

Pseudo-Māshā'allāh
On the Astrolabe

Part II: *De compositione astrolabii*
Critical Edition
with English Translation``
by

Ron B. Thomson

Version 1.6

Toronto, 2020

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TEXT AND TRANSLATION

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[De compositione
astrolabii]

[*On the Astrolabe:
Construction*]

The following manuscripts begin with the Prologue, line 1 (“Scito quod astrolabium”):

Aα Bα Bγ Bε Bζ Bη Bι Bκ Cβ Cδ Cε Cη Cθ Cι Dβ Dγ Dη Eα Eβ Eδ Eζ Eη Eμ Eν Eο Eτ Eυ Eφ Fα Fβ Fδ Fζ
Lβ Lγ Lε Lζ Lη Lκ Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Mφ Nα Oα Oζ Oη Oκ Oμ Oξ Oο Oπ Oσ Oτ Oυ
Pα Pγ Pδ Pθ Pλ Pμ Pν Pο Pπ Pρ Pτ Pυ Pφ Qα Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sθ Sι Sκ Sλ Tδ Uα Vα Vβ Vε
Vι Vκ Vν Vπ Vσ Vυ Vχ Vψ Wα Wβ Wι Xα Xβ

[Prologue]

INCIPIT ASTROLABIUM MESSEHALLE / PROHEMIUM IN ASTROLABIUM MESSEHALLE

Scito quod “astrolabium” est nomen grecum cuius interpretatio est “acceptio stellarum,” eo quod accipitur ex eo veritas earum rerum quarum scientia queritur ex

- 1 Incipit ... Massehalle₂] *om.* Βα Βε Cβ Cθ Dβ Εα Εμ Να Οη Οο Ργ Ρπ Qα Qμ Sβ Sι Sλ Vα Vν; *illeg.* Uα(*later hand*); Compositio astrolabii Vχ(*later hand*); Compositio astrolabii M~ Eτ Lζ; Compositio astrolabii secundum M~ prohemium Vβ; De astrolabio Λκ Vν; De astrolabio compositione Cδ(*later hand*); Hic incipit astrolabium Pο; Hic est incaptio astrolabii ad sumi pontificis dei honorem Mγ; De compositione astrolabii Bκ; Hic incipit canon novi astrolabii M~ Eο(*later hand*); In nomine domini Iesu Christi ... astrolabii M~... Bε(*later hand*); Incipit astrolabium Cι Sθ; Incipit astrolabium M~ [*illeg.*] Pν; Incipit astrolabium M~ Bγ(*later hand*) Bη Βι Eδ Eζ Mη Mθ Mλ Mν Mο Pτ Qδ Rα Rβ Vκ Vψ Wβ Wι Xβ; Incipit astrolabium M~ prohemium Bζ Fα Pλ; Incipit astrolabium M~ vel tractatus astrolabii Pδ; Incipit astrolabium secundum M~ Dγ; Incipit compositio astrolabii Oπ; Incipit compositio astrolabium M~ Vε; Incipit de compositione astrolabii Fδ; Incipit liber sive tractatus astrolabii M~ Rubrica Vπ; Incipit opus astrolabii secundum M~ Oα; Incipit tractatus astrolabii Cε(*marg.*) Oμ(*marg.*); Incipit tractatus astrolabii edicionis M~ prohemium Cη; Incipit tractatus astrolabii M~ Aα Eν Pν; Incipit tractatus de compositione astrolabii secundum doctrinam M~ Dη; Opus astrolabii secundum M~ Eν Mκ Oσ(*later hand*) Vσ; Opus astrolabii secundum M~ Rubrica Oκ; Prohemium abastrolabium M~ Pα; Proemium astrolabii M~ Pρ; Proemium in astrolabium M~ Eβ Eφ Fβ Fζ Lβ Lε Lη Mδ Mφ Oζ Oτ Oξ Oυ Pα Pθ Pμ Pρ Pυ Qλ Sδ Tδ Vι Wα; Proemium in astrolabium M~ 1445 Mν(*diff. hand*); Prohemium in astrolabium M~ capitulum primum Qγ; Prohemium in astrolabium M~ et primo compositio eiusdem Eη; Prohemium in compositione astrolabii M~ Qβ; Prohemium tabularam in astrolabium M~ Lγ; Sequitur alia compositio astrolabii bona Pφ(*later hand add.:* que est M~); Tractatus astrolabii secundum magistrum Johannem Sacro Boscho Xα
- 1 Messehalle] Macelama Eν Oσ; Macellama Mκ Oα(?) Vσ; Mesaalat Rβ; Mesahallach Fβ; Mesalahat Qδ; Mesehalle Qβ; Mese^{le} Dγ; Meshale Wι; Meshalle Bζ Pτ; Messah[*cut off*] Bκ(*marg.*); Messahalach Eη; Messahale Mη Mθ Mο Pλ; Messahallach Mδ; Messahallah Dη Vε; Messahalle Pδ Vψ; Messalahat Pφ; Messcallath Oκ; Messeh^a... Lζ; Messehalat Pν; Messehalath Bη Oζ Pρ; Messehale Mλ Oυ; Messehallach Eβ Eο Fα Lβ(*marg.*) Mυ Mφ Oξ Vβ Vι; Messehallat Vκ; Messehallath Bε Cη Fζ Lβ Lγ Lη Oτ Pα Pθ Pμ Qγ Qλ Sδ Tδ; Messehallaz Pυ Wα; Messehallaz₄ Aα; Messehalla₃ Eν Vπ; Messehallath Sκ; Messehalle Bγ Βι Eδ Eζ Eτ Eφ Oυ Rα Wβ; Messehallhach Lε; Messehhalath Xβ; Methalle Mν
- 2 Scito] Sciendum Oη est] sit Aα Bζ Cδ Cθ Dβ Dη Eν Eυ Fδ Mγ Mθ Mκ Mλ Mν Oη Oκ Oμ Oπ Pπ Sθ Sι Sλ Vα Vπ Vσ Vχ
- 3 earum rerum quarum] earum quarum Bζ Βι Dγ Eδ Eζ Eτ Lζ Mβ Mο Oκ Qβ Pγ Pο Pτ Rα Sβ Wι Xα; eorum quorum Βα Cβ Cδ Cθ Εμ Eν Mγ Mκ Mλ Mν Oα Oη Oμ Oπ Oσ Qα Qμ Sθ Sι Sλ Uα Vε Vσ Vχ Vν

[*Prologue*]

HERE BEGINS THE ASTROLABE [TEXT] OF MESSAHALLA
PROLOGUE TO THE ASTROLABE [TEXT] OF MESSAHALLA

Know that “astrolabe” is a Greek noun whose meaning is “the reception of the stars”¹ because with it the truth is obtained of these things whose knowledge is sought of²

¹ Cf. Cap. 4 line 20.

² For the Arabic tradition of this phrase, see David King, “On the Origin of the Astrolabe According to the Medieval Arabic Sources,” *Journal for the History of Arabic Science* 5 (Aleppo, 1981), pp. 44-83; reprinted in D. King, *Islamic Astronomical Instruments* (London: Variorum, 1987), text III. See especially pp. 47 and 52. In the treatise by al-Zarqāllu, the Arabic reads “because with it is obtained what you want to know of the positions of the stars”; “with it you obtain what you want to know about the position of the stars” (p. 69).

5 locis stellarum. Et dixit Ptholomeus quod sit sicut spera que fuerit extensa. Eritque punctus ipsius axis apparens et almucanthat, que sunt in omni tabula eius, sunt opposite circulis qui sunt in directo, quorum cuspis est punctus cenith capitis in eodem

4 stellarum] *ms* Lκ *ends*; *add.* fixarum Mγ Ptholomeus] Pholo' Qμ; Phtholo~ Pq; Phto' Rα; Phtolo~ Oα Oσ Vπ; prologus Bα; Ptolo~ Bη Bκ Dβ Eδ Eζ Eη Ev Eφ Fβ Mγ Mv Mo Mu Mφ Pγ Po Pφ Sλ Vα Vε Vχ Vψ Xβ; Tholo~ Bζ Cθ Eα Mη Oκ Oπ Qα Sι Vv; Tolo~ Cβ Oξ Vκ; Tpholo~ Sκ quod] *om.* Sκ sit] est³ Eμ Oη Pα; fit Ev Mδ Qγ Sδ Tδ Uα Vσ Xα que fuerit extensa] extensa in plano⁴ Bγ Bε Bη Bζ Bι Cε Cη Cι Dγ Dη Eα Eβ Eδ Eζ Eη Eτ Eφ Fα Fβ Fζ Lγ Lη Lε Lζ Mη Mo Mq Mu Nα Oζ Oξ Oτ Ou Pγ Pδ Pθ Pλ Pμ Pν Po Pq Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Tδ UαVβ Vι Vκ Vψ Wα Wβ Wι Xα Xβ; que fuerit extensa in plano Eo Ev Mδ Pα Vε Vπ; oculo supra posito in polo australi *add.* Lβ Pq(*interlin.*) Qβ

5 apparens] *add.* oculo supple positio in polo australi Fζ almucanthat] almicantharath Xα; almicantharath Bζ; almicantharat Ev; almicantharath Eα Oη; almicantharaz Oμ; almicanth'ach Eτ; almicanth'ath Uα; almicantharath Aα Pv Tδ; almicantharath Dη; almicantharath Pλ; almichiaustarath Mv; almihantharath Bε; almitantarat Bκ; almucacharath Pα; almucan^{rat} Vε; almucanthatat Fζ; almucanthatat Sι; almucanthatat Bα Cβ Cθ Mκ Oκ Oπ Sθ Vα Vσ; almucanthatat Vκ; almucanthatat Mδ Mθ Nα Pθ Pq Rβ Sλ Vv; almucanthatat Cδ Oσ Qα; almucanthatat Vv; almucanthatat Vχ(*corr. from almi~*); almucanthatat Cθ; almucanthat'at Eφ almucanthat'ath Lη; almucanthatant Cη; almucanthatarath Lγ; almucanthatarath Sκ; almucanthatarath Bγ Bη Cι Dγ Eβ Eζ Eη Fα Lβ Lε Lζ Mλ Mo Mu Mφ Oζ Oξ Oτ Ou Pγ Pδ Pμ Po Pπ Pτ Pv Qβ Qγ Qλ Qμ Rα Sβ Sδ Vβ Vι Vπ Wα Wβ Wι; almuchanthatarath Mγ; almuchanthat'az Eμ; almuchanthatarath Bi Ev Pφ; almuchanthatarath Qδ Xβ; almuchanthatarath Vψ; almucanthatarath Fβ; almutantarat Oα; almutanthatarath Eδ; almutanthatarath Dβ; almutanthatarath Fδ Oo; almutanthatarath Mη et ... sunt,¹] *lac.* Cε

6 circulus] *lac.* Cε in directo] *add. interlin.* scilicet azimuth Vβ quorum] *add. interlin.* scilicet almucanthatarath Vβ cuspis] punctus Bγ(*del.*; *add. in marg.* cuspis) Bη Cη Eθ (*add. interlin.* scilicet cuspis) Eτ Eφ Mo Pγ Pτ Sκ Wβ Wι; *add. interlin.* al'⁵ punctus id est centrum Vβ punctus *interlin.* Bζ Sβ; *om.* Bα Bε Dη Eα Eβ Eη Fα Fβ Fδ Fζ Lγ Lη Mu Mφ Oζ Oλ Oξ Oτ Pα Pλ Pμ Pν Pq Qβ Qγ Tδ Vι cenith] cenit *some* capitis] capitum Bζ Bη Bι Cι Dβ Dγ Eδ Eo Eφ Mγ Mδ Mv Oα Oκ Oo Oπ Oσ Pδ Pθ Po Pτ Pφ Qδ Qμ Rα Rβ Sθ Sι Sκ Sλ Uα Vα Vκ Vv Vσ Vv Vψ Wβ; captum Mη Mκ Mλ Pα Pγ; *add. interlin.* al' capitum Vβ

³ "sit" might be "fit" in some manuscripts – it is often difficult to distinguish between the two.

⁴ Both versions can be found in both early and late manuscripts.

⁵ The abbreviation *al'* found throughout *ms* Vβ is difficult to expand with any certainty. Obviously it means "other [scribe/manuscripts]" or "elsewhere," but whether it should be expanded as *alias* (or some form thereof), *aliter*, or even *alibi* is not possible to determine.

the positions of the stars. And Ptolemy said that it is like a sphere which has been spread out.⁶ And the point⁷ of its axis will be visible⁸ [there]; and the almucantars,⁹ which are on all of its plates, are different from the circles which are [projected vertically from the pole],¹⁰ whose centre is the point of the overhead zenith in the same

⁶ Many manuscripts have “like a sphere spread out in a plane”.

⁷ Arabic: “centre”.

⁸ Arabic: “becomes visible”

⁹ Almucantar (Arabic: *al-muqaṭṭarāt*, المقنطرة; Latin: *almucanthatat*): a circle of equal altitude concentric with the zenith of the observer and parallel to the observer’s horizon; hence a different plate is needed for each latitude of observation. The Latin word has many variants throughout the treatise. Here it seems to be treated as a feminine plural noun. See Kunitzsch, *Glossar*, no. 31, pp. 535ff.

¹⁰ “in directo”

climate. Et initium eorum est ex circulo emisperii eiusdem climatis cui lineate sunt, scilicet ille almucanthatat. Invenimus quoque antiquos contentos fuisse mansione septem climatum, eo quod populationem et plus habitationis invenissent in eis. Et
 10 nomen “climatis” est nomen grecum significans declinationem, quia, cum esset terra rotunde figure, essent illi, qui habitant sub equinoctiali linea, in equalitate temporum semper;¹¹ et quorum cenith capium declinaverit a predicta linea fiunt eis diversa

- 7 emisperii] hemisperii *many* cui lineate] circumlineate Qμ lineate] mmedite (?) Sκ
- 8 scilicet ille almucanthatat] *om.* Bα Cβ Cδ Cθ Dβ Eμ Ev Fδ Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pπ Pφ Qα Sθ Sλ Vα Vε Vν Vσ Vυ Vχ almucanthatat] allmucanthatath Pδ; almicantarath3 Dη; almicanth’ach Et Uα; almicanthatath Xα; almicanthatath Aα Eα; almicanthatath Pλ; almicanthatath Cε; almisanzanthath Bε; almitantarath Bκ; almocanthatath Bζ; almuca^{rat} Lζ Sβ; almucan^{rat} Bι; almucanthatath Pα; almucanthatath Fζ; almucanthatath Wβ; almucanthatath Lγ Xβ; almucanthatath Mδ Mλ Nα Oξ Pθ Pρ Pυ Qλ Wα; almucanthatath Oζ Pγ; almucanthatath Eβ Fα; almucanthatath Bγ Eφ; almucanthatath Cη; almucanthatath Eη; almucanthatath Lε Sκ Tδ; almucanthatath Cι Dγ Eζ Eο Fδ Lη Mο Mυ Mφ Oτ Oυ Pμ Pν Pο Pτ Qβ Qγ Qδ Qμ Sδ Vβ Vι Vκ Wι; almucanthatath Eδ; almucanthatath Vπ; almucanthatath Ev Fβ; almucanthatath Rβ Vψ; almucanthatath Rα; almutantarath Lβ; almutanthatath Mη invenimus] *corr. in marg.* Qμ quoque] *om.* Mγ contentos] conceptos Cε Cθ Mν Oπ Qα Vπ Vχ; contemptos Aα Bα Ev Sι fuisse] *add. in Vψ mansione] mentione Mγ; fecisse mentionem Sι; add. interlin inventione Sλ*
- 9 septem] vii or 7 *many; add.* sicisse Mγ eo] *om.* Vψ habitationis] *add.* non Mγ eis] *add. in marg.* 7 climatibus Sθ
- 10 grecum significans declinationem] declinationis Bγ Sβ; entium declinationis Aα Bι Bκ Dγ Eδ Eζ Eο Eτ Eφ Lζ Pο Pυ Rα Sκ Uα Vκ; entium declinationis *del. and add. in marg.* grecum significans declinationem Wι; *add.* Est nomen entium declinationis Qμ
- 11 essent] *mss* essentque¹² linea] *om.* Sλ
- 12 semper] *om.* Cδ Eα Sλ; *illeg.* Sβ; similiter Aα Bγ Bι Bκ Cη Dγ Eδ Eζ Eο Eτ Ev Eφ Lζ Mη Mλ Mο Nα Pγ Pο Pτ Pυ Qμ Rα Sκ Uα Vβ Vε Vκ Vπ Wι; semper. Similiter Bη Qδ Rβ; *add. interlin.* illi scilicet Vβ zenith Bκ linea] circulo Sλ diversa] *om.* Sκ

¹¹ Of the 62 manuscripts with “semper”, 40 have punctuation following making “semper” part of the previous sentence. (20 have no punctuation and 2 have punctuation before “semper”.) Of the 28 manuscripts with “similiter”, 14 have punctuation preceding it, making “similiter” part of the following sentence. (Eleven have no punctuation and 3 have punctuation after “similiter”.) Note: this does not include the 3 manuscripts with the variant “semper. Similiter”.

¹² The text is amended from *mss* “essentque” here. The *-que* appears to have been added because scribes thought that this clause was also governed by *cum* (l. 10); but that would leave the conjunction *quia* (l. 10) with no verb to govern. [C.J.McD.]

latitude.¹³ And their start is from the circle of the horizon of the same plate¹⁴ in which they (that is, these almucantars) are engraved. We also find the ancients content that there were seven climates for living, this because they found in them the population and the greater part of the housing. And the name “climate” is a Greek name signifying “declination,”¹⁵ For, since the earth is a round shape, those who live on the equator are always in an equality of time;¹⁶ and for those whose overhead zenith is off the said [equatorial] line, the times of the hours become different for them.

¹³ That is, in the same latitude as that for which the plate being used was designed.

¹⁴ Astrolabe plates (for various latitudes) were sometimes known as “climates”; this is different from (although related to) the Greek “*climata*” (latitudinal regions) mentioned further on.

It seems that the oldest Arabic-Islamic astrolabes had plates only for the seven *climata*; in a later development the plates were made for the (geographical) latitudes of specific places. [P.K.]

¹⁵ Alternate reading (*entium declinationis*): “...the name of the declination of things”.

¹⁶ This could refer to the fact that night and day are always the same length at the equator, or to the corollary of this, that the day and night hours are always equal.

15 horarum tempora. Ideoque diviserunt antiqui declinationem per septem divisiones
 15 quas vocaverunt “climata.” Fuitque longitudo prime divisionis a linea equinoctiali
 secundum quantitatem unius hore equalis, et longitudo diversitatis reliquarum partium
 dimidium hore unius, perveneritque diversitas in septimo climate ad quattuor horas
 equales, et factus est longior dies illius loci 16 horarum, et brevior octo.

- 13 ideoque] item St septem] vii or 7 many
- 14 14 quas] om. Fζ vocaverunt] add. 7 Mγ climata] om. St fuitque] fitque St SA
- 15 15 quantitatem] add. diversitatis Aα Bα Bζ Bι Bκ Cδ Cθ Dβ Dγ Eζ Eμ Ev Eo Ev Fδ Lζ Mγ Mδ
 Mθ Mκ Mλ Mν Oα Oη Oκ Oο Oπ Oσ Pα Pπ Pτ Pφ Qα Qδ Rα Rβ Sβ Sθ St SA Vα Vβ Vν
 Vσ Vυ Vχ unius ... longitudo om. Vε partium] add. per SA; add. interlin. est Vβ
- 16 16 dimidium] add. est Mγ St unius] add. interlin. scilicet equalis Vβ septimo] vii° /
 7 / 7° / 7^{mo} many climate] ms Pπ ends ad] marg. Rα quattuor] 4 many
- 16-17 16-17 horas equales] marg. Rα
- 17 17 equales] om. Mγ dies] diebus Cθ Qλ; add. diebus Aα Bι Cι Dγ Eα Eβ Eδ Eζ Eη Eο Eτ
 Ev Eφ Fα Fβ Lβ Lγ Lε Lζ Lη Mδ Mη Mν Mφ Oζ Oξ Oτ Oυ Pγ Pδ Pλ Pμ Pν Po Pv Qβ Qγ
 Qδ Qμ Rα Rβ Sβ Sδ Sκ Tδ Uα Vι Vκ Vπ Wα Xα; add. dierum Bε Nα Vψ; add. in diebus Pτ
 illius] om. Qα Sθ; alius Pγ; eiusdem Bα Bζ Cβ Cδ Cε Cθ Dβ Dη Eμ Ev Fδ Mγ Mθ
 Mκ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ St SA Vα Vβ(add. interlin. al' illius) Vν Vσ Vυ Vχ
 16] xvi some et₂] add. dies Mγ; add. interlin. dies scilicet Vβ et₂ ... octo] om.
 Fζ brevior] add. dies Qμ Vψ octo] viii or 8 or 8° many; add. horarum Bε Bζ Cι
 Dβ Dη Eα Eβ Eη Eμ(interlin.) Fα Fβ Fδ Lβ Lγ Lε Lη Mγ Mδ Mη Mκ(interlin.) Oη Oζ Oξ
 Oο Oτ Oυ Pδ Pλ Pμ Pν Pφ Pτ Qβ Qγ Qλ Qμ Sδ Tδ Vν Vψ Wα Xβ; add. interlin. scilicet
 horarum Vβ

For this reason the ancients divided the declination¹⁷ into seven sections which they called “climata.” And the length of the first part [i.e., the first climate] from the equator was according to the quantity of one equal hour, and the length of the difference of the other parts is a half of one hour; and the difference in the seventh climata reached four equal hours, and the longest¹⁸ day of this place became 16 hours and the shortest 8 [hours].

