ZOLLER AND
'THE ALCABITIUS
PRIMARY DIRECTION METHOD'

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In his 'Tools and **Techniques of the Medieval Astrologer' Book Two, Robert Zoller** commented on the primary directions as per Bonatti and Alchabitius.

He also gave example of an interplanetary direction: trine of Jupiter to the Sun from his own chart.

(*Tools and Techniques Of the Medieval Astrologer. Book II : Astrological Prediction by Direction and the Subdivision of the Signs - 3rd edition (revised) New Library, London.2003.*
Only available from www.new-library.com/zoller/catalogue)

This rushed some spirits out of their slumber and more students of Astrology started investigating the most complex, but amazing and generously rewarding field of primary directioning...

Some of them repeatedly asked me about these "Zoller's directions" and 'Are they new type of directions or what??'
And whether my program 'Placidus' could compute them.

The following is an article that aims to clarify these things and, without any doubt remaining, to show the true nature thereof.

However, for the impatient, I will give right here the conclusions of the article:

1. Zoller exemplifies and uses the algorithm of **Alcabitius**.
2. The algorithm of **Alcabitius** is just another mathematical way to compute the **Semi-Arc primary directions**, known also as the **Placidean Semi-Arc**. These directions are actually the true Ptolemaic primaries.
Zoller=Alcabitius=Placidus Semi-Arc=Ptolemy
3. The computer program 'Placidus' can compute these directions.

Now we can go in some detail.

HISTORY:

ALCABITIUS was an arab astrologer from the 10th century (died 967?).

The book by Alcabitius was famous in Latin translation in Medieval Europe.

Many european astrologers as for example the famous Lucas GAURICUS[1] used the method of Alcabitius.

However, Alcabitius was not the first astrologer to invent the 'Alcabitius method'!

The Alcabitius method of primary directing is actually the same method that Ptolemy expounds in his 'Tetrabiblos'.

It turns out that the concrete mathematical algorithm 'of Alcabitius' was in fact widely known and used by the arab astrologers in the apogee of the Caliphate- at least a century before Alcabitius himself [2].

Probably we will never know who was the first to invent this algorithm since the idea goes back as far as Ptolemy.

Some names of Arab astrologers before and after Alcabitius expounding the 'Alcabitius' method for directioning: **al-Battani (born 858)**, al-Biruni (~10th cen), ibn Ridwan (11th cen), al-Marwazi, al-Khakani…

An interesting one is ibn Ridwan.

He was another famous arab astrologer and doctor from Cairo who explained the Ptolemaic algorithm and who lived after Alcabitius.

'ALI IBN RIDWAN wrote a commentary on Ptolemy where we can find the algorithm. Ibn Ridwan knew well Old Greek and probably read Ptolemy in original.[3]

Based on another treatise of his 'De Tribus Nativitatibus' [4], he was born in a poor family on jan 15, 988 and wrote the comments on Ptolemy when in his forties- somewhere around 1030 in Cairo where he was a practicing doctor held in big esteem by the Caliph of Egypt himself. [5]

The commentary of ibn Ridwan was translated in Latin in the court of Alfonso the Xth of Castilia somewhere in the 13th century.

In the end if we ask 'Where did all these arab astrologers drew from?', the answer of course will be 'Ptolemy!'

Later Maginus (even before Placidus) [6] and Placidus would expound the **Ptolemaic** primary directions method. It will be known also as the **Semi-Arc** or the **Placidean** method.

Maginus and Placidus though devised their own math algorithm.

Zoller also mentions the astrologers Kuehr and Morinus.

These two, should be underscored, directed in ways completely different between them and also even more different from the Ptolemaic method.

Kuehr[7] directed **Placidean Under-The-Pole** method which started with Placidus.

Morinus directed in the **Regiomontanian** method which started mathematically with Regiomontanus.

IN SHORT, the 3 attested 'historical' ways[8] of directing pertain to antiquity and the Renaissance[9].

