28°23'35.731"	**2380**	29°05'33.984"
2131	25°36'38.527"	**2181**	26°18'34.719"	**2231**	27°00'31.187"	**2281**	27°42'28.484"	**2331**	28°24'26.058"	**2381**	29°06'24.459"
2132	25°37'28.810"	**2182**	26°19'25.012"	**2232**	27°01'21.492"	**2282**	27°43'18.800"	**2332**	28°25'16.385"	**2382**	29°07'14.797"
2133	25°38'19.230"	**2183**	26°20'15.306"	**2233**	27°02'11.935"	**2283**	27°44'09.116"	**2333**	28°26'06.849"	**2383**	29°08'05.135"
2134	25°39'09.513"	**2184**	26°21'05.600"	**2234**	27°03'02.240"	**2284**	27°44'59.432"	**2334**	28°26'57.177"	**2384**	29°08'55.474"
2135	25°39'59.797"	**2185**	26°21'56.032"	**2235**	27°03'52.545"	**2285**	27°45'49.886"	**2335**	28°27'47.504"	**2385**	29°09'45.950"
2136	25°40'50.080"	**2186**	26°22'46.327"	**2236**	27°04'42.851"	**2286**	27°46'40.203"	**2336**	28°28'37.832"	**2386**	29°10'36.289"
2137	25°41'40.502"	**2187**	26°23'36.622"	**2237**	27°05'33.294"	**2287**	27°47'30.520"	**2337**	28°29'28.297"	**2387**	29°11'26.627"
2138	25°42'30.786"	**2188**	26°24'26.917"	**2238**	27°06'23.600"	**2288**	27°48'20.837"	**2338**	28°30'18.626"	**2388**	29°12'16.967"
2139	25°43'21.070"	**2189**	26°25'17.350"	**2239**	27°07'13.907"	**2289**	27°49'11.292"	**2339**	28°31'08.954"	**2389**	29°13'07.444"
2140	25°44'11.354"	**2190**	26°26'07.645"	**2240**	27°08'04.213"	**2290**	27°50'01.609"	**2340**	28°31'59.282"	**2390**	29°13'57.783"
2141	25°45'01.776"	**2191**	26°26'57.941"	**2241**	27°08'54.658"	**2291**	27°50'51.927"	**2341**	28°32'49.749"	**2391**	29°14'48.123"
2142	25°45'52.061"	**2192**	26°27'48.237"	**2242**	27°09'44.965"	**2292**	27°51'42.245"	**2342**	28°33'40.078"	**2392**	29°15'38.463"
2143	25°46'42.346"	**2193**	26°28'38.670"	**2243**	27°10'35.272"	**2293**	27°52'32.701"	**2343**	28°34'30.407"	**2393**	29°16'28.941"
2144	25°47'32.631"	**2194**	26°29'28.967"	**2244**	27°11'25.579"	**2294**	27°53'23.019"	**2344**	28°35'20.737"	**2394**	29°17'19.282"
2145	25°48'23.055"	**2195**	26°30'19.263"	**2245**	27°12'16.024"	**2295**	27°54'13.338"	**2345**	28°36'11.204"	**2395**	29°18'09.623"
2146	25°49'13.340"	**2196**	26°31'09.560"	**2246**	27°13'06.332"	**2296**	27°55'03.657"	**2346**	28°37'01.534"	**2396**	29°18'59.963"
2147	25°50'03.626"	**2197**	26°31'59.995"	**2247**	27°13'56.640"	**2297**	27°55'54.114"	**2347**	28°37'51.864"	**2397**	29°19'50.443"
2148	25°50'53.912"	**2198**	26°32'50.292"	**2248**	27°14'46.948"	**2298**	27°56'44.433"	**2348**	28°38'42.194"	**2398**	29°20'40.784"
2149	25°51'44.337"	**2199**	26°33'40.589"	**2249**	27°15'37.395"	**2299**	27°57'34.753"	**2349**	28°39'32.663"	**2399**	29°21'31.125"

Annexure – 8

True Rahu / Kethu

C.G.Rajan

Rahu and Ketu.

(The Moon's Ascending and Decending Nodes).