¹⁷ The equatorial latitude between the equator and the poles.

¹⁸ Latin translations often replace the Arabic superlative with a Latin comparative, as (for example) practically always in Gerard of Cremona. {PK}

[Construction, Section I]

COMPOSITIONIS ASTROLABII CAPITULUM PRIMUM: DE PREPARATIONE MATRIS

Cum volueris facere astrolabium ad latitudinem cuiuscumque regionis, unum est opus atque equale in omni latitudine. Fac tabulam pro matre que sit latior tabula rethis per quantitatem latitudinis limbi (qui limbus debet esse latior circulo Capricorni

- 1 Compositionis ... matris] *om.* Bα Bι Bκ Cδ Cε Dβ Eα Eο Lζ Nα Mγ Oη Oο Pγ Rα Sβ Sθ Sι Uα Vα Vυ Xα; *add.* Capitulum compositionis astrolabii, primo de compositione matris Wβ; Capitulum primum compositionis astrolabii de preparatione matris Fα; Capitulum primum de compositione matris Sκ; Capitulum primum de preparatione matris Bε Pν; Compositio astrolabii Cβ Cι Eζ Eτ Mη Mν Pδ Pο Pτ Vψ Wι; Compositio matris Dγ Vκ; Compositionis astrolabii capitulum primum de preparatione matris Oυ Pμ Vι; De astrolabii compositione Aα Eυ; De compositione Pυ; De compositione astrolabii Bγ(*later hand*) Eδ Vπ; De compositione astrolabii et primo de compositione matris Bη; De compositione astrolabii et primo de matre et al. Eφ; De compositione matris Qμ; De forma limbi Bζ Fδ Vν; De matre Eη; De preparatione matris Qδ Rβ; Incipit compositio astrolabii et primo de preparatione matris Pλ; Inicium operis Oπ Qα; Inicium operis astrolabii Cθ Eμ(*marg.*) Eν Mθ Mκ Mλ Oα Oκ Oσ(*later hand*) Sλ Vσ Vχ; Initium operis astrolabii. Et primo. De formatione limbi Vβ; Primum capitulum in Compositionem astrolabii et primo De preparatione matris, que postena dicitur Cη; Sequitur de compositione matris astrolabii Dη; Sequitur de compositione astrolabii et primo de preparatione matris. Capitulum Qγ; Sequitur tractatus astrolabii in quo primo agit de compositione matris Qβ
- 1 astrolabii] *add.* ad cuiuscumque regionis latitudinem Xβ
- 2 Cum] *add.* ergo Eβ Fα Fβ Fζ Lβ Lε Lη Oξ Oυ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Xβ; *add.* igitur ergo Wα; vero Bκ ad] *add.* uniuscumque Sβ ad latitudinem] altitudinem Sι cuiuscumque] *om.* Sβ; cuiusque Mγ Sθ regionis] *add.* volueris Cθ Eν Eο Oα Oπ Oσ Vυ unum] nom/uom Sι; *add.* enim Aα Bα Cβ Cδ Cε Cθ Dβ Dη Eμ Eν Eο Fδ Lε Mγ Mδ Mθ Mκ Mλ Oα Oη Oκ Oο Pτ Pφ Sθ Sι Sλ Vα Vν Vπ Vσ Vυ Vχ Wα
- 3 est] *add.* equale Sι tabula] *om.* Bε Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Mφ Oζ Oξ Oτ Oυ Pγ Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Xβ sit] *om.* Mγ
- 4 rethis] retis *many, and elsewhere*; rechi Fζ; rectis Sθ
- 4-5 limbi ... latitudinis] *om.* Sλ
qui ... latitudinis] *om.* Eη

[*Construction, Section I*]

FIRST CHAPTER ON THE CONSTRUCTION OF AN ASTROLABE: ON THE PREPARATION OF THE MOTHER

When you wish to make an astrolabe for the latitude of any region, there is one method and it is the same for every latitude. Make a plate for the mother¹ which is wider than the plate for the rete² by the amount of the width of the rim (this rim should be a little bit wider than the circle of [the Tropic of] Capricorn),

¹ The “mother” (Latin: *mater*) is the main plate of an astrolabe with a rim within which the rete, and any other plates, can sit.

² The “rete” or “net” (also called the “spider”) (Latin: *rete/rethe, retis/rethis*) is the open-network plate which displays the positions of the fixed stars and the ecliptic.

- 5 paulisper) secundum eam, scilicet quantitatem latitudinis, in qua poterit describi almuri graduum qui est denticulus egrediens a capite Capricorni super gradus limbi predicti.
- Cuius limbi densitas sit secundum quantitatem rethis, si fuerit astrolabium unius latitudinis, aut secundum quantitatem tabularum et rethis ut equentur, dum ponitur axis, et non transgrediantur invicem.
- 10 Et figes limbum clavis in quattuor partibus vel absolute ut quibusdam placet in
- 5 paulisper] *om.* Bδ Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mυ Mφ Oζ Oξ Oτ Oυ Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Xβ secundum] per Aα Bα Cβ Cδ Cθ Dβ Eμ Ev Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Qα Pφ Sθ St Vα Vε Vν Vσ Vυ Vχ eam] *om.* Sk scilicet] *om.* Wι latitudinis] *om.* Aα Bγ Bε Bη Bι Cβ Cη Cθ Dβ Dγ Eζ Eμ Ev Eτ Ev Fδ Lζ Mγ Mκ Mν Mo Nα Oη Oο Oπ Pα Pγ Po Pτ Qα Rα Sβ St Sk Uα Vβ Vκ Vν Vπ Vχ Wβ Wι in] *om.* Aα Bγ Bη Bκ Cθ Cη Dβ Dγ Eδ Eζ Eο Eτ Ev Lζ Mγ Mη Nα Oο Oπ Pα Pγ Pδ Po Pτ Qδ Qμ Rα Rβ Uα Vβ Vε Vκ Vν Vπ Wι Xα; secundum Sβ in qua] *om.* Sk qua] *add. interlin.* al' quod Vβ poterit] possit Bγ Bη Cη Dβ Eφ Oο Pα Pθ Qα; *add.* in ea Aα Bγ Bη Bι Bκ Cη Dγ Eζ Eτ Ev Eφ Lζ Mγ Mη Mo Nα Pα Pγ Pθ Po Pτ Pυ Qδ Qμ Rα Rβ Sβ Sk Uα Vκ Vπ Wβ Xα; *add. interlin.* possit Vβ describi] esse Bα Bζ Cβ Cδ Cε Cθ Dβ Dη Eμ Ev Eο Fδ Mγ Mδ Mθ Mκ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Qα Sθ St Sλ Vε Vν Vo Vσ Vχ almuri] muri Cδ(*add. interlin.* almuri) Eμ Mθ Mκ Oα Oη Oκ Oπ Oς Sλ(*add. interlin.* almuri) Vα Vε Vσ Vυ Vχ(*add. interlin.* al-); muri *corr.* to almuri Sθ; tauri *and add. in marg.* tau Sι; *add.* muri Fβ Lγ Lη Mδ Mυ Mφ Pα Wα Xβ Vι; *add. interlin.* id est ostensor Vβ
- 6 graduum] *om.* Bγ Bη Bι Bκ Cη Dγ Eδ Eτ Eφ Lζ Mo Nα Pγ Pθ Pλ Po Pυ Rα Sβ Sk Uα Vκ Wβ Wι Xα qui] *add. interlin.* scilicet almure Vβ egrediens] qui egreditur Aα Bα Bζ Cβ Cδ Cε Cθ Dβ Dη Eμ Ev Eο Fδ Mγ Mθ Mκ Mλ Mν Oα Oκ Oπ Oσ Pη Pφ Qα Sθ Sλ Vμ Vν Vπ Vυ Vχ Wα; *add. interlin.* in al' qui egreditur Vβ predice] *add. interlin.* scilicet rethe Vβ
- 7 Cuius] *add. interlin.* Scilicet limbi Sλ Cuius ... densitas] desintas Sθ limbi] *om.* Bα Cβ Cθ Dβ Eμ Ev Fδ Mγ Mθ Mλ Mν Oα Oκ Oμ Oο Oπ Oσ Pφ Qα St Sλ Vε Vν Vυ Vχ; *interlin.* Cδ Mκ rethis] rethis Fζ
- 7-8 si ... rethis] *om.* Fδ Oο Oπ
- 9 ponitur] *add.* rethis Mγ transgrediantur]³ transgredientur Bε Cη Eα Eη Ev Ev Eφ Fa Fβ Lβ Lε Lη Mυ Mφ Oζ Oξ Oτ Oυ Pα Pθ Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Uα Vι Vν Vπ Wα Xβ; transgredientur *corr.* to transgrediantur Bγ; transgreditur Aα
- 10 before Et *add. rubric* DE FIGURATIONE LIMBE Eμ(*marg.*) Mκ Sσ Et] sed Wι figes] figas Sβ limbum] *add.* 4 Mγ quattuor] 4 or 4^{or} many absolute] *om.* Sλ

³ Many scribes were uncertain about the mood of the verb, i.e., whether or not it was governed by “ut” (which it is) requiring the subjunctive.

by so much (that is, the amount of space) inside of which the indicator⁴ of degrees can be traced out; the indicator-muri is a small tooth projecting from the beginning of Capricorn over the degrees [inscribed] on the aforementioned rim. The depth of this rim should be according to the thickness of the rete, if it be an astrolabe for one latitude; or according to the thickness of the plates and the rete, so that they are level when the pin is inserted and they do not stick out beyond each other.

And you will fasten the rim [together] with rivets in four places or completely, as some people in

⁴ The indicator (Arabic: *al-murī*, المرّي ; Latin: *almuri* or *muri*) is a small pointer, or “hand” on the rete at 270° longitude (the beginning of Capricorn) used to read degrees along the rim. See Kunitzsch, *Glossar*, no. 32a, p. 538. See also Anthony Turner, “Concerning a Pointer on the Astrolabe,” *Journal for the History of Astronomy*, 46 (2015), 413-418.

15 quibusdam locis ad placitum. Et coniunges ipsum limbum matri cum stagno vel argento, et facies super extremitatem eius circulum. Post hoc dimittes spacium litteris, et facies iterum duos circulos ad invicem propinquos, inter quos erunt gradus succedentes rethi. Dividesque ipsum spacium quod fuerit inter ipsos circulos per 360 divisiones equales, et incipies scribere ab initio quarte occidentalis et meridiane ex puncto A, eundo ad punctum C continuatim usque in 360 divisiones, si deus voluerit.

- 11 placitum] libitum Sθ; *add. interlin.* libitum Vβ coniunges] iunges Sκ ipsum limbum] eum Bα Cβ Cδ Cε Cθ Dβ Eμ Ev Fδ Mγ Mδ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Sθ Si Sλ Vα Vv Vυ Vχ limbum] *om.* Dη Pρ cum stagno] *lac.* Xα stagno] cupro, auricalco Bε; stagno *or* stägno Bζ Bκ Eμ Ev Fβ Mκ Oη Pδ Si Sκ Vκ Vπ Vχ Wβ Xβ; stanno Bα Bi Cε Dβ Ev Fδ Mυ Mφ Pτ Vi Vσ vel] *add.* cum Aα Bζ Cβ Cθ Ev Mγ Mκ Mλ Oμ Oο Sθ Si Vπ Vσ
- 11-12 vel argento] *om.* Bα
- 12 argento] *add.* si volueris Aα Bζ Cβ Cδ Cθ Dβ Eη Eμ Ev Eο Ev Fδ Mγ Mθ Mκ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Sθ Si Sλ Vα Vβ Vε Vν Vπ Vσ Vυ Vχ extremitatem] extremitates Fζ; *add. interlin.* exteriorem Bγ; *add.* scilicet exteriorem Aα Eο Ev Vπ eius] eiusdem Mθ Oκ; *add.* exteriorem Bi Dβ Dγ Eδ Eζ Lζ Pο Qδ Rβ Sβ Vκ; *add.* unum Bζ Post hoc] Postea *many*; *add. interlin.* al' Et postea Vβ demittes] dimitte *some* spacium] *add.* per Sβ litteris] circulus Mφ Mυ Vi; *add.* in exteriori margine limbi Mν
- 13 duos ... inter] *om.* Bη
- 14 ipsum] *om.* Bε Cε Ci Eα Eβ Eη Eτ Fα Fβ Fζ Lβ Lε Lη Mν Mo Mυ Mφ Oζ Oη Oξ Oτ Pα Pγ Pδ Pλ Pν Po Pρ Pτ Qβ Qγ Qδ Qμ Rβ Sδ Sκ Uα Vi Vψ Wα Wβ Wi; primum Dη rethi] recti Si; rete Sλ
- 15 divisiones] partes Bα Cδ Dβ Eμ Fδ Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oσ Pρ Pφ Sθ Si Sλ Vα Vv Vσ Vυ; gradus sive divisiones Dη equales] *marg.* Rα quarte] X^e *many* occidentalis et] *with erasure dots* Rα ex] scilicet a Mγ
- 16 A] *add.* qui est sub armilla Cδ Sλ(*marg.*) Vσ; *add.* qui est sub armilla ad occidentem Oμ C] B, C, D et iterum revertendo ad A Bε Eα Eβ Fα(*om.* C, D) Fζ Lβ Lη Oζ Oξ Oτ Oυ Pλ Pν Pρ Pμ Qβ Qγ Qδ Rβ Sδ Tδ Xβ; G *corr. to* C Vχ continuatim] *add. interlin.* versus occidentem Sλ in] ad *some* divisiones] *om.* Bα Bζ Bη Bi Bκ Cβ Cδ Cθ Dγ Eδ Eζ Eμ Ev Eο Eτ Lζ Mδ Mθ Mκ Mλ Mν Mo Nα Oα Oη Oκ Oμ Oπ Oσ Pγ Pθ Po Pτ Pu Pφ Qδ Qμ Rα Rβ Sβ Si Sκ Sλ Uα Vα Vε Vκ Vπ Vσ Vυ Vχ Wβ Xα; divisiones vel gradus Pδ; gradus Bγ Cε Cη Dβ Dη Eφ Fδ Oο Pα Vβ Vν; partes Pρ; partes confimentes sub armilla Qα si ... voluerit] *om.* Aα Bγ Bη Bi Bκ Cη Dγ Ev Eφ Lζ Mλ Oη Pα Pθ Qα Rα Sβ Vκ Vπ Vυ Wβ

some places like, as you please. And you will join the rim itself to the mother with tin or silver; and you will make a circle around its edge. After this you will leave space for the inscribing and make again two circles close to one another between which will be the successive degrees of the rete. And you will divide this space which was between these circles into 360 equal divisions and begin to write from the first quarter (between the west and the south) from point A, going to point C, continuing for 360 degrees (God willing⁵).

⁵ Here and elsewhere, a possible vestige of an Arabic original.

20 Et elucidabis tabulam et equabis eam prout melius poteris. Deinde extrahes diametra illius que quadrant eam abscindens unum eorum per alterum super punctum cuspidis E et ita ut quadrant es sint equales; et facies in alia parte similiter. Suntque diametra que se abscindunt in alia parte tabule opposita diametris que se abscindunt in altera, id est, sint in directo eorum.

- 17 Et ... poteris] *om.* Oo elucidabis] [*lac.*]-dabis Xα; planes Bα; polies Bι Bκ Dγ Lζ Rβ Vκ; polies Qδ; pones Mλ Rα Sβ; *add.* et pones Eδ Eζ Pο; *add.* eam id est pones Eυ; *add.* id est polies Eο; *add.* id est pones Aα Eυ; *add.* *interlin.* al' dilucidabis Vβ; *expunged and add.* in *margin.* elimabis et pones hoc modo faciens tabulam Bγ elucidabis ... eam] elucidabis et equabis eam tabulam Bε Cι Eα Eβ Eη Fα Fβ Lβ Lγ Lε Lη Mη Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pν Pρ Qβ Qγ Qλ Qμ Sδ Tδ Vι Vπ Wα Xα Xβ tabulam] *om.* Bγ Bη Cε Cη Dη Eτ Eφ Mο Nα Pγ Pθ Pτ Sκ Uα Wι Wβ; eam Pυ et equabis ... poteris *om.* Bα melius] *rep.* Sι poteris] potueris Mγ
- 18 que ... alterum] in quadratum ita quod unum abscindat alterum Qα quadrant] *ms* Cζ *begins* abscindens] *corr.* to abscinde Wι; *corr.* to abscindentque Sθ; abscindensque *corr.* to abscindetque Sλ per] *om.* Cζ Sθ Sι Sλ per alterum] *om.* Mγ super] *add.* C Cη; *add.* E Bγ Bη Eφ Pα Pθ Vβ Wβ punctum] *add.* id est centrum Sβ
- 19 cuspidis] cuspidi Sβ; *add.* *interlin.* id est centri Vβ E] *om.* Bα Bγ Bη Cβ Cδ Cη Cθ Dβ Eμ Eν Eτ Eφ Fδ Mγ Mδ Mη Mθ Mκ Mν Mο Nα Oα Oη Oκ Oμ Oο Oπ Oσ Pα Pγ Pθ Pτ Pυ Pφ Qμ Sβ Sθ Sι Sκ Sλ Uα Vα Vβ Vε Vν Vσ Vυ Wβ Xα; C Mυ; equalis Eα; id est centri Bι Bκ Cζ Eζ Eο Lη Mλ Pο Rα; scilicet centrum Qα; unius centri Dγ Vκ; *add.* id est centri Eδ Qδ Rβ; *add.* scilicet centri Bζ et ita] terminato Fβ ut] quod Bκ parte] *add.* id est in dorso Cζ suntque] eruntque Sι
- 19-20 alia ... in] *om.* Oο Vα
- 19-21 Suntque ... eorum] scilicet in dorso ita ut sint in directo aliorum Qα
- 20 se₁] *om.* Sκ Wι abscindunt₁] abscindant Fζ tabule] *om.* Bγ Bη Bι Cη Eφ Pα Pθ Wβ; *add.* matris Cζ Oη
- 20-21 alia ... in] *om.* Bα Cε Eα tabule ... altera] *om.* Eυ
- 21 altera] alia Dγ Uα; alius Xα; latera Vν; *add.* parte Cζ sint] *om.* Cζ

And you will polish the plate and make it level as best you can. Then draw its diameters which quarter it, intersecting one of them by the other over the centre point E and in such a way that the quadrants are equal; and do the same on the back. And the diameters which intersect on one side of the plate are opposite the diameters which intersect on the other [side], that is, they should be lined up with them.

Post hec statues in interiori parte circulum Arietis et circulum Cancrī. Circulus autem Capricorni est ille qui incedit vel vadit per extremitatem tabule, et ipse est maior circulus qui cadit in matre et interius.

- 22 Post ... Cancrī] *om.* Pα statues] etiam facies Mγ; facies Bα Bη Dβ Mv Pφ St Vv
in] *om.* Sk parte] *add.* id est in profundo matris Cζ
- 22-24 Circulus ... interius] Et Capricorni ut patebit alibi Qα
- 23 est,] *add. interlin.* al' erit Vβ est₁ ... vadit] erit ille qui incedit Mδ; erit ille qui incedit vel vadit Cδ Eδ Mv Vχ; erit qui cadit Ev; erit qui incedit Bι Bκ Cβ Cθ Dγ Eo Ev Oα Oπ Oσ Rα Sβ Vε Vκ Vπ Vυ; erit qui incedit et vadit Sθ; erit qui incedit vel vadit; Eζ Eμ Po Pφ St Vα Xα; erit qui vadit Aα Bα Cζ Lζ Mθ Mκ Oκ Vσ; est circulus qui incedit vel vadit Dβ Fδ Mγ Vv; est ille qui incedit Fβ Nα Tδ; est ille qui vadit Pρ Pv; est qui incedit Bγ Bη Cη Eφ Oμ Pα Pθ Wβ; est qui incedit vel vadit Pλ Sλ; est talis qui incedit Bε; ille est circulus qui incedit vel vadit Oo; qui vadit Oη vel vadit] *marg.* Ov tabula] *add.* cum limbo Oσ(*marg.*) Sλ(*interlin.*)
- 24 et] *om. some* interius] in ceteris Aα Cβ Cδ Cθ Dβ Eμ Ev Eo Fa Fδ Mη Mκ Mλ Mv Oη Oo Oπ Vα Vε Vv Vσ Vυ; Et in ceteris facies ... [Cap. 2] Nα; in ceteris punctus dorsi astrolabii *corr. to* in ceteris Oσ; in ceteris scilicet tabulis Bζ; in ceteris vel interius interius Cη ; in tabulis Cι Ev; in tabulis ceteris Mθ Oκ; in tabulis(*interlin.*) ceteris punctus ut si astrolabii Oα; id est invenire matri et in ceteris similibus verse figuras videbis Bα; scilicet tabulis Cζ; *add.* hic autem(?) clarius possit per figuram sic subscriptum Pρ; *add.* sicut in presenti patet figura Dη

After this set up in the interior [i.e., central] part [of the mother/plate] the circle of Aries [i.e., the Equator] and the circle [i.e., the Tropic] of Cancer. Moreover the circle [i.e., the Tropic] of Capricorn is the one which extends to or runs along the outer edge of the plate and this is the largest circle which falls inside the mother.