They are:

The **PTOLEMAIC**- starts with Ptolemy, antiquity.
(used by Ptolemy, al-Biruni, ibn Ridwan, Alcabitius, Gauricus, Placidus, Simmonite, Zoller and myself),
The **REGIOMONTANIAN**[10]- 'Via Rationalis'- starts in the 15th century with Regiomontanus, ripe Renaissance.
(used by Regiomontanus, Maginus, Argolus, Morinus, William Lilly)
The **Placidean Under Pole**- starts in the 17th century with Placidus,), old Renaissance.
(used by Placidus, Sepharial, Kuehr)

VERBA ULTIMA

1. The method of ALCABITIUS IS THE SAME AS THE PTOLEMAIC I.E. THE PLACIDUS SEMI-ARC method IN ESSENCE AND MATHEMATICAL RESULTS.

2. Their difference being only in the concrete form of the mathematical algorithms.
The algorithms are different, the method is the same.
(As well known, there are billions of ways in the math towards the same result of a problem)

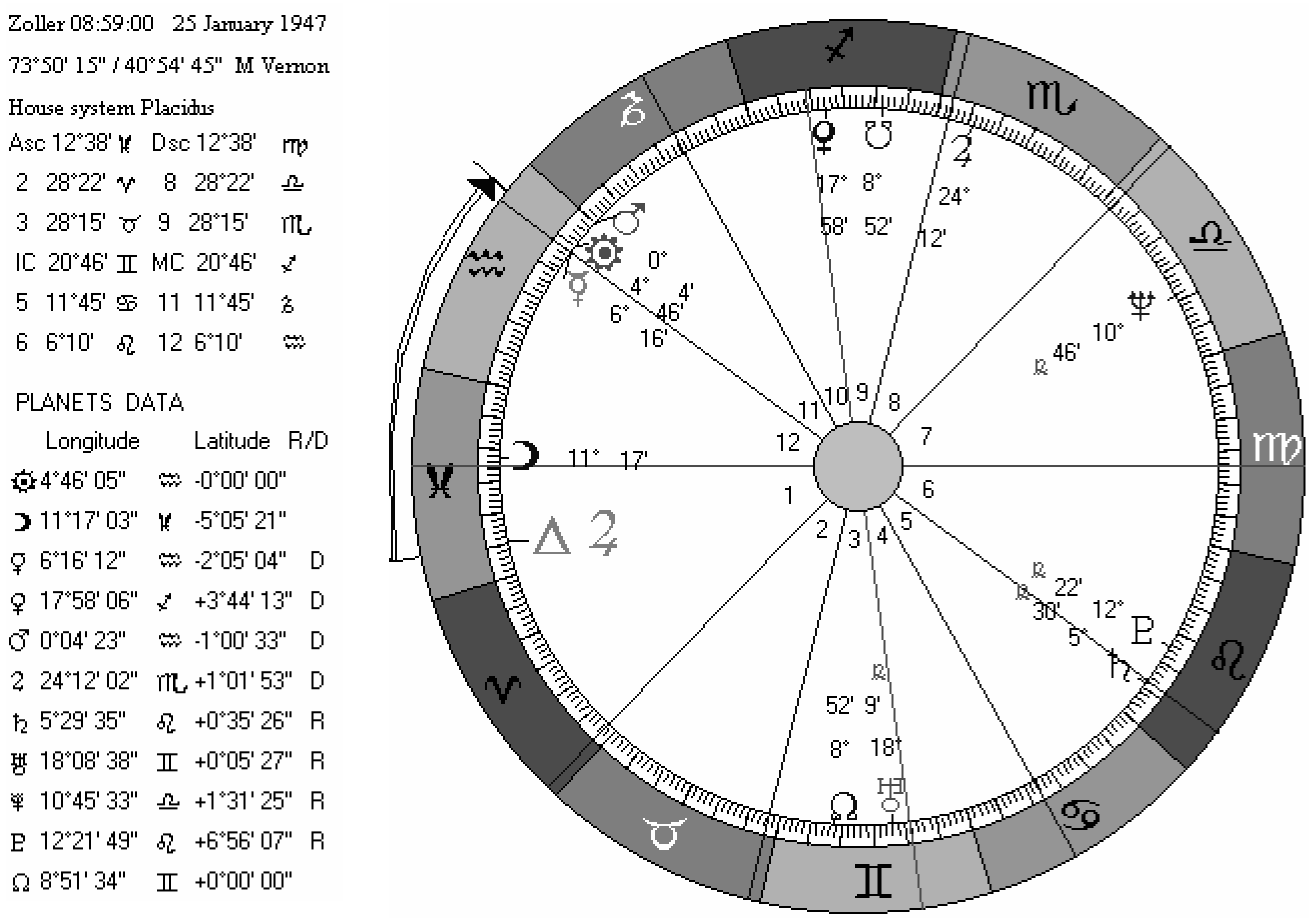
3. One and The Same direction computed in both algorithms, Alcabitius and Placidean Semi-Arc, will give the SAME DIRECTIONAL ARC, the holy Grail of the primary directing.
Computed in the Regiomontanian and the Placidean Under The Pole method, the direction will have another 2 arcs of direction, very different from each other and from that computed in the Ptolemaic (semi-arc) method…