European Almanacs and Ephemeris give usually only the Mean Longitude of the Ascending Node (Rahu) without giving its *True Longitude*. To get the true longitude, two corrections have to be made. One is due to the *Nutation in Longitude* and the other is due to the several inequalities to which the node is subject. The greatest of the several quantities which make up the correction for Nutation is 17″·234. The aggregate correction for the nutation in longitude may be ignored as it ranges from +19″·093 to −19″·093 which may be considered to be negligible but the correction for the greatest of the inequalities ranges from +1°–30′–26″ to −1°–30′–26″ which being an appreciable quantity cannot be ignored especially in the case of such a slowly moving point (i.e., an Indian planet) as the ascending node except on the score of tediousness of calculation. This inequality reaches its maximum at least twice in the course of a year and so it cannot be ignored altogether. Those who aim at greater precision have to apply the correction for the inequality (if not the correction for Nutation also) to the position of the Ascending Node given in European Almanacs or Ephemeris of Planets which are being largely used now-a-days. The magnitude of the corrrection due to the greatest of the several quantities making up the Nutation is given in table No. 8 of the Sun. The magnitude of the correction C due to the greatest inequality of Node is +5426″ Sine 2 $(S-\Omega)$ where S stands for the true longitude of the Sun and Ω stands for the mean longitude of the Ascending Node. If we put $P=2(S-\Omega)$, then this magnitude becomes $C=+5426''$ Sin P. I will take an example to illustrate the method of calculating the mean and true longitudes of the Ascending and Descending Nodes :—

Example (1)—Find the *Mean and True Longitudes of Rahu and Ketu* at 5–30 p.m. on 16—12—1924 at Madras.

Part I.

We know from formula No. 4 inpage 1of the Section giving the explanation and the use of the Tables of the Motion of the Moon (Rahu and Ketu), that

$V=360°-\Omega$

$V=360°-\Omega$

$\therefore \Omega=360°-V$

$=360°-223°·5446$ } (See $V=223°·5446$ in item No.(5) of Part I

$=136°·4554$ } of example (1) given for the Moon in page 5)

$=136°-27'-19''$ (1) ... from table 13 of the Moon.

∴ The Mean longitude of Rahu $=136°·4554$

The Mean longitude of Ketu = the Mean longitude of Rahu + 180°

$=136°·4554+180°=316°·4554$

$=316°-27'-19''$

From our results, the mean longitudes ... (1) of Rahu=136·4554,
(2) of Ketu=316·4554.

From Nautical Almanac, the mean longitudes ... (1) of Rahu=136·4554,
(2) of Ketu=316·4554.

So we see here that our results tally with the Nautical Almanac. *Nautical Almanac or Ephemeris of Planets stops here but we have to proceed further as shown below—*

Part II—(*a*) *Correction for Nutation*—

Ω=136·4554 Item No. (1) above
$\therefore U = -0°-0'-12''$ from Table No. 8 of the Sun (2).

Part II(*b*)—*Correction for Inequality of the Node*

Correction $C = +5426''$ Sin P.. (formula given above).
$P = 2(S-\Omega)$.

$S = 264°-17'-16''$ (*Vide* Item No. (8) in the Sun's Example No. (1) in the Sun's Tables.

$\Omega = 136°-27'-19''$ (1).
$\therefore S-\Omega = 127°-49'-57''$
$\therefore 2(S-\Omega) = 255°-39'-54''$
$\therefore P = 2(S-\Omega) = 255°-39'-54'' = 255°-40'$ nearly.

Now taking $C = 5426''$ Sin P.
$C = 5426''$ Sin $(255°-40')$
$= 5426''$ Sin $(-75°-40')$ from Table 1(*a*) of the Separate book of Conversion of Heliocentric co-ordinates.*
$= 5426'' \times [\text{Sin}-(75°-40')]$ — *Vide* (17) of Item No. (7) at page 3 of the separate book.
$= -5426''$ Sin $(75°-40')$
$= -5426'' \times 0{\cdot}96888$
$= -5257''$ nearly
$\therefore C = -1°-27'-37''$ (3)
$U = -0°-0'-12''$ (2)
$C = -1°-27'-49''$ (3)
$\therefore U+C = -1°-27'-49''$ (4) by adding (2) and (3)
$\Omega = 136°-27'-19''$ (1)

$\therefore \Omega+U+C = 134°-59'-30''$ by adding (1) and (4).
$\therefore$ The true Tropical longitude of Rahu $= 134°-59'-30''$
$\therefore$ The true Tropical longitude of Ketu $= 314°-59'-30''$ by adding 180°.

		Rahu.	Ketu.
Tropical (Sayana) longitude	=	134°–59′–30″	314°–59′–30″
Ayanamsa	=	22°–40′–23″	22°–40′–23″
∴ Nirayana longitude	=	112°–19′– 7″	292°–19′– 7″ Answer.

* The book is named "Conversion of Heliocentric Co-ordinates into Geocentric Co-ordinates —A book of Tables for converting Heliocentric Longitude and Latitude into Geocentric Tropical Longitude and Latitude and into Indian Siderial longitude" which is bound with this volume for the sake of convenience.