[FIGURA 1]⁶

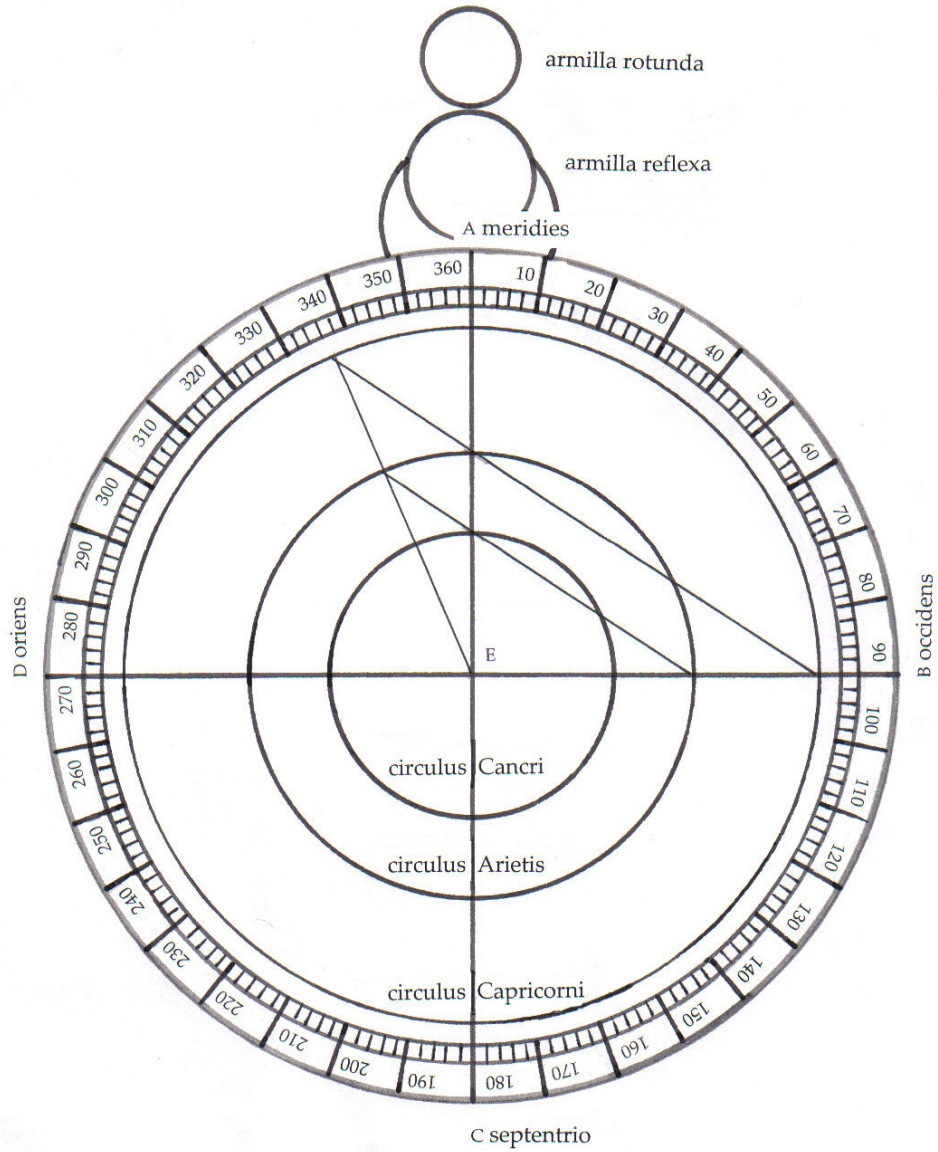


Figura interioris partis matris

⁶ The drawing of the equator and the Tropic of Cancer within the Tropic of Capricorn has to be made correctly. No information is given in the text at this point on how to do this; but see Cap. 7.

[Complete diagram] Bγ Bζ Bη Bι Cη Eβ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lη Mη Mλ Mν (fol. 53^v)
Mo Mv (fol. 406^r) Oζ Oτ Oυ Pα Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qμ Rα Sδ Sk⁷ Tδ Vι (fol. 331^v) Vκ
Wβ⁸ Xβ

[Partial diagram] Bε Cθ Cι Eη Eμ Mδ Mθ Mκ Oη Oκ Pγ Qλ Sθ Vε Vσ Wι

[Outline, or space only] Cβ Cε Dγ Dη Eα Eδ Eζ Eν Lβ Mφ Oξ Oπ Pν Pφ Qα Rβ Sι Uα Vα
Vβ Vν Vπ Vψ Wα

[No space] Aα Bα Bκ Cδ Cζ Dβ Eο Fδ Lζ Mγ Mν Nα Oα Oμ Oο Oσ Sβ Sλ Vυ Vχ Xα
Pθ: "A"⁹

[Caption]

Figura ... matris] om. Cβ Cθ Cι Eη Eμ Fα Mθ Oζ Oη Oκ Pγ Pτ Vε; *illeg.* Eβ Vσ; Figura anterioris
partis matris id est atene¹⁰ per interiorule(?) Wβ; Figura dorsi astrolabii que antenna dicitur Qλ;
Figura inscriptionis limbi Mκ; Figura inscriptionis limbi matris qui in arstrolabium dicitur Pδ;
Figure inscriptiones trium circularum arietis cancri et capricorni super circulum declinationem
Vκ; Figura interioris partis astrolabii scilicet matris et debet poni in [*sign; similar sign at end of Cap.*
1] Bη; Figuratiōe limbi. Ista dyiameter descendit in profundo [*illeg.*] et post describuntur .3.
circuli. Si voluerunt in eodem profundo [*illeg.*] in latera. Sed cum hoc non oportet ni quando
astrolabium [*illeg.*] cum super una latitudine Eμ; Interior pars matris Lη; Interior pars matris que
dicitur antenna Bγ Mo Po; limbus Qα; *add.* qui dicitur antenna Rα Oτ; *add.* id est ant(h)ene Eτ Eυ Lγ
Lε Mη Mν Mυ Qγ Qμ Sδ Sk Vι Xβ; *add.* scilicet ant(h)ene Bζ Mλ Tδ; *add.* scilicet asuji Bι

[Lettering on the diagram]

A] Bγ Bζ Bη Bι Cη Eβ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lη Mη Mo Mv Oζ Oτ Oυ Pα Pλ Pμ Pο Pρ Pτ Pυ
Qβ Qγ Qμ Rα Sδ Sk Tδ Vκ Xβ Wβ; om. Mλ Mν Pδ Qδ Vι B¹¹] Bγ Bζ Bι Cη Eβ Eτ Eυ Eφ Fα
Fβ Lγ Lε Lη Mν Mo Mv Oζ Oτ Oυ Pα Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qμ Rα Sδ Tδ Vι Vκ Xβ Wβ; om.
Fζ Pδ Qδ; *cut off* Bη Mη Mλ; D Sk; *add.* qualibet partis quartis divide 90 punctus Xβ C] Bγ Bζ

⁷ In ms Sk the complete diagram is on f. 79^r. On fol. 78^r there is a similar diagram with only the limbus with its numbered divisions drawn, and labeled "Figura Limbi". On fol. 78^v there is also a similar diagram with the limbus and its numbered divisions drawn, as well as the horizontal and vertical diameters.

⁸ Note: in ms Wβ the drawing of the armillae, plus the word "meridies" is at about 11 o'clock on the diagram, because of a lack of space in the top margin.

⁹ In ms Pθ there is a line in the text and a large "A" in the margin indicating where Fig. 1 should go, but there are no diagrams (but many partially or wholly blank pages) in the manuscript. Similar references to subsequent figures are given at the appropriate places ("B", "C", etc.) but no diagrams are found in the manuscript for these, either.

¹⁰ *atena / antenna / anthena*: It is unclear where this word comes from. There is no Arabic astrolabe term to which it can be immediately related. Similarly for "asuji". See also Fig. 2. It should be noted that here these words refer to the plates in the "mother" on the front of the astrolabe, although ms Qλ refers to the back as does ms Eβ in Fig. 2.

¹¹ "B" and "occidens" may have been on the diagram at an earlier stage in some manuscripts, but could have been cut off either by rebinding or in the filming (e.g., Mλ Oτ).

Bη Βι Cη Εβ Ετ Ευ Εφ Fα Fβ Lγ Lε Mη Μλ Μν Μο Μυ Οζ Οτ Ου Ρα Ρλ Ρμ Ρο Ρρ Ρτ Ρυ Qβ Qγ
 Qμ Ρα Sδ Sκ Tδ Vι Vκ Xβ Wβ; *om.* Fζ Lη Pδ Qδ D] Bγ Bζ Bη Βι Cη Εβ Ετ Ευ Εφ Fα Fβ Lγ Lε
 Lη Mη Μλ Μν Μο Οζ Οτ Ου Ρλ Ρμ Ρο Ρρ Ρτ Ρυ Qβ Qγ Qμ Ρα Sδ Tδ Vι Vκ Xβ Wβ; *om.* Fζ Μυ Ρα
 Pδ Qδ; B Sκ E] Bγ Bη Βι Cη Εβ Ετ Εφ Fα Fβ Fζ Lγ Lε Lη Mη Μλ Μν Μο Μυ Οζ Οτ Ου Ρα
 Ρλ Ρμ Ρο Ρρ Ρτ Ρυ Qβ Qγ Qμ Ρα Sδ Sκ Tδ Vκ Xβ Wβ; *om.* Bζ Ευ Pδ Qδ Vι

[Numbering on the diagram]

om. Cβ Cθ Mθ Qα Ρα Vε 10, 20, ... 360] Cη Cι Eμ Eτ Ευ Εφ Fα Fζ Lγ Lη Mη Mκ Μλ Μν Μο
 Μυ Οζ Οκ Pγ Ρλ Ρο Ρρ Ρυ Qλ Qγ Qμ Vι Vκ 5, 10, 15, 20, 25, 30] Bη 5, 10, 15, ... 360] Bζ
 Βι Eη Fβ Lε Οτ Ου Ρα Pδ Ρτ Qβ Qδ Sδ Tδ Wβ 5, 10, 15, 20, 25, 30, 40, 60, 70, 80, 90 | 340,
 345, 350, 355] Bε 5, 10, 15, 20 | 85, 90 | 180, 185 | 270, 275 | 360 Xβ 10, 20, 30 ... 80, 90]
 Mδ 10, 20, ... 90 | 110 ... 190 | 210 ... 320 | 340 | 360] Oη 15, 30, 45, ... 360] Bγ *add.*
 .36. Gradus] Vα *add.* ab A ad B divide esse punctus omnis 5 et reinde | qualibet partes
 quarte circuli divide 90 pars Xβ D–A] 5, 10, 15, ... 85, 90 Sκ¹² B–A] 5, 10, 15, ... 85, 90 Sκ
 D–C] 5, 10, 15, ... 85, 90 Sκ B–C] 5, 10, 15, ... 85, 90 Sκ

[Other information]

meridies] *om.* Bζ Βι Μλ Pδ Po occidentis] *om.* Bζ Βι Fα Fζ Lγ Μλ Οτ Pδ Po Qγ
 septentrio] *om.* Bζ Βι Fα Fζ Lη Μλ Ου Pδ Po; *illeg.* Eβ Qμ oriens] *om.* Bζ Βι Fα Fζ Pδ Po
 Qμ

armilla rotunda] *om.* Bζ Βι Cβ Cι Eη Eμ Ευ Εφ Fβ Lε Mη Mθ Μλ Μο Μυ Oη Οκ Oξ Ρα Pγ Ρο Ρυ
 Qα Qδ Tδ Vε Vι Vσ; armilla Cθ; armilla reflexa Mκ; armilla suspensoria Bγ armilla reflexa]
om. Βι Cι Eη Eμ Ευ Εφ Fβ Lε Lη Mη Μλ Oη Οκ Oξ Ρα Pγ Ρο Ρυ Qα Qδ Qμ Tδ Vε Vι Vσ; armilla
 Cβ; reflexa Lγ Vκ; armilla reflexa in qua fixa est rotundi Xβ; *add. in text after Cap. 2* armilla reflexa
 vel suspensoria que alhantica¹³ dicitur abraice [= arabice] alhabor¹⁴ ansa Pδ; *add.* ansa Wβ

circulus Cancrī] *om.* Bγ Cβ Cθ Cι Eη Eμ Εφ Fα Mθ Mκ Μο Oη Οκ Pγ Pδ Po Ρυ Qα Vε; *illeg.* Eβ;
 Cancrī Pρ; Cancrī Vκ circulus Arietis] *om.* Bγ Cβ Cθ Cι Eη Eμ Εφ Fα Mθ Mκ Μο Oη Οκ Qα
 Pγ Pδ Po Ρυ; *illeg.* Eβ; Declinatio solis | Ariēs equinoc[tia]lis Libra Pρ; Arietis et Librarum Lη Ρλ;
 circulus Arietis et Librarum Bη Cη Oζ Qδ circulus Capricorni] *om.* Bγ Cβ Cη Cθ Cι Eη Eμ
 Εφ Fα Fβ Mθ Mκ Μο Μυ Oη Οκ Pγ Pδ Po Ρυ Qα Vε; *illeg.* Eβ; Capricorni Lη Ρλ Vκ; Capricornus
 Pρ; *add. on outer rim* limbus Βι Μλ

Some diagrams have other points – from Figura 7 – marked on them:

G] Vκ
 H] Βι Fα Μλ Μυ Ρα Sκ Vκ
 K] Fα Μυ

¹² In ms Sκ this pattern of numbering is also found in the figure on f. 78^v. In the diagram on f. 78^r, however, the limbus is numbered “10, 20, ... 350, 360”, but counter-clockwise rather than clockwise.

¹³ *alhantica*; a variant on *al-halqa* (see Fig. 2, as well as Cap. 2, note 25 and Kunitzsch, *Glossar*, p. 522).

¹⁴ *alhabor*: a variant on the Arabic word for “holding or keeping back” (*al-habs*; الحبس), an alternative for “handle”; in Latin: *armilla reflexa* or *ansa*. See Kunitzsch, *Glossar*, p. 559.

L] Fα Vκ
M] Fα Mυ Vκ; κ Bι Mλ Rα Sκ
N] Fα Mυ Sκ Vκ
O] Mυ Vκ
Q] Vκ
S] Mυ Vκ
T] Fα Mυ Vκ; ι Bι Rα
V] Mυ Vκ
Z] Mυ Pυ Vκ; G Bι Fα Mλ Rα

[CAPITULUM 2.] DE DORSO ASTROLABII ET PRIMO DE CIRCULO ALTITUDINIS¹

5 Facies circulum super extremitatem tabule, dimittesque spacium, in quo possint scribi littere numeri, et incipies scribere litteras a puncto D, qui est in oriente, usque in punctum A, qui est sub armilla, qui significat in astrolabio meridiem. Perficiesque in eandem quartam 90 gradus hoc modo. Divides predictam quartam per 18 divisiones

- 1 De ... altitudinis] *in marg.* Eζ Lγ Mv(*diff. hand*) Po Qλ(*later hand*); *illeg.* Eδ; *om.* Aα Bα Bζ Bι Bκ Cβ Cδ Cε Cθ Cη Dβ Dγ Eα Eη Eο Eτ Eυ Eφ Fβ Lζ Mγ Mν Mφ Nα Oη Oμ Oο Oτ Oυ Pα Pγ Pθ Pυ Pφ Qα Qδ Rα Rβ Sβ Uα Vα Vε Vκ Vπ Vυ Wα Wβ Xα Xβ; Capitulum dorsi astrolabii Oα; Capitulum secundum Oτ; Capitulum secundum de dorso astrolabii primo de circulo altitudinis Mo; Capitulum secundum scilicet de dorso astrolabii et post de circulo abscisor Bε(*marg.*); De compositionem trium circulorum scilicet Cancri, Arietis et Capricorni Sκ; De divisione limbi et circulorum dorsi astrolabii et inscriptione ipsorum Mλ; De dorso astrolabii Dη Eμ Fα Pρ(*diff. hand in marg; add. c. ii*) Qγ Vψ; De formatione dorsi astrolabii Fδ Vβ Vν; Descriptio dorsi astrolabii Bη; Dorso astrolabii et primo de circulo altitudinis Xβ; In dorso scilicet astrolabii Bγ(*later hand in marg.*); Opus dorsi astrolabii Cζ Eμ(*marg.*) Eν Mθ Mκ Oκ Oπ Oσ(*later hand*) Sλ Vβ Vσ Vχ; Post hoc in dorso astrolabii Sθ Sι(*om. astrolabii*); Sequitur de compositione limbi Qβ
- 1 astrolabii] arstrolabii Lε; astrolabio Fζ
- 2 *before* Facies *add.* Deinde Pα; *add.* Et in dorso astrolabii Qα; *add.* Hoc facto Cδ; *add.* Post dorsi astrolabii Cθ; *add.* Post hoc in dorso astrolabii Cβ Oμ; *add.* Post hoc in dorso tabule Pφ Facies] Faciesque *many; add.* inde Bγ Cη Eφ Pθ; *add.* post hoc Bζ circulum] arcum in dorso Pα; *add.* Arietis Lβ; *add.* in dorso tabule Bζ; *add.* post hoc in dorso tabule Dβ Fδ Mγ Oο Vβ Vν tabule] *om.* Mν; eius Dβ Fδ Mγ Oο Vβ Vν; *add. interlin.* id est tabule Vβ dimittesque] dimittens Bκ Rα in quo] *rep.* Wι possint possent Sι
- 2-3 possint scribi] scribantur Bα
- 3 scribi] describi Sκ; inscribi Sθ scribi ... incipies] *om.* Fβ et ... puncto] *interlin.* Sθ usque] *corr. from* a puncto Sθ in₂] *ad many*
- 4 qui est] *corr. from* usque Sθ significat] signat *many* astrolabio] abstrolabio Pα
- 5 eandem quartam] eadem Mγ; eadem quarta Rα Sι quartam₁] *interlin.* Sθ quartam 90 gradus] *om.* Mλ 90] 60 Eν; lxx^{mo} Nα; *om.* Bα 90 gradus] *om.* Bγ Bη Eτ Mo Pγ Pθ Pυ Sκ Uα Vα Vσ Wβ Wι gradus] *om.* Cβ Cδ Cε Cζ Cθ Dη Eμ Mθ Oη Sθ; divisiones Dη; *add. in marg.* divisiones Sθ hoc modo] *om.* Bα Nα Oη Vε; *add.* DICIT(DOCET Cζ) MODUM DIVIDENDI PRIMUM CIRCULUM IN DORSO, QUI EST EXTERIOR OMNIBUS, ET DICITUR CIRCULUS ALTITUDINIS Cζ Eμ(*marg.*) Oη Divides] *add.* scilicet *many* quartam] *om.* Sκ 18] 9 Mδ; 80 Rβ divisiones] partes Sλ

¹ Numerous manuscripts continue on from Capitulum 1 without a break and without a heading.

[CHAPTER 2.] ON THE BACK SIDE OF THE ASTROLABE ; AND FIRST THE CIRCLE OF ALTITUDE

You will make a circle around the edge of the plate and leave a space in which numerals² may be written, and you will start to write the numerals from point D, which is at the east, along to point A, which is beneath the armilla,³ which in an astrolabe indicates the south. And in the same quarter you will complete 90 degrees in this way. You will divide the aforementioned quarter into 18 equal divisions,

² *littere numeri* = the characters or symbols of number.

³ *armilla(e)*: these are the two suspension rings at the top of the astrolabe. The use of the term here simply indicates that point A is at the top of the astrolabe.

equales, et scribes in prima divisione 5, et in secunda 10, et in tertia 15, atque sic augmentando usque ad 90; et per hanc quartam accipies altitudinem solis atque stellarum. Similiter facies in ceteris quartis.

10 Incipies autem scribere a puncto orientis usque in meridiem, id est ex D in A, ut supra dictum est. Deinde incipies a puncto D et facies similiter usque in C; post hoc ex B in A, ad ultimum vero ex B in C.