4. The program Placidus computes the Alcabitius, i.e....the Placidean Semi-Arc method.

5. It also computes the other old methods: the Regio (Morinus) and Placidus Under Pole (Kuehr).

RE-COMPUTATION OF THE EXAMPLE DIRECTION IN ZOLLER

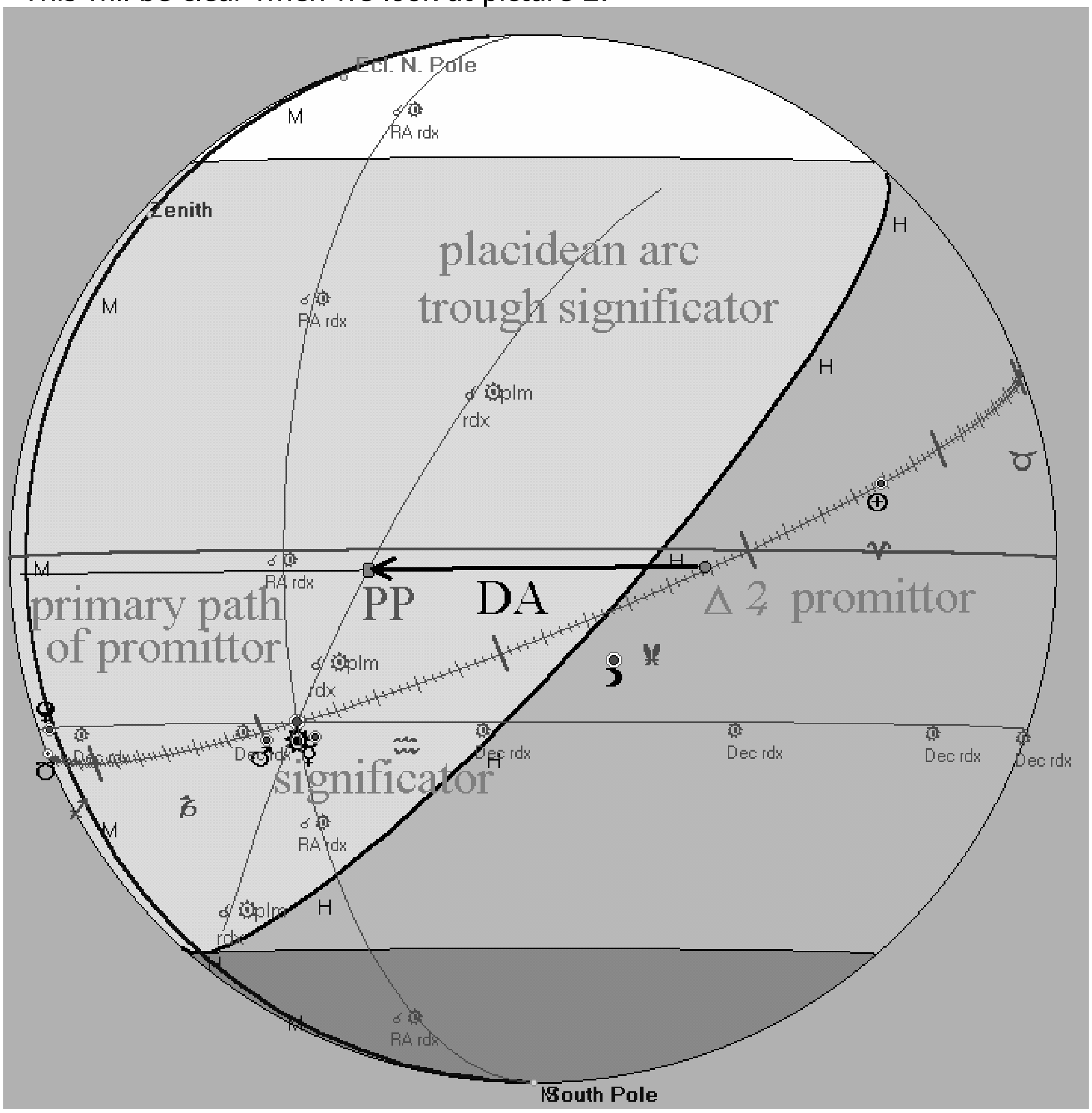
In 'Tools & Techniques of the Medieval Astrologer', book two, page 56, Zoller gives as an example for interplanetary direction, a direction in his own chart:
zod. △♃ direct → ☉ .