Descriptis litteris,⁴ iterum facies duos circulos propinquos sibi, inter quos erit

- 6 prima] *om.* Pμ 5] 10 Mδ et in secunda 10] *om.* Wα 10] 20 Mδ 10 et in tertia] *om.* Qλ et in tertia 15] *om.* Bι Bκ Dγ Eζ Eτ Mλ Qδ Rα Rβ Sβ Uα Vκ 15] 30 Mδ sic] *add.* deinceps Sλ
- 7 augmentando] *add.* per 5 Dη; *add.* per 5 ulterius Qδ Rβ; *add.* per additionem quinarum Qα; *add.* ulterius Bκ Dγ Eδ Eζ Mλ Vκ 90] nonaginta Mγ; 60 *corr. to* 90 Eν; *add.* gradus Fα; *add.* que omnia patent melius in figura pronotata supra Cζ; *add. interlin.* que omnia patent melius in figura pronotata ex alia parte folii Eμ per] *rep.* Qμ hanc] *add.* autem Cζ
- 8 Similiter] *add.* autem Sλ quartis] *add.* si placet Qα
- 9 orientis] *add.* D Bγ Bη Cη Eφ Pα Pθ Wβ; *add.* A Vκ id est] *om.* Oο Vα; scilicet Bκ id est ex D in A] A Bγ Bη Cη Eφ Mθ Pα Pθ Wβ; ex D id est in A Bι Eδ Lζ; ex D scilicet in A Dγ Sβ Vκ A] *marg.* Sθ
- 9-10 Incipies ... incipies] scilicet Qα id ... est] dictum est ex D id est in A ut super Eζ; dictum est ex D in A ut super dictum est Xα; id est dictum est ex D in A ut super Pο; id est ex D scilicet in A ut super Rα ut ... est] *om.* Bα in] *om.* Sκ
- 10 dictum] *om.* Fα dictum est] *om.* Aα Bι Cβ Cδ Cζ Cθ Dβ Dγ Eμ Eν Eο Eυ Fδ Lζ Mγ Mδ Mκ Mλ Oα Oη Oκ Oμ Oπ Oσ Pο Pφ Sβ Sθ Sλ Vα Vβ(*add. interlin.*) Vε Vν Vπ Vσ Vυ Vχ est] *om.* Oο Sι deinde] *om.* Sι incipies] incipies Sθ D] *add.* incipies Qδ Rβ et facies similiter] *om.* Qα similiter] *om.* Bα ex] *om.* Qμ
- 10-11 Deinde ... C] *om.* Cι
- 11 ad ultimum vero] et Bη Wβ; ultimo Bκ vero] *om.* Rα
- 12 before Descriptis *add.* DE CIRCULO SIGNORUM Bγ(*marg.*) Bι(*marg.*) Cι Eζ(*marg.*) Eτ(*marg.*) Mη Pδ Pτ Qμ Vψ Wι; *add.* DE INSCRIPTIONE SIGNORUM IN DORSO Mο; *add.* In alio ergo Dγ Eο Descriptis] Deinde scriptis Eυ Vπ; Scriptis Aα Descriptis litteris] DE SCRIPTIS LITTERIS Pγ Descriptis ... iterum] Postea Bα litteris] *om.* Pθ; *add.* numerorum Mθ Oκ iterum] *om.* Sκ Wι duos] 2 *many* inter] in Sι

⁴ Several manuscripts read “DE SCRIPTIS LITTERIS” as if it were the heading for this next section. But most manuscripts simply read “Descriptis litteris” (an ablative absolute) referring to the previous section.

and you will write 5 in the first division, and 10 in the second, and 15 in the third, and so on increasing up to 90. And with this quarter you will receive [i.e., measure] the altitude of the sun and of the stars. Similarly you will do so in the other quarters.

Now you will begin to write from the eastern point to the southern one, that is, from D to A, as is said above. Then you will begin from point D and make similar [divisions and marks] along to C; after this from B to A; and finally from B to C.

Once these numerals have been marked out, you will next make two circles close together between which will be

15 modicum spacium, in quo erunt gradus designati, qui gradus, ut supra diximus in litteris, erunt in unaquaque quarta per 18 divisiones distributi, et in unaquaque divisione 5, ita ut in unaquaque quarta inveniantur 90 divisiones trium signorum; et fiunt omnes 360 gradus, qui sunt gradus 12 signorum. Sub quibus etiam dimittes

- 13 modicum] *om.* Pτ modicum ... erunt] *om.* Vv spacium] *om.* Mφ QΛ in ... designati] per (pro Qδ Rβ) gradibus designandis Bι Bκ Dγ Lζ Mλ Qδ Rα Rβ Sβ Vκ; *add.* scilicet distincti Mv designati qui gradus] *om.* Mo Pγ Sκ qui] *add. in marg.* per Sθ gradus₂] *om.* Bγ; *add.* ita Cβ Cθ Eμ Eo Oα Oπ Oσ Vχ supra] *om.* Mγ Rα Sβ subra diximus] *prediximus* Bκ; *add.* omnia ista apparebunt in duabus figuris subscriptis in aliam paginam Fβ in₂] cum *many*
- 13-14 in litteris] *om.* Bα Cβ Cζ Dβ Eμ Fδ Mγ Mκ Mv Oη Oκ Oμ Oo Pα Pφ Sθ St Vα Vv Vσ; *interlin.* Sλ
- 14 litteris ... in₂] *om.* Dβ erunt] *om.* Sκ; distributi et Oμ in₁] ut Rα unaquaque₁] qualibet Sλ unaquaque quarta] undique parte Mγ; utraque parte Oo quarta] *om.* Dγ; *add.* 90 et Eα quarta ... unaquaque₂] *om.* Qδ; scilicet St per ... unaquaque₂] *om.* Pv 18] *om.* Vε; 9 Mδ; 19 Oπ Vπ; 80 Rβ divisiones] partes Pq distributi] *om.* Oμ; distincti Cε Pφ; inscripti Bζ(*interlin.*: distributi) distributi ... unaquaque₂] *om.* Xα et] scilicet Mλ et ... unaquaque₂] scilicet Xα unaquaque₂] una Mφ Mv Vi; una scilicet Cβ Cζ Cθ Ev Mθ Mκ Mv Oα Oη Oκ Oπ Oσ Sλ Vα Vσ; *add.* scilicet Aα Bι Cδ Dβ Dγ Eζ Eμ Eo Fδ Lζ Mδ Oμ Oo Rα Vκ Vv Vπ Vυ Vχ; *add.* sub Vε
- 14-15 per ... quarta] *om.* Eη Fα Tδ per ... inveniantur] *om.* Be distributi ... 5] incipiens a capite signi ita ut in prima divisione sint 5 Ev(= *ll.* 18-19) et ... divisione] scilicet Bα
- 15 divisione] parte Pq divisione ... unaquaque] *om.* Mγ divisione ... quarta] *om.* Nα 5] quinque *some*; 10 Mδ; *add.* et in alia divisione 10 Cζ Eμ Mθ Mκ Oη Vσ; *add.* et in alia 10 Oκ ut] quod Cζ St unaquaque] qualibet *some* quarta] *om.* Pμ quarta ... signorum] divisiones 3 signorum et inveniatur 90 Rβ inveniantur] sint Bα Bι Bκ(sit) Dγ Eζ Lζ Mλ Po Sβ Vκ Xα; sunt Rα 90] *om.* Dη; 19 Vπ; 60 *corr. to* 90 Ev; 98 Mφ Mv Vi; 190 Uα divisiones] gradus Bα Bγ Bη Bι Bκ Cδ Cζ Cη Cθ Dβ Dγ Dη Eζ Eμ Ev Eτ Mγ Mκ Mλ Mv Mo Oα Oπ Oσ Po Qα Rα Sβ Sθ St Sκ Sλ Uα Vα Vκ Vv Vσ Vυ Vχ Wβ; *add.* gradus Mδ Xα; *add.* id est gradus Aα; *add.* vel gradus Cι Ev Mη Pδ Qμ Vπ trium] *om.* Eζ Lγ Po trium signorum] *om.* Aα Bα Bγ Bη Bκ Cβ Cδ Cζ Cη Cθ Cι Dβ Dγ Eμ Ev Eτ Ev Mγ Mη Mκ Mλ Mv Nα Oα Oπ Oσ Qα Qμ Rα Sβ Sθ St Sκ Sλ Uα Vα Vκ Vv Vπ Vσ Vυ Vχ Wβ; *add.* fiunt Lβ
- 15-16 90 ... sunt] *om.* Cε Pγ Pτ Pv Wι
- 16 fiunt] erunt Sλ; sint Bκ Dγ Rα Sβ 360] 60 Xα; 160 Oo gradus₁] *om.* Mγ St qui sunt] *om.* Vε qui sunt gradus] *om.* Bη Wβ; scilicet Bα gradus₂] *om.* Rα 12] xii *or* duodecim *some*; 3 Sθ signorum] *add.* Docet facere circulum signorum qui est sub circulo abscindens et omnia patent in pronotata figura Cζ Eμ(*marg.*) quibus etiam] quorum quolibet Qδ Rβ

a small amount of space in which the degrees will be marked; these degrees – as we have mentioned above with the numerals – will be distributed over the 18 divisions in each quarter – 5 in each division – so that in each quarter the 90 divisions⁵ of the three signs are found; and there are created all 360 degrees, which are the degrees of the 12 signs. Beneath these you will also leave a

⁵ Some mss say “degrees”.

spacium, in quo describas litteras numeri graduum, qui dividunt gradus uniuscuiusque signi per sex⁶ divisiones, incipientes a capite signi ita ut in prima divisione sint 5, et in secunda 10, et sic augmentando usque in 30. Et hec divisiones erunt lineae venientes ab extremitate tabulae, quae dividant gradus et litteras superiores.

Post haec facies duos circulos, inter quos dimittes spacium quod divides per 12 partes aequales, in quibus describes nomina signorum, et omnes isti circuli erunt ex uno

- 17 in quo describas litteras] ad scribendum Βα; pro litteris Βι Βκ Δγ Λζ Μλ Ρα Σβ Vκ numeri] quinque ΝαΟμ graduum] *add.* signorum Ομ dividunt] dividat, dividant, dividit *many* uniuscuiusque] cuiusque Βα
- 18 per ... signi₂] in quarta est altitudo poli supra horizontem tanti est distantia cenith ab equinoctiale. Et hoc est latitudo regionis Μη sex] 6 *some*; vi *some*; *om.* Vκ; 30 Βε Εα Εβ Fα Fβ Fζ Lβ Lγ Lε Lη Μο Οζ Οξ Οτ Ου Πλ Ρμ Ρν Ρο Qβ Qγ Qδ Qλ Rβ Sδ Tδ Wα Xβ; *marg.* Sθ; 60 Pθ incipientes] incipiendo Οη; incipies Βγ Βη Cη Lβ Ρα Pθ Πλ Qδ Rβ Vε Wβ Xα; incipiens Βε Βζ Cε Cι Εα Εδ Εζ Εο Ετ Εφ Fα Fβ Lγ Lε Lη Μο Μυ Μφ Να Οζ Οξ Οτ Ου Ργ Ρδ Ρμ Ρν Ρο Ρτ Ρυ Qβ Qγ Qλ Sδ Tδ Uα Vβ Vι Vπ Vψ Wα Xβ; incipites Ομ signi] *add.* quarta est altitudo poli supra horizontem tanti est distantia cenith ab equinoctiale. Et hoc est latitudo Vψ ut] quod *many* 5] quinque *some*
- 18-19 et ... 10] *om.* Βγ Βη Cη Ετ Εφ Μο Να Ργ Ρθ Ρυ Qδ Rβ Sκ Uα Wβ; *add.* in tertia 15 Xα
- 19 10] 20 Ομ in] ad Sι
- 20 extremitate] *add.* circumferentiae Qα tabulae] *om.* Βα Βζ Μν Οη dividant] dividunt Εζ Μλ Μν Οα Οκ Οπ Ρφ Qδ Ρα Rβ Vπ Vχ litteras] lineas Ετ Qδ Rβ Tδ; *add.* per Μγ superiores] *add.* 3-line gloss Cζ
- 21 duos] 2 *many*; 3 Εφ quod] quos Sι divides] dimittes Να
- 21-22 per ... aequales] *om.* Fζ
- 22 describes] scribes *some* nomina] *add.* 12 Βγ Βη Cη Ρα Pθ Wβ circuli] *add.* isti erunt] *om.* Βε Cε Cι Εα Εη Ετ Fα Lβ Lγ Lε Lη Μη Μυ Μφ Οζ Οξ Οτ Ου Ργ Ρδ Ρλ Ρμ Ρν Ρο Ρυ Qγ Qλ Sδ Sκ Tδ Uα Vι Vψ Wα Wι Xβ
- 22-23 erunt ... punctum] exunt ab uno puncto et habebunt punctum Να; habebunt unum centrum Qα ex uno ... punctum] super idem centrum Vυ

⁶ The confusion here is between dividing a sign into 6 divisions (of 5 degrees) or into 30 divisions (of one degree). Most diagrams show each sign divided into 5-degree sections and these divided into single-degree subsections – so both readings make perfect sense.

space in which you should write the numerals of the degrees, which divide the degrees of every sign into 6 divisions, beginning from the head of the sign so that there are 5 in the first division and 10 in the second and in this way increasing up to 30. And these divisions will be lines coming from the edge of the plate, in order to divide the outer⁷ degrees and numerals.

After this you make two circles between which you will leave a space which you will divide into 12 equal parts, in which you will write down the names of the signs, and all of these circles will be based on one

⁷ *superiores*: the divisions, degrees and numerals in the outer circles.

25 puncto, id est habebunt unum punctum, scilicet E, qui est in medio tabule. Et incipies ab Ariete in initio quarte occidentalis et meridiane, qui est punctus B, iens versus meridiem, qui est punctus A; et divides unumquodque signum per 30 divisiones, ut supra.

Post hec pones regulam super 24 gradum et dimidium ex Geminis (in hoc

- 23 puncto] spatio *corr.* to puncto Oξ; *add.* scilicet centro Bζ Bι Bκ Dγ Eδ Eζ Lζ Mλ Qδ Rα Rβ Sβ Vκ Vπ Xα; *add.* scilicet centro et Aα Eο Eυ Pο Vπ id est] *om.* Fζ Pδ; et Mν Sι Vν id est ... punctum] *om.* Bα Vψ unum] *om.* Sκ; *add.* et idem Mν habebunt unum punctum] ex uno puncto gredis(?) puncto procedunt Tδ punctum] centrum Bγ Bη Cη Eφ Pα Pθ Wβ; et idem punctum Mν; punctum, punctum Cβ Cθ; punctum (*corr.* to circulum), punctum Vχ; spatium Oξ; *add. interlin.* id est centrum Vβ scilicet E] *om.* Mo Qβ Sκ; G scilicet E Qδ; id est centrum Oη; indelibet E Aα; in se Wι E] *om.* Qμ tabule] *add. 2-line gloss* Cζ
- 23-24 incipies ab Ariete] *om.* Eα Eη
- 24 Ariete] *om.* Bε; oriente et est Dη in] *om.* Eδ Oπ; et Aα Bα Bγ Bζ Bη Cη Cθ Cι Dβ Eμ Eτ Eφ Lβ Mγ Mη Mθ Mκ Mν Mo Mv Mφ Oα Oκ Oξ Oο Oσ Pα Pγ Pδ Pθ Pρ Pτ Pυ Pφ Qγ Qμ Rα Sι Uα Vα Vν Vπ Vυ Vχ Vψ Wβ Xβ; et est Dη; et in Cε Eα Eβ Eη Fα Fβ Fδ Lγ Lε Oζ Oτ Oυ Pλ Pμ Pν Qβ Qλ Sδ Tδ Vβ Vι Wα; et incipies ab Bε; qui est Oη; qui est in Vκ; scilicet Vσ; vel et Eυ qui est] *om.* Wα iens] incis Sκ; ienis Sι
- 24-25 B ... punctus] *marg.* Vυ; *om.* Pμ Qδ
- 25 punctus] versus Mγ
- 26 *before* Post *add.* DE INSCRIPTIONE [*illeg.*] Eδ; *add.* DE INSCRIPTIONE CIRCULI MENSIIUM Sκ; *add.* DE INSCRIPTIONE MENSIIUM Bη(*marg.*) Cι(*torn*) Eτ Pδ Qμ Vι Vψ Wι; *add.* DE INSCRIPTIONE MENSIIUM ET DIERUM IN DORSO ASTROLABII Mυ(*marg.*); *add.* DE INSCRIPTIONE 12 MENSIIUM Mo Pτ; *add.* DE PUNCTO ZODIACI INVENIENDO PER LINEAM SUBTILES Aα Eυ(*add. in marg.* et de dorso astrolabii) Mη Vπ; *add.* SCILICET IN DORSO. DE INSCRIPTIONE MENSIIUM Bγ(*later hand in marg.*); *add. in marg.* Docet facere circulum dierum qui debet esse ecentricus a productis circulis Eμ; *add.* SEQUITUR DE INSCRIPTIONES MENSIIUM Dη Post hec] Postea *many* 24] 17 Pτ Vβ(*add. interlin.* al' 18); 18 Bε Dβ Eα Eη Fα Fβ Fδ Fζ Lβ Lγ Lε Lη Mγ Mδ Mυ Mφ Oζ Oξ Oο Oτ Oυ Pδ Pλ Pμ Pν Pρ Pφ Qβ Qγ Qλ Sδ Sι Tδ Vι Vν Vψ Wα Xα; 18 vel 24 Xβ; 27 Aα Bγ Cδ Cε Cη Eδ Eο Eτ Eφ Mo Pθ Uα Vπ; 28 Dη Eζ; 78 Eβ; *add. in marg.* aliqui libri habent 24 et .S. Vβ; *add.* (in hoc ... spere [*ll.* 26-27]) Mν Vα 24 ... Geminis] 12 gradus Cancri, cum dimidio qui est angulus solis anno 1443 Eυ gradum] *om.* Bα Eμ Mθ Mν Pλ Vα; *superscr.* Eμ Sλ Vσ et dimidium] *om.* Bγ Bε Bη Bκ Cε Cη Cι Dη Eα Eβ Eη Eο Eφ Fα Fβ Fζ Lβ Lγ Lε Lη Mθ Mυ Mφ Oζ Oκ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Qα Qβ Qγ Qλ Rα Sδ Sι Sκ Uα Vι Vκ Vπ Vψ Wα Wβ Xα Xβ; fere Bι Dγ Lζ Mλ Sβ; scilicet Mθ Oκ; *add.* fere Eδ Eζ Pο Qδ Rβ ex Geminis] *om.* Mγ; Geminorum Bα Bγ Bη Cε Cη Dη Eτ Eφ Pα Pθ Pτ Qδ Rβ Sι Uα Vβ Vπ; *add.* Geminorum cuta(!) dimidium esse Geminis Sκ; *add. in marg.* Sed nota quod in hoc tempore ponatur super 27 Geminorum et hoc est propter motum 8^e spere qui maior est modo quam tunc fierit 2 gradibus et dimidio fere Eμ
- 26-27 in ... spere] *om.* Aα Bγ Bη Bι Bκ Cβ Cδ Cε Cζ Cη Cθ Dγ Dη Eδ Eζ Eμ Eν Eο Eτ Eυ Eφ Lζ Mθ Mκ Mλ Mo Nα Oη Oκ Oμ Oο Oπ Pα Pγ Pθ Pο Pτ Pυ Rα Sβ Sκ Sλ Uα Vε Vκ Vπ Xα Wβ Wι; *in marg.* Qα Vσ; *interlin.* Vχ

point, that is they will have one centre, namely E, which is in the middle of the plate. And you will start from Aries at the beginning of the south-west quarter, which is point B, going towards the south, which is point A; and you will divide each sign into 30 divisions, as above.

After this you will place the ruler on $24^{\circ}30'$ of Gemini⁸ (at this time,

⁸ At issue here is the precession of the solar apsides (about 1.1' per year) and therefore which number to choose. Gemini $24^{\circ}30'$ would mean that the aphelion would fall around 9 June (Julian calendar); in AD 2000 it fell on 4 July.

The various numbers here may represent attempts to get a correct position for a current date (as with ms Ev: Cancer $12^{\circ}30'$ in AD 1443) or error and/or confusion in copying, especially because of the ways 4's and 7's could be written.

Julio Samsó (*On Both Sides of the Straits of Gibraltar* [Leiden: Brill, 2020], p. 218) notes that the figure of $84^{\circ}30'$ for the longitude of the solar apogee is not far off the figure of $85^{\circ}49'$ established by Ibn al-Zarqāllah using his observations of 1074-1075; and that the figure of 87° matches a calculation for the solar apogee (coinciding with the apogee of Venus) in his *Almanac* tables for Venus.

autem tempore ponatur super 27 gradum et hoc est propter motum octave spere);
 et iunges eam cuspidi per lineam subtilem. Deinde divides ipsam lineam a cuspidem
 usque in circulum sibi propriorem per 32 divisiones, et pones summitatem prime
 30 divisionis ex parte cuspidis circuli signorum cuspidem; et accipies ex hac linea 30
 divisiones, eritque inter utrasque cuspides una divisio ex ipsis divisionibus, et inter
 caput linee altera divisio prohibens eos ne se contingant.

- 27 27] 7 Lβ; 17 Bε Eβ Eη Fβ Fζ Lγ Lε Lη Mγ Mδ Mν Mφ Oζ Oτ Oυ Pλ Pμ Pν Pρ Pφ Qβ Qγ
 Qλ Sδ Tδ Vι Vχ; 21 Sι 25 Qα; 27 *corr. to* 17 Qμ gradum] eiusdem Bζ; grado eiusdem
 Mν; gradu eiusdem Pφ Sι Xβ; gradum eiusdem Bα Fδ Oα Oσ Qδ Rβ; gradus eiusdem Dβ
 Mγ Qα Sθ Vυ Vυ; *add.* Geminorum Vβ
- 28 eam] *add. interlin.* scilicet regulam Vβ cuspidi] *add.* id est centro Qδ Rβ
 subtilem] *add. interlin.* ut posset deleri Eμ; *add.* Ut posset deleri. Nota quod in hoc
 tempore ponatur super 27 Geminorum et hoc est propter motum 8° spere qui maior est
 modo quam tunc fuerit 2 gradibus et dimidio fere Cζ ipsam lineam] *om.* Eφ Mo Nα
 Pγ Pυ Wι; eam Bγ Bη Cε Cη Dη Eτ Pα Pθ Sκ Uα Wβ Vι; eam lineam Mφ Vβ(*add. interlin.*
 ipsum) Vπ; ipsam Vε; illam lineam Vκ; lineam Bε Cι Eα Eβ Eη Fα Fβ Lβ Lγ Lε Lη Mη Mυ
 Oζ Oξ Oτ Oυ Pδ Pλ Pμ Pν Pρ Qβ Qγ Qλ Qμ Sδ Tδ Vψ Wα a] *ms* Bθ *begins*
- 29 usque] ut Vψ usque ... propriorem] in circulum priorem Pφ sibi] *om.* Bα Cδ Cζ
 Dβ Eμ Fδ Mθ Mν Oη Oο Pφ Sι Sλ Tδ Vβ Vν Vσ propriorem] priorem Bζ Dβ Eμ Fδ
 Oη Oο Pφ Vβ(*add. interlin.* id est propriorem vel propinquiorem) Vν; propinquiorem Aα
 Bη Bθ Cε Eυ Mδ Oα Oσ Pα Pρ Qα Qβ Qδ Rβ Sδ Vβ Vε Vπ Vυ Wβ; propinquiorem *corr. to*
 propriorem Mν; *add.* scilicet signorum Oη Sλ(*interlin.*) 32] 12 Vε; 22 Pα; 30 Qα; 31
 Mθ Oκ; 33 Mδ Sθ; 33 *corr. to* 32 Pρ et ... divisionis] *om.* Eο Pμ; *add.* equales Sλ
 pones] pone *some*
- 30 cuspidis] *add.* primi divisione Rβ cuspidem] *om.* Bγ Cη Eφ Fζ Oτ Pα Pθ Qα Sβ Vε;
 cuspidem centrum Mθ Oκ; cuspidis Vυ Vψ; id est centrum Oη; scilicet cuspidem Eδ;
 scupidem Pτ; *add.* scilicet centrum et facies circulum secundum quod centrum Eα
 accipies] 70 cipies Eζ; excipies Eδ linea] *om.* Bζ Lβ; divisione Aα Bγ Bη Bθ Cη
 Eφ Eυ Pθ Wβ 30] 39 Oμ; 130 Pν
- 31 divisiones] *add.* equales *many*; *add. in marg.* et scribes circa circuum Sθ eritque] *om.*
 Vσ inter] *om.* Sθ; *twice* Rα; *add.* has Bγ Cη utrasque] has Pα; *add.* has Bη Wβ
 cuspides] *twice* Vσ; scupides Pτ una ... divisionibus] *om.* Pγ; *add.* 3-line gloss
 Cζ; *add. in marg.* scilicet inter circulum claudentem signa concentricum, et circulum
 mensium ubi describitur dies. Et tunc remanebunt solum divisiones Vβ ipsis]
 istis *many*; *add.* scilicet 32 Qβ divisionibus] *om.* Sι Vπ; *add.* scilicet 32 Xβ *add. in*
marg. scilicet circulum interior cum iam dictum Sθ
- 32 caput] capita *many* linee] *om.* Aα Bθ Bι Bκ Cβ Cθ Dγ Eν Eο Eυ Mλ Oπ Rα Sβ Vε Vπ
 Wα; *add.* et circuli Eβ Fζ Qδ; *add.* et circuli signorum Cδ; *add.* et circulum Bε Cε Cι Dη Eα
 Eη Fα Fβ Lβ Lγ Lε Lη Mδ Mη Mφ Oζ Oξ Oτ Oυ Pδ Pλ Pμ Pν Qα Qβ Qγ Qλ Qμ Rβ Sδ Tδ
 Vι Vψ Xα Wα; *add.* et circulum signorum Sλ Xβ altera] *om.* Qα eos] circulos
 Cδ; *corr. to* circulos Sλ contingant] *add. in marg.* Per istas duas divisiones, patet tibi
 distantia sive elongatio oppositi augies circuli quem describis a primo circulo Vβ

however, it should be placed on 27° and this is because of the motion of the eighth sphere);⁹ and will join this to the centre with a fine line. Then you will divide this line from the centre to the circle nearest to it into 32 parts, and you will create an area [i.e., a circle]¹⁰ with the first division from the centre of the circle of signs as its centre;¹¹ and you will take along this line 30 divisions [as radius], and there will be between both centres one division from these [32] divisions, and between the end of the line [i.e., the radius] [and the circle of signs] another division preventing them from touching each other.¹²

⁹ A parenthetical note to correct or update the figures given in the previous line by $2^\circ 30'$ or 3° , because of the precession of the solar apsides (here associated with “the motion of the eighth sphere”). The insert is found in both early and late manuscripts, and is missing from both early and late manuscripts.

¹⁰ *summitatem*: “surface”, hence figure or area, in this case a circle.

¹¹ That is, the centre of the new circle is one division ($1/32$) away from the centre (E) of the circle of signs.

This solar eccentricity of $1/32$ is equivalent to $1;52,30$ parts (if the radius of the solar eccentric is 60 parts). Since $1;52,30^\circ$ is the maximum solar equation (rather than the eccentricity) in Ibn al-Zarqāllah, Samsó speculates that the author of our text made an error here in adopting this figure for the wrong parameter. (Samsó, *On Both Sides*, pp. 418-419.)

¹² That is, if the centre of the new circle is one division (out of 32) away from the centre of the circle of signs, and its radius is 30 divisions (out of 32), the new circle will be inside the circle of the signs (at its nearest point) by one division.

35 Iterum facies circulum et divides eum per 365 divisiones secundum numerum dierum anni solaris, si fuerit astrolabium magnum; et si fuerit parvum, pones eos binos et binos. Deinde facies sub eo alterum circulum, in quo erit numerus dierum mensium latinorum. Post hec pones regulam super 15 gradus Sagittarii, et iunges eam cuspidi circuli signorum et pones notam in circulo mensium. Eritque hoc initium Decembris; et erunt ab eo usque in punctum C, qui est in septentrione, 15 dies et remanebunt post hoc spacium abscisis 15 diebus Decembris 350 dies, super quos divides reliquam partem

- 33 circulum] *add.* qui est circulus dierum Cζ Oκ et ... eum] *interlin.* Sλ 365] 360
Bη Cθ Fα Wβ
- 34 dierum] *om.* Vψ si ... magnum] *om.* Eζ fuerit,] *add.* astrolabium Bθ Eο Oπ Vπ
pones] pone *many*
- 35 et binos] *om.* Bε Eη Mη; *add.* et binos Bι facies] *om.* Wβ alterum] alium *many*
circulum] *om.* Bγ Bη Cε Cη Dη Eτ Eφ Nα Pα Pγ Pθ Sκ Uα Wβ Wι in quo] *om.*
Vσ
- 36 latinorum] annorum Mυ Mφ; *add.* et sub hoc alium in quo scribentur nomina mensium
latinorum Aα Bκ Dγ Dη Eζ Eο(*om.* latinorum) Eυ Lζ Mλ Pο Qδ Rα Rβ Sβ Vκ Vε(*om.*
nomina) Post hec] Postea *many*; Deinde Vχ 15] decimum quintum *some*; 25 Wβ
cuspidi] *om.* Pγ Sκ Uα; *marg.* Wι
- 37 et ... mensium] *om.* Mγ Vν notam] nomina Vψ; notas Rα mensium] signorum
Bα Bι Bκ Cβ Cδ Cζ Cθ Dγ Eμ Eζ Eν Eο Mκ Mλ Mν Oα Oη Oκ Oμ Oπ Oσ Pλ Pφ Qα Rα
Sβ Sλ Sθ Vα Vυ Vχ; signorum mensium Eδ Pο et₂ ... C] *marg.* Cθ
- 38 erunt] *superscr.* Cζ; *add.* anni Bζ C] S Vψ septentrione] *marg.* Sι 15] 3 Oμ;
10 Mθ; 12 Bη Sι Wβ dies] *om.* Qα; gradu Vε remanebunt] remanebit *many*
- 38-39 dies ... 15] *om.* Bθ Vπ
- 39 abscisis] subtractis Eα; *add.* id est subtractis Bε Cι Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lζ Mδ Mη Mυ
Mφ Oζ Oξ Oτ Oυ Pλ Pδ Pμ Pν Pο Qβ Qλ Tδ Vι Vψ Wα Xβ 15] 3 Oμ; 12 Bη Sι Wβ;
13 Eμ; 75 Sθ 350] 35 Bα; 352 Eυ; 358 Bα; 365 Eο; *add.* in *marg.* Quia si 350 dividantur
per 7, cuilibet parti dabit 50. Postea si divides 50 per 5, cuilibet dabit 10. Postea si 10 per
2, cuilibet dabet 5. Vβ dies] dividens Sι; divisiones Dβ Fδ Lβ Mγ Pφ Vν super]
erased Sλ

Once more you will make a circle and divide it into 365 divisions according to the number of days in the solar year, if it is a large astrolabe; and if it is a small one, you will draw them two by two. Next inside this you will construct another circle, in which will be the number of the days of the Latin months. After this, you will place the ruler on 15° Sagittarius¹³ and join it to the centre of the circle of signs, and you will make a note [where the line crosses] on the circle of months. And this will be the beginning of December, and there will be from here right up to the point C, which is in the north, 15 days and after this gap with the removal of 15 days of December, 350 days will remain, over which you divide the remaining part

¹³ In 1252, the true position of the sun (from the Tables of Toledo) for the beginning of December was Sagittarius 15° 45' 37". (See J. Chabás and B. R. Goldstein, *A Survey of European Astronomical Tables in the Late Middle Ages* [Brill: Leiden and Boston, 2012], p. 85: the tables are probably for Cremona, taken from Florence, Biblioteca Nazionale Centrale, ms. Conv. Soppr. J.V.6 [San Marco 189], f. 83v.) [J.C.]

40 circuli, id est multiplices 50 septies, dividendo primo in 7, secundo in 5, tertio in 2, postea iterum in 5; et ideo hoc ingenium inventum fuit quia non erat apta multiplicatio 365.¹⁴

45 Et scito quod sol ingreditur caput Arietis 14^o die mensis Martii, et initium Cancri 16^o die Junii, et initium Libre 17^o die Septembris, et initium Capricorni 15^o die Decembris.

- 40 circuli] *margin.* Sθ id est] et Vχ id est ... 2] Et primo multiplices in 7, secundo in 50 in duas Nα multiplices ... 7] primo multiplices in 7 Bζ Dβ Fδ Mγ Vβ(*add. interlin.* id est divides) Vv 50] 5 Oη; 30 *corr. to* 50 Mη; *add.* partes Pα 50 ... primo] *om.* Oo Vπ; septies primo dividendo Bζ(*margin.*) 50 ... secundo] in 7 primo Bθ Ev septies] *sepcies or sepines some septies dividendo] om.* Pv septies ... primo] *om.* Pv dividendo] *om.* Bε Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mv Mφ Oζ Oξ Oτ Oυ Pα Pδ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Vψ Wα Xα Xβ dividendo ... 7] *om.* Mo secundo] postea Vβ Vπ
- 40-41 50 ... 5] in 7 primo in 5 Aα 50 ... in] *om.* Cζ dividendo ... 5] *om.* Bι Bκ Cβ Cδ Cθ Dγ Eδ Eζ Eμ Ev Eo Et Lζ Mθ Mκ Mλ Mv Oα Oη Oκ Oμ Oπ Oσ Pγ Po Pτ Pφ Qα Rα Sβ Sθ Sι Sκ Sλ Uα Vα Vε Vυ Vσ Vχ Wι; *add. in marg.* Mη(*later hand*) Qμ(*om. dividendo*) dividendo ... fuit] *om.* Bα
- 41 postea iterum in 5] *om.* Bγ Cη Eφ Qδ Rβ Vκ 5] *add.* et tunc erunt 50 septies Aα Bθ Ev Nα Pv Vβ Vπ; *add.* septies Bζ Cζ Dβ Fδ Mγ Oo Vv ingenium] signum Cζ multiplicatio] *add.* per Mγ; *add. interlin., later hand* scilicet divisio Uα
- 42 365] 305 Mv; *add.* dies Oη Sθ; *add.* gradus Qδ Rβ
- 43 Et] *add. in marg.* Isti fuit modus. Non tenetur hodie sed quere ipsum in tabula quadrantis. Vβ Arietis] *add.* fixi Qα 14] 4 Xα; 15 Bζ Eo; 19^{mo} Oπ; 24 Dβ; *add.* 11 *superscr.* Pρ mensis] *om.* Bκ; *interlin.* Sλ
- 43-44 Cancri ... initium₂] *om.* Pμ
- 44 16] 26 Eβ; *add.* 12 *supra* Pρ die₁] *interlin.* Cζ; *add. interlin.* mensis Sλ Junii] Julii Mγ 17]¹⁵ 1 Lβ; 10 Lη Xα; 14 Sι; 16 Oζ Pρ; 19 Aα Bε Bγ Bθ Bκ Cη Cθ Dγ Dη Eδ Eζ Eη Ev Eo Et Ev Eφ Lζ Mλ Mo Nα Oπ Pα Pγ Po Pτ Pυ Qδ Rβ Sκ Uα Vε Vκ Vπ Vσ Vχ Wι; *add.* 14 *supra* Pρ die₂] mensis Vχ; *add.* mensis Aα Cβ Cδ Cζ Cθ Eμ Ev Eo Ev Mκ Oα Oη Oμ Oπ Oσ Sθ Sλ Vπ Vυ die Septembris] aperlis (?) Sι Septembris] Decembris Vε 15] *add.* 12 *superscr.* Pρ; *tercia decima* Qδ; 13 Rβ die₃] *interlin.* Cζ; *add.* mensis Cβ Cε Cζ Cθ Eμ Ev Eo Mκ Mv Oκ Oμ Oπ Pφ Qα Sθ Sι Vχ
- 44-45 et initium₂ ... Decembris] *om.* Wι

¹⁴ Addendum 2-1 material (found here in some mss or at the end of the next paragraph in other mss) describes changes due to the precessing of the equinoxes and attempts to update to AD 1220.

¹⁵ Some of the variance here may derive from a confusion when copying numerals; 7 (written as Λ) can gradually close at the bottom and be mistaken for a 0, a 6 or a 9.

of the circle, that is,¹⁶ you will multiply 50 seven times, dividing [the space] first by 7, second [each of these 7 parts] by 5, third [each of these] by 2, and once more by 5;¹⁷ and this scheme was devised for the reason that multiplication was not appropriate for [the number] 365.¹⁸

And know that the sun enters the beginning of Aries on 14 March, the beginning of Cancer on 16 June, the beginning of Libra on 17 September, and the beginning of Capricorn on 15 December.¹⁹

¹⁶ This section (lines 40-41 “*id est ... iterum in 5 / that is ... once more by 5*”) was confusing for many scribes who might not have understood the arithmetic involved, or who were trying to copy from an exemplar whose scribe did not understand the arithmetic. Since the circle of days of the year is difficult to divide by 365, the composer has devised an “ingenious system” whereby 15 days (December 1-15) are first cut off in the circle and then the remaining 350 are divided up by treating it as 7 units of 50; first, this remaining part is divided by 7, the resulting units of 50 by 5, the resulting units of 10 by 2, and finally the resulting units of 5 by 5.

¹⁷ When you divide the remaining arc (350 days) by 7, you produce 7 units each equivalent to 50 days. When you divide each of these units by 5, you produce a total of 35 units each equivalent to 10 days. And when you divide each of these units by 2, you produce a total of 70 units along the arc, each equivalent to 5 days; and these units are easily divided into single-day units, if necessary.

¹⁸ I.e., the dividing up of 365 (into 365 equal units).

¹⁹ Compared to the true position of the sun (from the Tables of Toledo), and allowing for rounding to the nearest degree, these dates differ only slightly from those of 1252. (Chabás and Goldstein, p. 85.) [J.C.] Samsó points out that these positions could also approximate those of around 1132 (*On Both Sides*, p. 419).

The difference between these figures and those we are used to, that is, near the 21st of the months in question, is explained mainly by the accumulation of errors in the Julian calendar system.

Iterum cum divides annum, pones regulam super centrum signorum et super divisionem dierum semper. Et nota quod circulus mensium potest fieri concentricus circulo signorum et idem est.

- 46 Iterum] Item P Pμ Vβ Vπ divides] *add.* circulum Eδ Eζ Mλ Rα(*marg.*) Sβ Xα
 annum] dies anni Bθ BκEο Lζ Qδ Rβ pones regulam] pone unum caput
 regulae Aα Bθ Eο Ev Vπ centrum] *add.* circuli Qδ Rβ et] *add.* aliud Aα
- 46-48 Iterum ... est] *om.* Bα Bζ Cβ Cδ Cζ Cθ Dβ Eμ Ev Fδ Mγ Mκ Mν Oκ Oα Oη Oμ Oο Oπ Oσ
 Qα Sθ St Sl Vε Vν Vυ Vχ signorum ... est] *om.* Mλ et ... est] et aliud super
 divisione dierum Bθ
- 47-48 semper ... est] *om.* Ev Nα Pπ Et nota ... est] *in marg.* Vβ; *om.* Aα Bι Dγ Eο Lζ Pγ Pυ
 Rα Sβ; *16-line gloss* Bκ
- 48 est] valet Bε Eη; *add.* Eο *fol. 184^{va} lines 18-33*

Again, when you divide the year, you will position the ruler on the centre [of the circle] of signs and on the division of the days. And note that the circle of the months can be made concentric with the circle of signs, and it is the same.

[ADDENDUM 2-1]

add. after 365 (line 42) Dβ Fδ Mγ Oo Vβ(marg.) Vv

add. after Decembris (line 45) Nα Vβ(marg.)

50 Et nota quod ecentrici solis omnes significationes, scilicet dies et menses, signare
 potes in concentrico semper regula posita super centrum ecentrici et signum, de quo
 intendis, usque in completionem omnium dierum et mensium et hoc propter
 formositatem instrumenti et quadrantis signandi commodum et augmentum. Item sub
 A ad partem B vel ad partem D sumere potes 5 gradus equipollentes 5 diebus in
 ecentrico cum regula super centrum et 5 gradus positi. Et residuos 360 dies in residuo
 55 ecentrici et gradus divides.

50 semper] ipsi Fδ; spamlr Vv; super Mγ Nα posita] imposita Fδ et signum] *om.*
 Mγ

51 propter] *add.* commoditatem et Nα Vβ

52 quadrantis] quadranti Fδ; quadrati Dβ commodum] quod et Nα

53 equipollentes] equipollentur Dβ Fδ 5₁] et Mγ

54 et 5] 25 Dβ Vv residuos] residuo Vv in residuo] *om.* Dβ

55 et] ut Dβ Fδ Vβ

[ADDENDUM 2-1]

And note that you can always show all the indications (that is, the days and months) of the sun's eccentricity by concentricity, having positioned the ruler on the centre of the eccentric [circle] and on the sign, on which you are directing your attention, up to the end of all the days and months, and this is because of the beauty of the instrument and the convenience and enlargement of the quadrant. Likewise from A towards point B or towards point D you can assume 5 degrees as equivalent to 5 days on the eccentric circle with the ruler positioned on the centre and on 5 degrees. And you will divide the remaining 360 days within the remaining eccentric circle and the degrees.

[ADDENDUM 2-2: TABULA]

Bζ Bι(marg.) Bκ Dγ²⁰ Eδ Eζ Eμ Λε Λζ Μκ Μλ Οα Οξ Ου Ρο Τδ Vκ Wα Χα(later hand)

TABULA AD SCIENDUM UBI SOL EST IN INITIO CUIUSLIBET MENSIS

MENSES	GRADUS	MINUTIAE	SIGNI
Martius:	16	53	Pisces
Aprilis:	17	36	Aries
60 Maius:	16	13	Taurus
Junius:	16	13	Gemini

56 Tabula ... mensis] Bκ Eζ Λζ Ρο; *om.* Bζ Dγ Eμ Μκ Οα Vκ Wα; *illeg.* Eδ; Tabula ad sciendum nomina mensium Μλ; Tabula loci solis in principio cuius mensis Bι(marg.); Tabula loci solis et punctus cuiuslibet 12 mensium et hec est ascensio solis in initio cuiuslibet mensis Λε Οξ Ου Τδ(*om.* cuiuslibet); *add. in marg.* unus modus locandi menses Λζ

57 Menses ... Signi] Initia dierum mensium signis gradus minutiae Bζ; *om.* Χα; gradus minutiae Eμ Μλ Μκ Οα; menses m. Dγ

58 Martius ... Pisces] Martius [*illeg.*] 53 [*illeg.*] Eδ; initium prime diei Martius Piscium 16 53 Eμ Μκ Οα; puncti prime diei Martius Pisces 16 53 Bζ; 16 Pisces Dγ 16 53] 16 52 Χα

59 Aprilis ... Aries] Aprilis [*illeg.*] 36 [*illeg.*] Eδ; initium prime diei Aprilis Arietis 17 36 Eμ Μκ Οα; puncti prime diei Aprilis Aries 17 35 Bζ; Aprilis 36 Dγ 17 36] 14 35 Bζ; 17 15 Λε Τδ; 17 35 Bζ Bι Eζ

60 Maius ... Taurus] Maius [*illeg.*] 35 [*illeg.*] Eδ; initium prime diei Maii Tauri 16 35 Eμ Μκ Οα; puncti prime diei Maius Taurus 16 13 Bζ; 16 Taurus Dγ 16 13] 16 15 Eζ Οξ; 16 25 Χα; 16 35 Bκ Μλ Οα Ρο

61 Junius ... Gemini] Junius 16 13 [*illeg.*] Eδ; initium prime diei Junii Geminorum 16 13 Eμ Μκ Οα; puncti prime diei Junii Gemini 16 47 Bζ; Junius 13 Dγ 16 13] 16 22 Χα; 16 31 Eζ; 16 47 Bι Λε Τδ Vκ Wα

²⁰ The table in Dγ is defective, giving only the month plus the minutes, or the degree plus the sign for alternating months. Presumably the scribe intended to insert the missing names and numbers in a different colour of ink, but neglected to do so.