Picture 1
The horoscope of Robert Zoller
(from the computer program 'Placidus')

Here the promittor or the point that is carried *with the celestial sphere* (***primo mobili***) is the zodiacal trine of Jupiter wich happens to be in **24°12′ ♓.**

This point is carried until it 'reaches' the Sun.
It can, of course, never reach the Sun, but it reaches a point which is similar to the point occupied by the Sun.
This will be clear when we look at picture 2:



Picture 2
The horoscope of Robert Zoller in 3 dimentions
The primary direction <u>zod. △ ♃ direct → ☉</u> shown in 3D.
(from the computer program 'Placidus')

It shows Robert Zoller's horoscope in 3 dimentions. We can see the promittor and its primary path that it sweeps with the celestial sphere. In **the semi-arc method of Placidus**, we can construct a ***Placidian arc*** through any significator. Every point on this arc will divide its **SemiDayArc** in the same

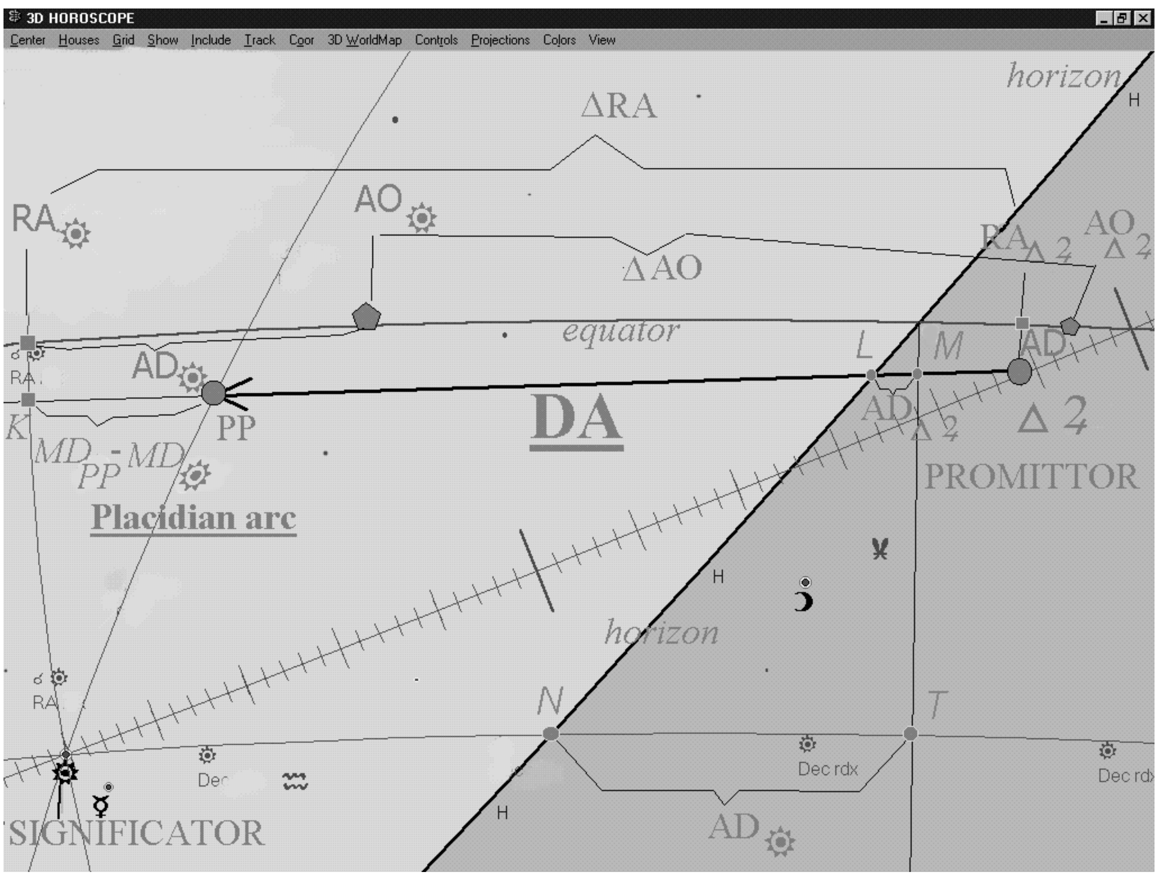
proportion as the significator. In our case the significator is the ☼[11].
Wherever the placidian arc through the significator, ☼ , crosses the primary path of the promittor, △ ♃, this point is called Pars Proportionalis (Proportional Point), PP on the picture.