[ADDENDUM 2-2: TABLE]

TABLE: [TO KNOW WHERE THE SUN IS AT THE BEGINNING OF ANY MONTH]

MONTH ²¹	DEGREE	MINUTE	SIGN ²²
March:	16	53	Pisces
April:	17	36	Aries
May:	16	13	Taurus
June:	16	13	Gemini

²¹ Compared to the true position of the sun (from the Tables of Toledo) at the beginning of each month for 1252 (and rounding off the seconds to the nearest minute), most of the values here are between 4 and 6 minutes greater. July is 3 minutes greater and August only 1 minute. (See Chabás and Goldstein, p. 85.)

May is 18 minutes less (but its value is suspicious since the degrees and minutes are the same as for June). It would be more in line with the other months if we were to read Taurus 16° 35' as in some variants.

March is 10 minutes less. There is no obvious explanation for this. [J.C.]

Samsó suggests that these dates also correspond to ca. 1132 (*On Both Sides*, p. 419).

²² The difference between these positions and those which we would use today (about 6 or 7 days) result from the accumulation of errors in the Julian calendar.

	Julius:	14	47	Cancer
	Augustus:	14	27	Leo
	September:	14	35	Virgo
65	October:	14	12	Libra
	November:	15	20	Scorpio
	December:	15	51	Sagittarius
	Januarius:	17	28	Capricornus
	Februarius:	18	53	Aquarius

- 62 Julius ... Cancer] Julius 14 47 [*illeg.*] Eδ; initium prime diei Julii Cancrī 14 47 Εμ Μκ Οα; puncti prime diei Julii Cancrī 14 27 Βζ; 14 Cancer Dγ 14 47] 14 5 Λε Τδ; 14 27 Βι Vκ Wα Xα
- 63 Augustus ... Leo] Augustus 14 Eδ; initium prime diei Augusti Leonis 14 27 Εμ Μκ Οα; puncti prime diei Augusti Leonis 14 30 Βζ; Augustus 27 Dγ 14 27] 14 0 Βι Λε Οξ Ου Τδ Vκ Wα
- 64 September ... Virgo] September 14 35 [*illeg.*] Eδ; initium prime diei Septembri Virginis 14 35 Εμ Μκ Οα; puncti prime diei Septembri Virginis 14 35 Βζ; 14 Virgo Dγ 14 35] 14 25 Μλ Wα
- 65 October ... Libra] October 14 22 [*illeg.*] Eδ; initium prime diei Octobri Libre 14 12 Εμ Μκ Οα; puncti prime diei Octobri Virginis 15 13 Βζ; October 12 Dγ 14 12] 14 13 Βι Λε Οξ Ου Τδ Vκ
- 66 November ... Scorpio] November 15 20 [*illeg.*] Eδ; initium prime diei Novembri Scorpionis 15 20 Εμ Μκ Οα; puncti prime diei Novembri Scorpionis 15 30 Βζ; 15 Scorpio Dγ 15 20] 15 30 Βι Vκ Wα
- 67 December ... Sagittarius] December 15 51 [*illeg.*] Eδ; initium prime diei Decembri Sagittarii 15 51 Εμ Μκ Οα; puncti prime diei Decembri Sagittarii 17 52 Βζ; December 51 Dγ 15 51] 15 11 Wα; 15 45 Xα; 15 52 Βι Εζ Λε Οξ Ου Τδ
- 68 Januarius ... Capricornus] Januarius 17 28 [*illeg.*] Eδ; initium prime diei Januarii Capricorni 17 28 Εμ Μκ Οα; puncti prime diei Januarii Capricorni 17 20 Βζ; 17 Capricornus Dγ 17 28] 17 24 Βι Λε Τδ; 15 34 Wα; 17 34 Vκ
- 69 Februarius ... Aquarius] Februarius 18 53 [*illeg.*] Eδ; initium prime diei Februarii Aquarii 18 53 Εμ Μκ Οα; puncti prime diei Februarii Aquarii 18 53 Βζ; Februarius 53 Dγ 18 53] 18 51 Εζ Vκ; 18 42 Xα

July:	14	47	Cancer
August:	14	27	Leo
September:	14	35	Virgo
October:	14	12	Libra
November:	15	20	Scorpio
December:	15	51	Sagittarius
January:	17	28	Capricornus
February:	18	53	Aquarius

[FIGURA 2]

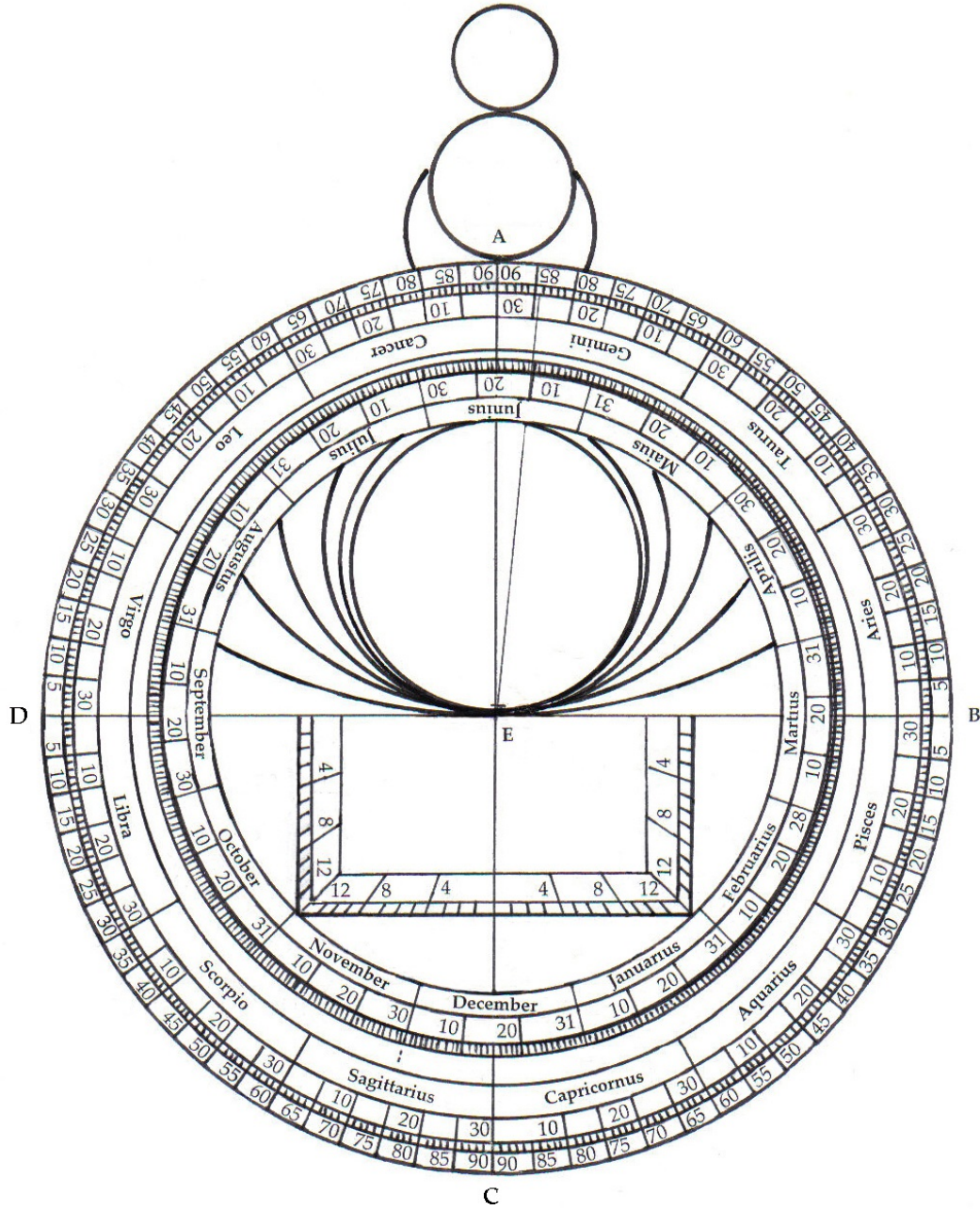


Figura dorsi astrolabii

[Complete diagram] By Be Bz Bt Bk Cη Cι Eβ Eμ Eο(fol. 185^v) Eτ Eυ Eφ Fa Fβ Fz Ly Le Lz
 Lη Mη Mκ Mλ Mν(fol. 41^v) Mo Oz Ok Ot Ou Pa Py Pδ Pλ Pμ Po Pq Pt Pv Qβ Qγ Qδ Qλ Qμ Sδ

SΘ Σκ Τδ Vκ Wβ²³ Wι

[*Partial diagram*] Bη Bθ Eα Ev Mθ Mu(*fol. 406'*) Oξ Ra Vι(*fol. 331''*) Xβ

[*Outline, or space only*] Aα Bα Cβ Cε Dγ Dη Eδ Eζ Eη Lβ Mδ Mφ Nα Oα Pν Pφ Qα Rβ Sβ

Uα Vβ Vε Vν Vσ Vχ Vψ Wα

[*No space*] Cδ Cζ Cθ Dβ Fδ Mγ Oη Oμ Oο Oπ Oσ Sι Sλ Vα Vπ Vυ Xα

Pθ: “B”

[*Caption*]

Figura dorsi astrolabii] Cη Ci Ev Eφ Fa Fβ Mη Oτ Pa Pq Pv Qβ Qγ Sδ Sk; *om.* Bη Bθ Eα Eμ Eο Fζ Mθ Mκ Oζ Ok Oξ Pγ Pδ Pa Pτ Qδ Sθ Vι Wι; *illeg.* Bε; Dorsum astrolabii Bκ Lζ; Dorsum matris sive (*or vel*) posteria Bγ Mv Mo Po Vκ; Figura dorsi Lη; Figura dorsi astrolabii posterie Bζ; Figura dorsi astrolabii quod antenna²⁴ dicitur Eβ; Figura dorsi astrolabii quod posteria dicitur Bη Eτ Lγ Wβ Xβ; Figura dorsi astrolabii quod posteria dicitur sive mater Qμ; Figura dorsi astrolabii scilicet posterie Mλ; Figura dorsi quod posteria dicitur Qλ; Figura dorsi sive matris astrolabii Ou; Figura exterioris partis matris scilicet dorsi astrolabii Bi; Figura interioris partis matris id est ant(h)ene Lε Mv Tδ; Figura interioris partis matris que posteria dicitur Pμ; Figura secundi capituli Bε; *add.* Dorsum astrolabii Pq

ansa vel alhelka²⁵ Bκ Lζ armilla Qλ Ou; armilla perforata Oτ; armilla reflexa Bγ Ev Lε Pa Pμ Qβ Sδ Tδ; armilla rotunda Ev Lε Pa Qβ Sδ Sk Vκ; armilla suspensoria Bγ Bκ Lζ; reflexa Vκ dorsa Po Nota: quod cum quarta da accipitur altitudo solis atque stellarum Pq

Sint astrolabium / horoscopus / astrolapsum / walzagora / horalogium idem Bκ

[*Lettering on the diagram*]

A] Bγ Bζ Bi Bκ Cη Eβ Eμ Eτ Ev Eφ Fa Fβ Fζ Lε Lζ Mη Mκ Mλ Mv Mo Ok Ot Ou Pa Pγ Pδ Pa Pμ Po Pq Pτ Pv Qβ Qγ Qλ Qμ Sδ Sθ Sk Tδ Vκ Wβ; *om.* Bε Ci Eo Lγ Lη Oζ Qδ Wι B²⁶] Bγ Bζ Bκ Cη Eβ Eμ Eτ Ev Eφ Fβ Fζ Lζ Lη Mη Mκ Mλ Mv Mo Ot Pa Pγ Pδ Pa Po Pq Pτ Pv Qγ Qλ Qμ Sδ Sθ Tδ Vκ Wβ; *om.* Bε Bi Ci Eo Fa Lγ Lε Oζ Ou Pμ Qβ Sk Wι; *cut off* Qδ; D Ok C] Bγ Bζ Bi Bκ Cη Eβ Eμ Eτ Ev Eφ Fβ Fζ Lγ Lζ Mη Mκ Mo Ok Ot Pa Pγ Pδ Pa Po Pq Pτ Pv Qγ Qλ Sδ Sθ Tδ Vκ Wβ; *om.* Bε Ci Eo Fa Lε Lη Mv Oζ Ou Pμ Qβ Sk Wι; *cut off* Qδ Qμ D] Bγ Bε Bζ Bi Bκ Cη Ci Eβ Eμ Eο Eτ Ev Eφ Fa Fβ Fζ Lγ Lε Lζ Lη Mη Mκ Mv Mo Oζ Ok Ot Ou Pa Pγ Pδ Pa Pμ Po Pq Pτ Pv Qβ Qγ Qδ Qλ Qμ Sδ Sθ Tδ Vκ Wβ; *om.* Bε Ci Eo Fa Lγ Lε Oζ Ou Pμ Qβ Sk Wι; B Ok; *cut off* Mλ E] Bi Cη Eβ Eμ Eτ Eφ Fa Fβ Fζ Lγ Mv Mo Ok Ot Ou Pa Pμ Pq Pτ Pv Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Wβ; *om.* Bγ Bε Bζ Bκ Ci Eo Ev Lε Lζ Lη Mη Mκ Mλ Oζ Pγ Pδ Pa Po Sθ Vκ Wι

[*Edge circle*]

D–A: *om.* Eo Mo; 10, 20, 30, ... 90 Bγ Cη Ci Eβ Eτ Ev Eφ Fa Fβ Fζ Lγ Lη Mη Mκ Mλ Mv Mu Oζ Ok

²³ In ms Wβ the orientation of the armillae, plus the word “meridies” is at about 11 o’clock on the diagram, because of a lack of space in the top margin.

²⁴ See Fig. 1, note 10.

²⁵ The Arabic word for “ring”: *al-halqa* (الحلقة); in Latin: *armilla suspensoria* or *ansa*. See Kunitzsch, *Glossar*, no. 11, pp. 522-523.

²⁶ “B” and “occidens” may have been on the diagram at an earlier stage in some manuscripts, but could have been cut off either by rebinding or in the filming (e.g., Qδ).

Shadow square below diameter; no unequal hour-line arcs] Bζ Bη Bθ Bι Bκ Fα Lζ Mθ Mλ Mo Po Pτ Pv
Vι Vκ Wι

No shadow square; no unequal hour-line arcs] Eα Mυ Oξ

Right half of shadow square only; no unequal hour-line arcs] Eμ Oκ

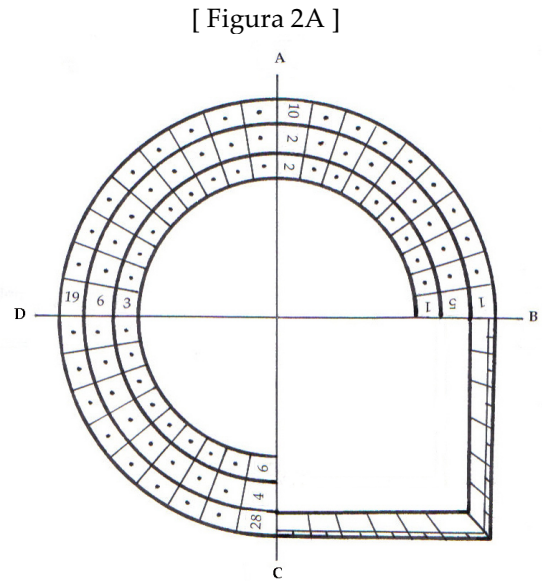
*add. extensa*²⁸ | *extensa* Fζ; *add. figura tertii capituli* Bε; *add. quodlibet illorum latus debet esse divisus in 12 puncta et 4 et tria per minuto punctorum* Bε; *add. umbra versa* | *umbra recta* | *umbra recta* | *umbra recta* Qμ; *add. versa* | *recta* | *umbra recta* | *umbra versa* Eβ; *add. versa* | *umbra recta sive extensa* | *versa* Pρ;

shadow square numbering] 4 8 12 | 12 8 4 | 4 8 12 | 12 8 4 Cη Eβ Ev Fα Fβ Fζ Lγ Lε Lη Mη Mλ Mo Oζ Oτ Oυ Pα Pδ Pλ Pμ Pρ Qβ Qγ Qλ Qμ Sδ Sκ Tδ Vκ; 3 6 9 12 | 12 9 6 3 | 3 6 9 12 | 12 9 6 3 Bγ Bι Cι Eτ Eρ Mκ Mν Oκ Pγ Po Pv; 2 4 6 8 10 12 | 12 10 8 6 4 2 | 2 4 6 8 10 12 | 12 10 8 6 4 2 Bκ Eμ Lζ; 2 4 6 8 10 12 | 12 10 8 6 4 | 4 6 8 10 12 | 12 10 8 6 4 2 Bη Pτ Qδ Wβ; 2 6 9 12 | 12 9 6 2 | 2 6 9 12 | 12 9 6 2 Wι; 3 6 9 12 | 12 9 6 3 | 4 8 12 | 12 9 6 3 Bε; 2 4 6 8 10 12 | 12 10 8 6 4 Eμ; *om.* Bζ Bθ Eο Mυ Oξ Sθ Vι

hour circles numbered] 1 ... 12 Ev Pγ; 6 ... 1 | 1... 6 Qδ

Eμ] 4 concentric arcs (3/4 circles) in the upper quadrant and lower left quadrant (BADC). Arcs divided into 10 sectors (BA) and 9 sectors (AD, DC); boxes filled with 3 series of numbers (see Figure 2A).

1	5	1	20	1	6
2	6	2	21	2	1
3	7	3	22	3	2
4	2	6	23	4	3
5	3	1	24	6	6
6	4	2	25	7	1
7	5	3	26	1	2
8	7	6	27	2	3
9	1	1	28	4	6
10	2	2			
11	3	3			
12	5	6			
13	6	1			
14	7	2			
15	1	3			
16	3	6			
17	4	1			
18	5	2			
19	6	3			



²⁸ The *umbra recta* is referred to as the *umbra extensa* in the *Practica*, Cap. 42.

[CAPITULUM 3.] SCIENTIA IMPOSITIONIS QUADRANTIS UMBRE

5 Cum volueris ponere quadrantem umbre, iunge cuspidem circuli signorum per lineam subtilem et occultam, que vadit per medium quarte occidentalis et septentrionalis equaliter, cuius finis erit circulus mensium. Postea produces ex fine eius duas lineas ad summitatem tabule, et erit quadrans erectis angulis. Deinde facies

- 1 Scientia ... umbre] *om.* Bα Bζ Bη Bι Bκ Cδ Cε Cη Dβ Dγ Eα Eφ Fδ Lζ Mγ Mδ Mν Nα Oα Oη Oξ Oο Pγ Pυ Pφ Qδ Rα Rβ Sβ Sθ Sι Uα Vα Vε Vκ Vυ Vχ Wβ Xα Xβ; *illeg.* Eδ Eο; De compositione quadrantis Pτ Sκ; De compositione(*corr. from* compositio) quadrantis scilicet umbre in astrolabio Vβ; De compositione quadrantis umbre Pλ Vν; De figuratione quadrantis id est scale altimetre Fα; De impositione quadrantis Dη; De impositione umbre quadrantis c. iii Pρ; De inscriptione quadrantis umbre Mο; De positione quadrantis in dorso astrolabii Mθ Oκ; De quadrante Bγ(*marg., later hand*) Cι Eζ(*marg.*) Pθ Po(*marg.*) Qμ Vψ; De quadrante faciende Wι; De quadrante umbre Qα(*marg.*); De quadrantis compositione Pδ; De quadrantis ordinatione Aα Bθ Mη Vπ(*add. Rubrica*); De quadrantis ordinatione et compositione Eυ; De scientie impositionis quadrantis umbre Fβ; Capitulum 3 De scientia impositionis umbre quadrantis Bε; Opus quadrantis umbre sic est Qα; Opus vel compositio quadrantis umbre Oσ(*later hand*); Opus vel positio quadraturis umbrae Oμ; Opus vel positio quadrantis umbre Cζ(*marg.*) Eμ(*marg.*) Eν Mκ Mλ Oπ Sλ Vσ; Post sequitur positio quadrantis umbre Cβ Cθ; Scala altimeri Eτ; Scientia positionis quadrantis umbre Mν(*diff. hand*) Mφ Vι
- 2 *before* Cum *add.* 3 Bε Cum] *add.* scire Nα Cum ... umbre *om.* Qα ponere] componere Dβ Fδ Mγ Mν Nα Nν Pφ Sι umbre] *libre corr. to* umbre Wβ; uni hore Nα iunge] *om.* Oμ; *add. interlin.* punctum medium in illa quarta Sλ cuspidem] punctum medium in illa quarta cuspidi Cδ; *add.* umbre iuge cuspidem Tδ signorum] singulorum Vπ
- 3 et occultam] *om.* Bα Dβ Fδ Mγ Vν quarte] *om.* Sκ
- 4 equaliter] *om.* Cζ Eμ Oη; equalitaris(!) Vψ; qualiter Rα equaliter cuius] reliquis Mθ mensium] *om.* Fα; *add.* De quadrante umbre Mγ Postea] post hoc *some* produces] educes Cθ Oπ
- 5 eius] scilicet ipsis quadrantis Bζ duas] 2 or ii. *some* lineas] *om.* Nα; *add. in marg.* scilicet diametri equidistantes Sλ; *add.* Eo fol. 184^{va} line 38 – fol. 184^{vb} line 7 summitatem] *asumitate* Eδ; *divisitate* Eα; *summitates* Dγ Mν Oσ Vβ(*gloss*); *add. in marg.* id est ad duas dyametrias Qμ tabule] *om.* Oμ; *add.* id est ad 2 dyametria quartam secantia quam quartam actor hic supponit esse tabulam Qβ Sδ erit] *add.* circulum mensium. Postea produces ex fine eius duas ad summitatem tabule et erit Nα erectis] *om.* Vκ; *ereptis* tabulis Oκ; *ex erectis* Bα Cδ Cι Sθ; *ex erectis* Mν; *ex erectis or ex rectis* Bζ Cε Dη Dβ Eα Eβ Eη Eο Fα Fβ Fδ Lβ Lγ Lε Lη Mγ Mδ Mφ Mν Nα Oα Oζ Oξ Oο Oσ Oτ Oυ Pα Pγ Pθ Pλ Pμ Pν Pρ Pτ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vβ Vι Vν Vσ Vυ Vψ Wα Xβ facies] *facias many*
- 5-6 Deinde ... puncta] *om.* Vε

[CHAPTER 3.] THE METHOD OF THE ENGRAVING OF THE SHADOW SQUARE

When you wish to include a shadow square¹ [on the back], join the centre of the circle of signs with a faint and hidden line which passes equally through the middle of the north-west quarter, whose end will be the circle of months. Next you will draw from its end two lines to the [radii]² of the tabula, and there will be a right-angled quadrilateral. Then,

¹ The shadow square and hour lines are similar to what was found on the *quadrans vetus*.

² Not the normal meaning for “*summitatem*”, but the only one which makes sense.

post ipsas duas lineas, alteras duas prope eas, inter quas erunt puncta. Item facies duas lineas istis latiores inter quas erunt littere, et divides spacia que sunt inter eas lineas ex utraque parte per 6 divisiones ad litteras. Spacium vero quod est strictius divides per

- 6 post] postquam Bθ Vπ post ipsas] *om.* Cζ duas₁] *om.* Wβ; *crossed out* Qμ; *add.* ita quod utraque unam parvam Bζ lineas] litteras *corr.* to lineas Mθ alteras] *om.* Eδ Oπ Vι Vκ; alias Bη Dβ Fδ Oμ duas₂] 2 *some*; *om.* Bγ Bζ Bη Cδ Cη Cι Dβ Eδ Eμ Eφ Fα Fδ Mθ Mκ Mo Nα Oκ Oο Oπ Pγ Pτ Pυ Qα Sκ Sλ Uα Vα Vκ Vν Vσ Vυ Vψ Wι Xα Xβ; *add. interlin.* duas scilicet lineas Vβ; *add.* lineas Bι Bκ Cβ Cθ Eα Eζ Ev Eο Lζ Mλ Mν Oα Oμ Oσ Pγ Po Pφ Sβ Sλ(*interlin.*) Vχ prope ... duas₃] *om.* Dγ eas] signas Cζ erunt] 12 Vσ; *add.* 12 Cδ Mκ(*marg.*) puncta] puncti *many*³; spacia Oξ facies] facias *some*; *add.* alias Bγ Cη Dη Eφ; *add.* alteras Vκ duas₃] *om.* Bα Bη Cζ Eμ Mθ Mν Oκ Oμ Vα; *interlin.* Sλ; 2 *some*; 3 Lγ
- 6-7 ipsas ... latiores] *marg.* Bη alteras ... lineas₁] *om.* Mφ Mυ Oη Vι; *marg.* Rα erunt quas] *marg.* Pρ puncta ... erunt] *om.* Wβ duas lineas] *marg.* Sθ
- 7 lineas₁] litteras *corr.* to lineas Mθ istis] *om.* Bγ Cη Eφ Oμ Sι Sκ; istas Fζ latiores] *om.* Sκ; *corr.* from lineas Sθ erunt] *marg.* Rα littere] linee Mo Vα; numerorum Cζ spacia] *ms* Dβ *ends* sunt] *om.* Bζ eas] *om.* Cβ Cθ Ev Oπ Qα; duas Bα Cδ Cζ Eμ Fδ Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oσ Pφ Sθ Sι Sλ Vα Vν Vσ Vυ; has Bγ Bη Cη Wβ; illas Fβ; istas Cε; *add.* et Bζ lineas₂]⁴ *om.* Mυ Mφ Uα Vι Wα; *illeg.* Cε; litteras Aα Bα Bε Bη Bθ Bι Cδ Cζ Cθ Cι Dγ Dη Eα Eβ Eδ Eζ Eη Ev Eφ Ev Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Nα Oζ Oμ Oξ Oπ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Po Pρ Pτ Pυ Qα Qβ Qγ Qδ Qλ Rα Rβ Sδ Tδ Vα Vβ Vε Vπ Vχ Vψ Wβ Wι Xα Xβ; litteras *corr.* in *marg.* to lineas Sλ
- 8 parte] *om.* Aα Pα; *add.* quadrantis Mθ Oκ; *add.* scilicet quadrantis Cζ Mκ(*interlin.*) Oη ad litteras] *om.* Bε Eα Eβ Eη Fβ Fζ Lβ Lγ Lε Mδ Mυ Mφ Oζ Oξ Oυ Pα Pλ Pν Pρ Qβ Qγ Qδ Rβ Sδ Tδ Vι Wα Xβ; alias Mθ Oκ quod] *marg.* Rα strictius] subterius Bα Cδ Eη Eμ Fδ Mθ Mκ Mν Oκ Oο Oσ Pφ Qα Sθ Sι Vα Vν Vσ Vυ; subterius strictius Bζ; superius Mγ Oα Oη; inter utroque latere superius Cζ

³ Some scribes treat “point” (*punctum*, -i [n]) as masculine (*punctus*, -i) although the true masculine form is *punctus*, -us (Pliny) meaning a pricking or puncturing. One *ms* (Qβ) even has “*puncta*” with “*al’ puncti*” inserted above.

⁴ Even though the majority of manuscripts have “*litteras*,” the meaning of the section requires the reading “*lineas*.” The abbreviations for both words are very similar and can easily be mistaken, one for the other.

after these two lines, you will make another two near to these, between which will be the points. And likewise make two [other] lines further apart than these between which will be the numerals, and divide the spaces which are between these lines on both sides into 6 divisions for the numerals. However, divide the space which is narrower into

10 12 secundum numerum punctorum ad unamquamque litteram 2 punctos; et incipies scribere ex diametris. Et si vis in astrolabio duos quadrantes facias in alia quarta septentrionali et orientali, scilicet que est iuxta eam, similiter.⁵

Potes etiam inter quadrantes duos eosdem inferiores infra circulum mensium constituere lineas horarias, ut fit in quadrante, per quas etiam habebis horas diei naturales in dorso.

- 9 12] 2 C⁶; 13 Mδ Sα Sι; 13 *corr. to* 12 Aα punctorum] *om.* Lβ litteram] lineam Mφ Nα Oα Sι Vν; *corr. to* lineam Mθ; *add.* scilicet Bε Cβ Cδ Cε Cζ Cθ Dη Ev Mθ Mκ Mν Oα Oη Ok Oμ Oπ Oσ Qα Sι Vα Vσ Vν Vχ 2] duos *many*; *add.* scilicet Aα Bθ Dγ Eμ Eo Ev Lζ Sθ Uα Vβ(*interlin.*) Vε Vκ Vπ punctos] *add.* scilicet Cι Eδ Eζ Eτ Mη Mλ Mo Nα Pγ Po Pτ Qδ Qμ Rα Rβ Sβ Sκ Sλ Vι Wι Xα
- 10 diametris] diametro Pτ; *add.* astrolabii Vσ; *add.* dividentes omnes circulos Qα vis] volueris Aα Bζ Bθ Cδ Cζ Cθ Eμ Ev Eo Ev Fδ Mγ Mθ Mκ Mν Oα Oη Ok Oμ Oo Oπ Oσ Pφ Qα Sθ Vα Vβ Vε Vν Vπ Vσ Vν Vχ; volueris habere Sλ in astrolabio] *om.* Cδ Qα; in astralabio Lε quadrantes] *add.* facere Bε(*marg.*) Bζ Cβ(*interlin.*) Mλ; *add.* componere Qα; *add.* habere Cδ Eμ(*interlin.*) Mκ(*interlin.*) Oη Pφ Sθ(*marg.*) Vσ facias] facies Fζ
- 10-12 duos ... duos] Bε(*marg.*) quadrantes ... duos] *om.* Eη
- 10-15 Et ... astrolabii] *om.* Bα
- 11 et orientali] *om.* Aα Fa et orientali scilicet] scilicet et orientali *some* Bγ Cη orientali] occidentalis Dγ scilicet] *om.* Bε similiter] *om.* Aα Pθ Vε; *add.* De allida comuni. Cum vis facere (*i.e., beginning of Cap. 4*) Wι
- 12 quadrantes duos] duos quadrantes duos Wβ duos] *om.* Fζ; et Mδ eosdem] eiusdem Pν inferiores *om.* Bα Bζ Bη Cε Cη Dη Wβ; interiores Mη Qδ infra *om.* Dη
- 12-14 Potes ... dorso] *om.* Aα Bα Bθ Bι Bκ Cβ Cδ Cζ Cθ Dγ Eδ Ev Eμ Ev Eo Ev Fδ Lζ Mγ Mθ Mκ Mλ Mν Nα Oα Oη Ok Oμ Oo Oπ Oσ Pγ Pν Qα Rα Sβ Sθ Sλ Sι Vα Vε Vκ Vν Vπ Vσ Vν Vχ Xα; *in marg. Po; in marg. and add.* ut patet in figuris suprahabbitis Bζ; *add. in marg.* "Potes etc." aliqui habent istam litteram pro extenea(?) Vβ
- 13 lineas] sex litteras Qδ Rβ ut fit in] *om.* Eη fit] sic/sit Sκ habebis] *om.* Bγ Bζ Cε Eφ diei] *om.* Eτ Pτ Qμ Sκ
- 14 naturales in dorso] *om.* Wι dorso] *add.* astrolabii Dη Eα; *add.* ut apparet in figura Cε Vβ; *add.* Et hec est figura dorsi Pφ

⁵ Scribes were unsure of which phrase was being modified by "similiter" and many use it to begin the next sentence ("Potes etiam ...").

⁶ There is a tear in ms Cι at this point, but it does appear that the scribe wrote ".2." rather than ".12."

12 according to the number of points, with two points to each numeral; and you will begin to write these [i.e., the numerals] from the diameters. And if you want two [shadow] squares in the astrolabe, you should make [the second] in a similar way in the other north-east quarter, which is next to it.

And within the same two lower squares inside the circle of the months you will be able to construct the hour lines as is done on a quadrant, through which you will also have the natural hours⁷ of the day on the back.⁸

⁷ These are the “unequal” hours which vary according to the length of daylight during the year.

⁸ The text suggests that the shadow square(s) be constructed above the horizontal diameter of the astrolabe; or alternatively that they be below that line. Depending on where the unequal hour lines have been engraved, the shadow square could be superimposed on the hour lines. The diagrams of the back vary in this respect (see Figura 2).

15 Et hoc est figura⁹ dorsi astrolabii.

15 Et ... astrolabii] *om.* Βκ Cδ Χα; *before ll. 12-14* Ετ Μη Μο Ρτ Ρφ Qδ Qμ Rβ Uα Vβ; Et superior est figura astrolabii Nα; ut apparet in figura superiori A septentrionali scilicet orientali qui est juxta eam similiter Wβ; ut patet in figuris suprahabitis Bγ Cη Eφ; ut patet in figura Bη Dη Et hoc] que Cι dorsi] *om.* Oπ astrolabii] *add.* in precedente pagina Cζ; *add.* quod(quam Mγ) queres in fine Fδ Mγ; *add.* que sequitur in figura latere Eυ

⁹ See Figura 2.

And this is the drawing of the back of the astrolabe [Figure 2].

[CAPITULUM 4.] DE COMPOSITIONE ALLIDADE COMMUNIS, QUE ETIAM REGULA DICITUR

Cum volueris facere allidadam, id est regulam que ponitur supra dorsum astrolabii, fac tabulam angustam in similitudinem regule, cuius longitudo sit ut longitudo tabule et plus per eam quantitatem qua possint abscindi due tabule perforate

- 1 De ... dicitur] *om.* Bα Bε Bζ Bι Bκ Cε Cδ Dγ Eα Eο Lζ Mγ Nα Oα Oη Oο Pγ Po Pφ Rα Sβ Sθ Sι Uα Vα Vε Vυ Xα; *diff. hand* Mυ; *add.* Capitulum Rubrica Qβ; Compositio allidade Vκ; De allida communi Wι; De allidada communi Cι Eτ Pθ Pδ Qμ Sκ Vψ; De allidada componenda Mυ; De allidada facienda que regula vel mediclinium dicitur Cη; De allidada id est regula dorsi astrolabii Mλ; De allidada Rubrica Eδ; De allidade sive regula Qα(*marg.*); De allidada vel mediclinio vel linea fiducie Bγ(*later hand*); De compositione allidade communis Fβ Pq(*add. C. iiiii*); De compositione allidade communis sive regule Eφ Xβ(*sive*) id est); De compositione allidade duplicis Aα Bθ Mη Pυ Vπ(*add. Rubrica*); De compositione allidade sive mediclinii communis Pτ; De compositione allidade sive mediclinii id est regule Vβ; De figuracione allidade Fα; De opere regule Cβ Vσ; De ordinatione alidade communis que regula dicitur Lβ; De positione allidade duplicis Eυ; De scientia regule Fδ Vν; Opus haludad' Sλ(*add. in marg. reg^e*); Opus regule Cβ Cζ Cθ Eμ(*marg.*) Eν Mθ Mκ Oκ Oμ Oπ Oσ(*later hand*) Vχ; Sequitur compositione [*illeg.*] Eζ; Sequitur
- 1 before De] *add.* Sequitur Pν; *add. 2-line gloss* Cζ; *add. marg. gloss* Cζ
- 2 before Cum *add.* 4 Bε Cum] Si Mγ Oο Sι Vν; *add.* autem Bκ volueris] vis *many* facere] finire Vε; *add. Cap. 3, ll. 12-14, rep.* Cum vis facere Wι allidadam] a dadam Vα; alhladam Fδ; alydadam Rβ; hallidadam Sλ; hallididam Cδ; *add. comunem* Bε id est] ad Nα; scilicet Cδ Pq id est regulam] *om.* Tδ; id est regula Dγ; que est regula Aα Bα Bθ Cβ Cε Cθ Dη Eν Eο Eυ Fδ Mγ Mθ Mκ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pλ Pφ Qα Sι Vα Vβ Vε Vν Vπ Vσ Vυ Vχ; que est regulam Bζ Cζ Eμ; que est tabula Mν ponitur] componitur Qα supra] super *many* astrolabii] *om.* Bα
- 3 fac] *om.* Sι; facies Aα Bα Bζ Bη Bθ Cβ Cδ Cζ Cη Cθ Dγ Eζ Eμ Eν Eο Eυ Fβ Fδ Mγ Mθ Mκ Mλ Oα Oη Oκ Oμ Oο Oπ Oσ Pα Pφ Qα Qβ Qγ Qδ Rβ Sδ Sθ Sλ Vα Vβ Vε Vν Vπ Vυ Vχ angustam] *add. interlin.* ex utraque parte equalem Mγ in similitudinem] *twice* Tδ similtudinem] similtudine *some* regule] *om.* Bθ Eυ sit] *om.* Mφ Vι ut] *om.* Bα Cδ Cζ Eμ Fδ Mγ Mθ Mν Oκ Oο Pα Sι Sλ Vν; *interlin.* Sθ; sicut Bγ Bη Cη Mκ(*interlin.*) Qα Vσ Wβ
- 3-4 sit ut longitudo] *om.* Oη Vα ut ... plus] longior diametro Qα
- 4 longitudino] latitudo Cδ Sλ; *add.* vel latitudo Pδ tabule] *add.* dorsi Aα Bε Cι Eα Eβ Eη Eυ Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mκ(*interlin.*) Mo Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pq Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Vσ Vψ Wα Xβ; *add.* dorsi astrolabii Vπ; *add.* scilicet matris Eμ(*interlin.*) Eφ (*interlin.*) Oη Vβ(*interlin.*); *add.* matris Mθ Oκ et ... tabule] *om.* Mλ plus] *om.* Vν; *add.* scilicet Bα per] *secundum* Qδ Rβ eam] eandem Vψ; *add.* quam Sβ possint] possent Sι; possit Vψ abscindi] *om.* Oο; *add.* ab ea Fβ due] 2 *many*; *om.* Bζ; et Aα Eυ

[CHAPTER 4.] ON THE FABRICATION OF THE COMMON ALIDADE, WHICH IS ALSO CALLED THE
RULE

When you wish to make the alidade,¹ that is, the rule which is placed on the back of the astrolabe, prepare a narrow strip like a ruler whose length should be as the width of the back of the disk and more according to that amount from which two perforated vanes can be cut²

¹ The alidade (Arabic: *al-ʿiḍāda*, العَضَادَة; Latin: *allidada*) is a ruler which rotates around the centre of the astrolabe. It has two sighting vanes and together with the rule it is used to read the altitude of the sun and of other stars. See Kunitzsch, *Glossar*, no. 19, pp. 527-528.

² Or, “as much more as is required to allow the cutting off of two perforated vanes”

5 ad accipiendum altitudinem. Et lineabis illam regulam per medium (id est facies in ea lineam bene apparentem dividens eam per medium) in longitudinem et postquam lineaveris ipsam, abscindes de ipsa quantum sufficit ad agendum duas tabulas predictas, et remaneat postea secundum longitudinem tabule vel prope aut paulominus,

- 5 ad] *om.* Cζ accipiendum] accipienda Vσ; accipiendam³ Aα Bε Cζ Eμ Eο Fδ Mθ Mλ Mν Oη Oκ Vα Vβ Vν Vπ; capiendam Bζ Oσ Vχ; sciendum Fα altitudinem] latitudinem Eη Xβ; *add.* soli et stellarum. Bα(*marg.*); *add.* soli et stellis Oη illam regulam] eam Aα Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Fδ Mγ Mθ Mκ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Qα Sι Sλ Vα Vβ Vε Vν Vσ Vυ Vχ; eam regulam Bθ Eο Ev Vπ; illam lineam Qβ; istam regulam Bε Nα Vψ; illam quantum *corr. to* illum Pρ; *add. interlin.* scilicet regulam Vβ medium] *add.* in longitudine Bζ id est facies] faciens Sι
- 5-6 id est ... medium] *om.* Aα Bα Bγ Bε Bη Bθ Bι Bκ Cε Cη Cι Dγ Dη Eα Eβ Eδ Eζ Eη Ev Eο Eτ Eφ Ev Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mη Mo Mυ Mφ Nα Oζ Oξ Oπ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Pο Pρ Pυ Qα Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sκ Tδ Uα Vβ Vε Vι Vκ Vπ Vψ Wα Wβ Wι Xα Xβ
- 6 bene] *om.* Oη Pφ dividens] dimidium Cβ Eμ; dividendo Vχ; divides Mλ Oα Oη Oο Oσ Vν; dividetis Oκ; que dividat Cδ Sλ Vσ in] secundum eius Dη longitudinem] *add.* dierum Pα
- 6-7 et ... ipsam] post Bα postquam ... ipsam] *om.* Qα
- 7 lineaveris ipsam] regulaveris eam Bζ Cβ Cδ Cθ Eμ Ev Fδ Mγ Mκ Oα Oμ Oπ Oσ Pφ Sθ Sι Sλ Vν Vυ Vχ ipsam] eam *some* abscindes] abscinde *many*; abscindens Oη Vβ Vσ de ipsa] ipsam Bγ Bη Cη Eφ ipsam in Bγ ipsa] ea *some* sufficit] *om.* Sι; sufficiente Vα ad agendum] agendum Eζ agendum] *om.* Qα; augendum Pδ; faciendum Bε Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mυ Mφ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pρ Qβ Qλ Qγ Sδ Tδ Vι Wα Xβ; habendum Vχ; tingendum Nα duas] *om.* Bα; 2 *many*
- 8 predictas] *add.* cum dentulos [*superscr.* pinnulas] Cδ; *add.* sive dentulos Sλ remaneat] *om.* Fα; *del.* Pρ; maneat Aα Bγ Bθ Bι Cη Cι Dγ Eδ Eζ Eο Eτ Ev Eφ Lζ Mη Mλ Mo Pγ Pδ Pο Pτ Pυ Qδ Rα Rβ Uα Vβ Vε Vκ Vπ Vψ Wβ Wι Xα; re- *superscr.* Bη postea] *om.* Bα; post modo Eδ; *add.* scilicet de regula Cζ Oη longitudinem] *om.* Wι; *add.* diametri Cβ(*marg.*) Cδ Ev Mκ(*marg.*) Oμ Sι Vχ(*interlin.*) Vσ tabule] diametri dorsi Qα; *add.* ipsius Oα Oυ; *add.* matris Eφ Mκ(*interlin.*); *add.* scilicet matris Cζ Eμ(*interlin.*) vel] *om.* *many* vel prope] predicte Pτ prope] fere Bα aut] autem Fβ; et *many*; vel Bι Dη Qδ Rβ
- 8-9 aut ... pannis] *om.* Qα