△ ♃ should reach **PP** in order for the direction ***△ ♃ direct → ☼*** to be complete. We measure this in time (equatorial degrees) and call it the Directional Arc (**DA**). After we find out the DA, in degrees, we transform it in larger units of time (years) by a key of choice (simplest one is 1 degree = 1 solar year).

Up to this point we explained the direction as per Placidus Semi-Arc which is the easiest way to compute, understand and envision the method of Ptolemy.

Now we will turn to the algorithm of Alcabitius, examine it in 3D and prove graphically and mathematically that this is the same as the Placidian Semi-Arc.

Look at picture 3:



Picture 3
A zoom on the region of interest (from the computer program 'Placidus')

Here are shown the primary paths of the promittor and the significator.

The MT arc is an equatorial meridian through the crosspoint between the horizon and the equator. All points on this arc are 90 degrees from the meridian and have the same RA. We can see here graphically the **ascensional difference** (**AD**) of the △♃ and the ☼. It shows with how many degrees is the day semi arc (of a point) less or more than 90. *That's why it is called 'difference'- a difference from 90 degrees is meant.*

Now we are ready to do the Alcabitius algorithm graphically:
We project the significator, ☼, and the promittor, △♃, on the equator with a Right-Ascension (equatorial) Meridians and get the points of their right ascensions: $RA_{\text{☼}}$ and $RA_{\triangle\text{♃}}$.

We can see also graphically the $\mathbf{\Delta RA = RA_{\triangle\text{♃}} - RA_{\text{☼}}}$. This is what Alcabitius calls **Significator of Right Circle** (point 3 of the algorithm on page 53 of Zoller).

Now let us turn to the famous Ascensio Obliqua (AO). ***The AO is the time-projection of the point onto the equator and in the time-plane of the horizon.*** **The AO rises together with the point on the horizon.** ***If we connect all points that rise together with a certain star we will get the ascensional circle of that star. It will be what we see on the horizon when that star rises.***

To get the Ascensio Obliqua (AO) of the ☼ and the △♃, we can add the absolute value of their ascensional differences (AD) to their right ascensions (RA). We can see this on the picture as well.

The formula is: **AO = RA - AD**[12].

Their difference $\mathbf{\Delta AO = AO_{\triangle\text{♃}} - AO_{\text{☼}}}$ is called ***Significator of the Region*** by Alcabitius and is point 4 of the algorithm.

Now we are at point 5 of the algorithm. We subtract ***Significator of the Region*** from **Significator of Right Circle**: **ΔRA -ΔAO**.

We see from the graph that **ΔRA -ΔAO** is just $\mathbf{AD_{\text{☼}} - AD_{\triangle\text{♃}}}$ by absolute value *(OR* $\mathbf{AD_{\triangle\text{♃}} - AD_{\text{☼}}}$ *mathematically)*

We can prove this purely mathematically too:

$$\mathbf{\Delta RA - \Delta AO =}$$

$$\mathbf{= RA_{\triangle\text{♃}} - RA_{\text{☼}} - (AO_{\triangle\text{♃}} - AO_{\text{☼}}) =}$$

$$\mathbf{= RA_{\triangle\text{♃}} - RA_{\text{☼}} - AO_{\triangle\text{♃}} + AO_{\text{☼}} =}$$

$$\mathbf{= RA_{\triangle\text{♃}} - RA_{\text{☼}} - (RA_{\triangle\text{♃}} - AD_{\triangle\text{♃}}) + (RA_{\text{☼}} - AD_{\text{☼}}) =}$$

$$\mathbf{= RA_{\triangle\text{♃}} - RA_{\text{☼}} - RA_{\triangle\text{♃}} + AD_{\triangle\text{♃}} + RA_{\text{☼}} - AD_{\text{☼}} =}$$

$$\mathbf{= AD_{\triangle\text{♃}} - AD_{\text{☼}}.}$$

Now, the trick is to add and subtract 90 degrees from this.

$$\mathbf{= AD_{\triangle\text{♃}} - AD_{\text{☼}}} =$$

$$\mathbf{= AD_{\triangle\text{♃}} - AD_{\text{☼}} + 90 - 90 =}$$

= + 90 +$AD_{\triangle ♃}$ – $AD_{☼}$ - 90=

= + (90 +$AD_{\triangle ♃}$) –(90+ $AD_{☼}$)=

=$DSA_{\triangle ♃}$ – $DSA_{☼}$.

This holds because the **DaySemiArc = 90 + AD.**

Now we can continue with the Alcabitius algorithm, but use this **$DSA_{\triangle ♃}$ – $DSA_{☼}$** notation which mathematically (by value) is equal to **$AD_{\triangle ♃}$ - $AD_{☼}$**.

Now we are at the end of point 5: We will multiply **$DSA_{\triangle ♃}$ – $DSA_{☼}$** by the Meridian Distance of the Sun.

($DSA_{\triangle ♃}$ – $DSA_{☼}$)*$MD_{☼}$.

Point 6 is to divide it by the **$DSA_{☼}$.**

($DSA_{\triangle ♃}$ – $DSA_{☼}$) * $MD_{☼}$ / **$DSA_{☼}$**.

This is equal to

= **$DSA_{\triangle ♃}$* $MD_{☼}$** / **$DSA_{☼}$ – $DSA_{☼}$ * $MD_{☼}$** / **$DSA_{☼}$**=

= **$DSA_{\triangle ♃}$* $MD_{☼}$** / **$DSA_{☼}$ – $MD_{☼}$** =

In the first member here, we see immediately the Placidian formula for finding the Meridian Distance of the Proportional Point (PP) which is **$DSA_{\triangle ♃}$* $MD_{☼}$** / **$DSA_{☼}$**. It comes from the equation:

MD pp. / DSA pp.(prom) = MD sig. / DSA sig,

This equation is the corner-stone of the Placidian-Ptolemaic logic. It describes the placidian arc that connects points with position between rise and culmination the same as proportionate to their DaySemiArc.

From this we get MD pp. = DSA pp.(prom) * MD sig. / DSA sig.

So, **$DSA_{\triangle ♃}$* $MD_{☼}$** / **$DSA_{☼}$ – $MD_{☼}$** becomes: **MD pp – $MD_{☼}$**.

We can see this on the picture. The RA (equatorial) meridian through the ☼ crosses the primary path of the △♃ in point K. The distance from this point to the Meridian is the Meridian Distance of the **☼**. The Meridian distance of the proportional Point is the distance from the point PP on the graph to the Meridian.

On the picture **MD pp – $MD_{☼}$** is the distance between points K and PP and lies on the primary path of the promittor, △♃.

Now, the last part of point 6 of Zoller's Alcabitius paraphrase is:

Subtract the result (**MD pp – $MD_{☼}$**) from **∆RA (if ∆RA > ∆OA)**.

△**RA** on the primary path of the promittor is the distance between the points △♃ and K.
When we subtract from the **K–△♃** distance (△RA) the **K - PP** distance (**MD pp – MD☉**), we get **PP –△♃** as a result.
And this is exactly the Placidian Directional Arc.

This concludes the graphical and the math proof that Alcabitius = Placidian Semi-Arc.

However, no matter how rigorous the math proof may be, people who are not math inclined, will not be convinced…..until we DO

A RECOMPUTATION OF THE DIRECTION IN BOTH ALGORITHMS

On page 56 Zoller computes the direction. He finds out the Directional Arc to be 38.736 (38° 44′ 11″). We will not be able to reproduce this result, because Zoller uses slightly different values for the RA of the points and for the AD of the Sun.
Instead we will take the values of the intermediate variables from the program 'Placidus' and compute with them.

RE-COMPUTATION PER ALCABITIUS

Robert Zoller, 08:59:00 AM, 25 Jan. 1947, TimeZone= +5;
Mount Vernon 73° W 50′ 15″ / 40° N 54′ 45″

RAMC = 259.94481
RA ☉=307.1138, MD ☉= 47.169, AD ☉= -17.4412, DSA ☉= 72.5588,
OA ☉= 324.555,
RA △♃=354.6761, MD△♃= 94.7313, AD △♃ = -1.99861, DSA △♃ = 88.00138,
OA △♃ = 356.6747,

3 point of Zoller' algorithm:
△**RA** = RA △♃ - RA ☉ = 354.6761 - 307.1138 = 47.5623

4 point of Zoller' algorithm:
△**OA** = OA △♃ - OA ☉ = 356.6747- 324.555= 32.11972

5 point of Zoller' algorithm:
∆**RA** -∆**OA** = 47.5623- 32.11972= 15.44258
15.44258 * $MD_{\odot}$ = 15.44258 * 47.169 = 728.41147

6 point of Zoller' algorithm:
728.41147 / $DSA_{\odot}$ = 728.41147 / 72.5588 = 10.0389

∆**RA** -10.0389 = 47.5623 - 10.0389=

= **37.523 = DA of the direction**.

RE-COMPUTATION PER PLACIDUS SEMI-ARC

In this case the DA of the direction is **DA= $MD_{\triangle♃}$ – MD pp**. [13]
MD pp = **$DSA_{\triangle♃}$ * $MD_{\odot}$** / **$DSA_{\odot}$** =
= 88.00138 * 47.169 / 72.5588 = 57.2079.
DA= $MD_{\triangle♃}$ – MD pp = 94.7313 - 57.2079 =

=**37.523 = DA of the direction**

The result for the directional arc is the same in both algorithms.

With this I will conclude the present article.
Anyone with questions may contact me at: rumen_k_kolev@yahoo.com

Footnotes for "ZOLLER AND 'THE ALCABITIUS PRIMARY DIRECTION METHOD'"

1: Lucas Gauricus from the 16^{th} century was famous with his prediction of the tragic death of the king Henry the second, king of France.
He wrote:
TABULAE DE PRIMO MOBILI QUAS DIRECTIONUM VOCITANT, Romae 1557
In this book he explained the Alcabitius method.

2: Islamische Encyclopaedie, 1900-1911, article on al-**Tasyir**(direction)
3: The Encyclopaedia Of Islam, 1971, London article on IBN RIDWAN

4: De tribus nativitatibus = Of three charts. The first of which is his own.

5: The Encyclopaedia Of Islam, 1971, London article on IBN RIDWAN

6: MAGINUS was teacher of the teacher of Placidus- Argolus. Argolus is widely mentioned and praised by William Lilly.
  'Tabulae Primi Mobilis', I.Antoniis Magini, Venetiis, 1604

7: 'Berechnung Der Ereigniszeiten', E.K.Kuehr, Wien 1951

8: Cardanus in the 16th century, mathematician and engineer famous even today, invented his own method, but had no followers.
  'Operum, Tomus Quintus…' Hieronymi Cardani, Lugduni 1663

9: The renaissance starting with the translation of Old Greek and Arabic authors into Latin and continuing until Latin was used as lingua franca.

10: 'Tabulae Directionum…' I.Regiomontani, 1551

11: Whoever wants a clear explanation of the basic terms of the primary directions and their astronomical meaning should obtain my books 'Primary Directions-Basics' and 'Placidian Classic (SEMI-ARC) Primary Directions'

12: The AD for the ☼ and the △♃ are both negative and minus negative number gives a + number. That's why the AO increases over the RA in this cases.

13: Look in my book 'Placidian Classic (SEMI-ARC) Primary Directions', page 27 or case 16 of the interplanetary directions.

END of "ZOLLER AND 'THE ALCABITIUS PRIMARY DIRECTION METHOD'"