³ To agree with “*altitudinem*”.

for taking the altitude [of the sun and the stars]. You will draw a line on it along its middle lengthwise (that is, make a very visible line on it which divides it along the middle), and after you have drawn it, you will cut off from it as much as is needed for making the two aforesaid vanes; and afterwards there should remain [a length] of about the dimension of the disk, either nearly or a little less,

- 10 ne accipiatur in pannis. Postea divides eam per medium certissime in duas partes, et pones in medio eius notam super quam erit apertio axis. Deinde abscindes dimidium regule ex una parte, secundum quod notavi tibi, et abscindes eam ex alia parte econtrario; et servabis lineam que est in medio eius que vadit per axem dum
- 9 ne] *om.* Mη Vι Vψ; ut Oο accipiatur] accipiat Aα Bι Bγ Bθ Cβ Cε Cη Cι Dγ Eδ Eζ Ev Eο Eτ Ev Eφ Fβ Lζ Mλ Nα Oμ Oπ Pγ Pδ Pθ Po Pq Pτ Pv Qδ Rα Uα Vβ Vκ Vπ Wβ Xα Xβ; accipiant Rβ Vχ; accipias Vε; habeat Mδ; *add.* vel adhereat Bγ Bη Cη Eφ Po(*marg.*) Qγ Wβ; *add.* vel hereat Bε Bι Eα Eη Fα Fβ Lβ Lε Lη Mφ Mυ Oζ Oξ Oτ Pα Pλ Pν Pq Qγ Qλ Vι Wα accipiatur in] hereat (*add. in marg.* alter accipiatur in pannis) Oυ in pannis] se vestibus Fβ; *add.* id est vestibus Eφ(*interlin.*) Vβ(*interlin.*); *add.* vel ne panno inhereat Tδ; *add.* Si ne fuerit allidade longior quam longitudinem matris extremitatis eius capiantur vel(scilicet Eμ) retineantur in pannis tuis cum volueris astrolabium alenare(ellenara Cζ = allinare) aut demittere Cζ Eμ(*interlin.*) Postea] post hoc *many; del.* Pq divides] *rep.* Si certissime] rectissime Eδ; rectissime certissime Eα in duas partes] *om.* Qα duas] 2 *many* partes] *om.* Cε
- 10 pones] ponas Eβ Fα Lγ Lε Mδ Mυ Mφ Oζ Pα Pμ Qβ Qγ Qλ eius notam] no^am Rβ; noni Qδ; *add. interlin.* id est punctum Mγ erit] *om.* Ev apertio] ap(p)aritia or ap(p)aricio⁴ Bα Bι Cδ Cι Eζ Fα Fβ Fδ Fζ Lβ Lγ Lη Mδ Nα Oζ Oη Oο Oυ Pα Pδ Pλ Po Pq Pv Pφ Qβ Sλ Vν Vχ Vσ Vψ; aptatio Mγ Vβ; apuncto Bθ; a puncto Vπ; aspercio Cε Eα; *add. interlin.* al'appari^o Vβ axis] assis Vπ; *add.* in figura allidade inferiori depicte Bζ; *add. interlin.* id est foraminem Eφ; *add. interlin.* id est foramen Vβ abscindes] abscindens Cθ; abscindens *corr. to* absindes Cβ dimidium] medium Wι
- 10-11 super ... tibi] *om.* Eη dimidium ... alia] medium secundum notaverit ibi ex utraque Qα
- 11 parte,] *add.* in longo Bα secundum ... tibi] *om.* Cδ secundum ... tibi] *om.* Sλ secundum ... parte,] *om.* Wα notavi] et nota Sι; narraui Sκ; notam docet Oη; notavit Wβ; numeravi Mo Qμ Wι tibi] *om.* Bζ Eα Mν Wβ; in figura Bε abscindes eam] *om.* Bγ Bε Bη Bι Bκ Cη Cι Dγ Eα Eβ Eδ Eζ Eη Eτ Eφ Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mυ Mφ Nα Oζ Oξ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Po Pq Pτ Pv Qα Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sκ Tδ Uα Vβ Vι Vκ Vψ Wβ Wι Xα Xβ alia] altera Vε; utraque Qα
- 11-12 et ... econtrario] abscindes econtrario aliud dimidium ex alii parte Bα
- 12 econtrario] e converso Fζ Lε Mδ Mφ Mυ Oξ Oτ Oυ Pq Qγ Sδ Tδ Vι Vψ; *add.* modo Qα servabis] saluãdo Qα; secabis Vε; signabis Bζ in] *om.* Wι eius] *om.* Bα Qλ que vadit] vadens Qα axem] axcem Sκ; *add. interlin.* id est clavem Eμ Mκ Oη dum] cum Fδ Mγ Pφ Vν
- 12-13 eius ... abscinderis] *om.* Aα Bθ dum] cum Sι dum abscideris] *om.* Bα Mν Qα

⁴ The abbreviations of these two words are often indistinguishable.

that it may not be caught in one's garments. Afterwards divide it very accurately down the middle into two parts and place in the middle of it a mark on which the opening for the axis will be. Then cut away half of the rule on one side (according to what I have indicated to you) and cut it away on the other opposite side.⁵ And you will preserve⁶ the line which is in the middle of it which passes through the axis while

⁵ That is, cut away one side (from the edge to the central line) from one end of the strip to its middle point (of rotation), and cut away the opposite side (from the edge to the central line) from the other end of the strip back to its middle point.

⁶ Or "you will not damage ...", "you will not cut into ..."; "you will safeguard ...".

abscideris, quia in ea erit fiducia. Et acues summitates regule versus lineam a sursum usque deorsum ut fiat subtilis summitas regule et possint videri gradus.

15

Post hoc compones tabulas super unam longitudinem ab axe et servabis ut lineae que sunt in predictis tabulis cadant super lineam regule. Et perforabis eas ante compositionem earum, et sint foramina unius longitudinis a regula. Sintque ipsa foramina super lineam tabularum equaliter perforata et in unaquaque tabula sint duo

- 13 abscideris] abscindis Oκ; *add.* eam Fδ Mγ Oo Pφ Sθ(*marg.*) Sι Vν erit] *om.* Vψ acues] *om.* Lβ Sι; acuas Nα; acuet Pα; accues Mφ Pτ; ames *or* aines Fζ regule] *om.* Qα versus] usque Nα lineam] *add.* fiducie Bε Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mφ Mν Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Vψ Wα Xβ sursum] sumo Cδ Sλ
- 13-14 versus ... regule] Mκ(*marg.*) a ... deorsum] *om.* Qα
- 14 usque] versus Bζ; *add.* ad Bε Eα Fζ Lβ Lγ Lη Mγ Mφ Pα Qβ Qγ Qλ Xβ fiat] subtilis scribat Cζ summitas] *om.* Oπ Qα; submitas Fβ regule] *om.* Qα Xα Xβ et] *om.* Cζ Xβ; ut Aα Bα Cδ Eζ Eμ Eν Mθ Mκ Mλ Mν Oα Oη Oκ Oμ Oσ Pφ Qδ Rβ Sθ Vα Vβ Vσ Vπ Vν; et *corr.* to ut Cβ gradus] *add.* *interlin.* qui fuerit in dorso Vβ; *add.* sicut vides in hac figura Cζ
- 15 compones] componas Rα; pones Dκ Tδ tabulas] gradus tabulas 18 *corr.* to tabulas 18 Pρ; tabulasia Sι; *add.* duos *or* 2 Bε Bη Cε Cι Dη Eα Eη Fα Fβ Fδ Fζ Lβ Lγ Lε Lη Mδ Mη Mν Mφ Mν Oζ Oξ Oo Oυ Oτ Pα Pδ Pθ Pλ Pμ Pν Pρ Pφ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sι Tδ Vι Vβ(*interlin.*) Vν Vψ Wα Wβ Xβ; *add.* sive denticulos Cδ Sλ super] *om.* Pν; iux Bη ab axe] axem Vα ab axe et] ut Nα axe] axce Sκ; *add.* tabulas Bγ servabis] *om.* Bζ ut] tunc Lγ
- 15-16 et ... sunt] i^aut Qα
- 16 predictis] dictis Bα tabulis] *om.* Pθ Qδ cadant] *add.* orthogonaliter Wβ lineam] *add.* *and del.* tabularum equaliter Sθ regule] recte Bα; tabule Oπ; tabule regule Lγ; *add.* ortogonaliter Bε Bη Cι Eα Eβ Fβ Fζ Lγ Lε Mη Mν Mφ Oξ Oτ Pα Pδ Pμ Pν Qβ Qλ Rβ Tδ Vψ Wα; *add.* orthogonaliter Eη Lη Mδ Oζ Oυ Pθ Pλ Pρ Qγ Qδ Vι Xβ perforabis] forabis Bα Cε
- 17 compositionem] compones Eδ; positionem Bα earum] *om.* Bα; *add.* vel sicut quibusdam placet: post insertionem ipsarum(earum Cδ) Cδ Sλ; *add.* Immo melior est forte perforare eas post compositionem earum Cζ Eμ(*marg.*) et] ut Sκ longitudinis] *add.* id est equidistantia Xβ; *add.* sive rationis Mκ(*marg.*); *add.* sive remotionis Cδ Sλ Vσ; *add.* vel altitudinis Bζ a regula] *om.* Pρ ipsa] *om.* Bι Eδ Mγ Vν
- 17-18 unius ... foramina] *om.* Vν ipsa foramina] *om.* Qα
- 18 super] *add.* istam Wα lineam] lineas Aα Bθ Eα tabularum] *om.* Mν Vν; dentulorum Sλ perforata] *om.* Bα; *add.* ita Eφ unaquaque] utraque Bα Cδ Sλ tabula] *om.* Qα; linea Pφ sint] *om.* Vψ duo] 2 *many*; *om.* Cι

you have done the cutting, because in it will be the fiducial [line].⁷ And sharpen the ends of the rule towards the fiducial line, backwards and forwards, so that [each] end of the rule becomes pointed and the degrees can be seen.⁸

After this you will attach the vanes at the same distance from the axis,⁹ and ensure that the lines which are on the aforesaid vanes coincide with the [“central”] line of the rule. In addition you will pierce them before attaching them [to the rule] and the holes should be of the same distance from the rule. And these holes should be evenly pierced along the line of the vanes; and in each vane let there be two

⁷ This edge must be very accurate; the measurements “depend” on it.

⁸ This interpretation – the angling of the ends to a point in order to read the degrees around the rim more precisely – was suggested by Michael Masi in his notes.

⁹ Literally, “at one length” (i.e., the same distance) but each towards opposite ends.

20 foramina, maius scilicet et minus, minus ad accipiendum radios solis in die et maius ad accipiendum stellas in nocte. Nota quod centrum duarum tabularum, que sunt supra capita allidade, et axis allidade debent habere idem centrum, et linea, que est in regula, debet respondere centro dictarum tabularum equaliter, cum collocantur in regula sive in allidada.

Et scito quod armille, per quas suspenditur astrolabium, reflectuntur super

- 19 maius scilicet et minus] *om.* Qα; scilicet Bα; unum maius et alterum minus Pφ scilicet] *om.* Dγ Fα Vκ maius₁ ... minus₂] unus maius alius minus Pφ minus₂] *om.* Bκ Cε Eζ Eτ Fδ Mγ Mo Oη Ok Om Pγ Pl Sκ Uα Vε Wα Wι; *interlin.* Mθ; *add.* autem est Qδ Rβ; *add.* quidam Bε Eβ Fβ Fζ Eα Eη Fα Lβ Lε Lη Lγ Mδ Mu Mφ Oζ Oξ Oτ Pα Pl Pμ Pν Pρ Qγ Qλ Sδ Sl Tδ Wα Wβ Xβ; *add. interlin.* scilicet foramen Vβ accipendum] accipiendas Oη; accipiendos Aα Bθ Cζ Eμ Ev Eo Eu Fδ Mθ Ok Oo Oπ Oσ Sθ St Va Vπ Vσ Vυ Vχ; capiendos Bζ Dη; excipiendos Eo radios] radium Eδ et maius] cum minori. Cum maiori vero Pφ maius₂] minus Cη; minus *corr. interlin.* to maius Bθ; *add.* quidam Ov; *add. interlin.* scilicet foramen Vβ
- 19-20 radios ... accipiendum] *om.* Sκ
- 20 accipendum] *om.* Qα; accipiendas Aα Bθ Cδ Cζ Eμ Ev Eu Fδ Mγ Mθ Oη Ok Oo Oπ Oσ Va Vε Vπ Vσ Vυ Vχ; accipiendis Cβ Cδ Sβ; accipiendos Bα; capiendas Bζ Dη; excipiendas Eo in nocte] *om.* Mκ; *add.* et in praedicta pagina est figura regule Ev *add. in marg.* hec est figura Sθ nota] nōndum(?) Sκ centrum] centra Aα Bγ Bη Cη Ev Tδ Vπ duarum] 2 many; duo Xβ que] *om.* D; *add.* capita Nα supra] super many
- 20-23 Nota ... alidada] *marg.* Vβ; *om.* Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Fδ Mγ Mθ Mκ Mν Oα Oη Ok Oo Om Oπ Oσ Pφ Qα Sθ St Sl Va Vε Vν Vσ Vυ Vχ
- 21 capita] capud Dη Eβ Lβ Lγ Mu Mφ Oζ Oξ Oτ Ov Pθ Pν Pτ Pμ Qγ Qλ Sδ Uα Vι Xβ; caput Cι Eη Mo Pα Pγ Pδ Pl Pρ Qβ Tδ allidade₁] alidade Rβ; alilade Rα axis] assis Vπ; axcis Sκ axis allidade] *om.* Aα Bγ Bθ Cη Eδ Eo Eu Mη Pτ allidade₂] alidade Rβ Wι debent habere] debet esse Qδ Rβ idem] *om.* Aα centrum] *add.* axis allidade Aα Bθ Eo Ev in regula] intra Dγ
- 22 debet] *add. and canc.* habere Pα respondere] corespondere Nα centro] *add.* duarum Mη equaliter cum] *om.* Bθ Vπ collocantur] corrigatur Eη
- 23 allidada] alidada Rβ; allilada Rα
- 24 before Et] *add. marg. gloss* Eμ scito] nota Eδ
- 24-33 Et...voluerit] Item quod foramen armille et allidade similiter cadat equaliter super lineam mediatricem proba per filum cum ponderoso alio suspens (!) Qα

holes, that is to say, a larger and a smaller, the smaller for receiving the rays of the sun by day and the larger for receiving the [light of the] stars by night. Note that the centre of the two vanes, which are towards the ends of the alidade, and the axis of the alidade ought to have the same centre and the line which is on the rule ought to correspond to the centre of the aforesaid vanes, equally when they are placed together on the rule or alidade.

And know that the rings by which an astrolabe is suspended are beveled on

25 spinas suas quousque unaquaeque earum currat in alia, quasi super acumen gladii, ne tardetur, et forte erit in sede aliqua declinatio ad aliquam partium. Et si non fuerit foramen in quo est allidadath, que est armilla reflexa, que figitur in matre super lineam

- 25 spinas] pinas Vv earum] *om.* Wβ; illarum Qδ Rβ Vπ currat] et Oμ in alia] *om.* Pλ alia] aliam Eζ Vβ quasi super] et que Vκ ne] *om.* Mη
- 26 tardetur] tardat *corr.* to tardet Rα; tardatur Eβ Oτ; tardes Vχ; tardet Aα Bα Bθ Bη Bι Bκ Cβ Cδ Cζ Cθ Dγ Eδ Eζ Eμ Ev Eu Fδ Lζ Mγ Mη Mθ Mκ Mλ Mv Mo Nα Oα Oη Ok Om Oo Oπ Oσ Pγ Pδ Pτ Pv Pφ Qμ Sβ Sθ St Sk Sl Uα Vα Vβ Vε Vκ Vv Vπ Vσ Vυ Wβ Wι Xα; *add.* motus Bζ Dη; *add.* motus eius Pρ Tδ; *add.* scilicet motus Aα Bγ Bη Bθ Bι Bκ Cε Cη Cι Dγ Eδ Eζ Eο Eτ Eφ Ev Lζ Mη Mκ(*interlin.*) Mλ Mo Pγ Pδ Pθ Po Pτ Pv Qμ Rα Sβ Sk Uα Vκ Vπ Vψ Wβ Wι Xα Xβ; *add.* scilicet motus eius Bε Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mv Mφ Oζ Oξ Oτ Ou Pα Pλ Pμ Pv Qβ Qγ Qδ Qλ Rβ Sδ Vβ Vι Wα; *add.* secundus motus Nα; *add.* *interlin.* *illeg.* Mγ et forte] *om.* Eζ forte] fortasse Cε Vζ Dη Eμ Ev Mθ Oα Oη Ok Om Oσ Sθ Vπ Vυ; fortassis Aα Bζ Bθ Cβ Cδ Cθ Eβ Ev Eο Fδ Mκ Mv Pφ Oo Oπ St Sl Vα Vε Vυ Vσ Vχ; ne fortassis Mγ; *add.* *interlin.* al' fortassis Vβ; *add.* *in marg.* Docent qualiter scias recte pendere matram Cζ Eμ erit] *om.* Qμ; esse Sι in sede] *om.* Fβ sede] se Bε Cβ Cε Cι Dη Eα Eη Eφ Fα Fζ Lβ Lγ Lε Lη Mγ Mδ Mo Mv Mφ Nα Oζ Oη Oξ Oτ Ou Pα Pδ Pμ Pθ Pλ Pv Pρ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vε Vι Vψ sede aliqua] *om.* Oμ; alia Xβ aliqua] *om.* Cζ Sθ Sl ad aliquam] *om.* Vψ Et₂] ut Eφ Cη Et si] cum Bζ Vχ Et si non fuerit] Et non sit Bα Cδ Eμ(*sit corr.* to fit) Fδ Mθ Mκ Mv Oα Oη Ok Om Oo Oσ Pφ St Sl Vα Vυ Vσ Vυ; Et non fuerit Cβ Cθ Oπ; Et si non sit Dη; *add.* non sit Sθ non] *om.* Ev fuerit] *om.* Fα
- 27 foramen] *add.* bene factum or benefactum Bε Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mo Mv Mφ Oζ Oξ Oτ Ou Pα Pθ Pλ Pμ Pv Pρ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Wα Xβ in₁] *om.* Vψ allidadath] alhdada^t Oτ(*add.* *interlin.* id est); alhlada Cβ; aliclada Rβ; alidada Eα Eζ Pδ; alilacha Cζ; alitata Ev; allidada~ Cε; allidada¹⁰ Bα Bγ Bε Bζ Bη Bι Bκ Cη Dη Eβ Eδ Eη Eο Eτ Ev Eφ Fα Fβ Fδ Fζ Lβ Lγ Lε Lη Mδ Mη Mκ Mλ Mo Mv Mφ Nα Oα Oζ Oη Om Oξ Oσ Ou Pα Pγ Pθ Pλ Pμ Pv Po Pρ Pτ Pv Pφ Qβ Qγ Qδ Qλ Sβ Sδ Sθ St Sk Tδ Uα Vβ Vι Vκ Vυ Vυ Vψ Wα Wβ Wι Xα Xβ; allidada *corr.* to allilata Eμ; allidada *corr.* to hallidada Cδ; allidanda Oo; allidata Aα Mγ Mv Vσ; allidada Cι; allilada Cθ Dγ Lζ Rα; alliladi Vε; allilata *corr.* *suprascr.* to allidada Mθ; allilata Ok Vα; allilatat Vχ; alsilata Oπ; hallidada Sl; *add.* et Bγ Bη Cη Eφ Wβ; *add.* id est clavus super A literam Cδ Sl allidadath ... est₂] *om.* Bθ Vπ que₁] id Bα est₂] *om.* Mγ Pδ; *add.* ad Bκ armilla] armila Oo; armillaus(!) Pα; mulla Cε; *add.* illius Fζ; *add.* suspensoria Eβ Ou(*and deleted*) reflexa] deflexa Lβ figitur] fingatur Mθ Ok; significat Oη in matre] *om.* Oμ

¹⁰ Since the *allidada* / *alidada* is the subject of this capitulum, many scribes have erroneously written “allidada” here when it should be “allidadath”. See the note to the English at this line.

their spines [i.e., their inner edges] for as far as one of them runs over the other, as if upon a sword edge, lest [their movement] be impeded and when seated there might perhaps be some leaning towards one side. And if the hole, which is pierced in the mother in which is the ring [i.e. *allidadath*],¹¹ which is the *armilla reflexa*, is not most accurately along

¹¹ The Arabic base word is *al-‘itāqa* (العلاقة) or “a strap” [or the like, for suspending something]. How this becomes transcribed as *allidadath* (and its variants) is not obvious. Not to be confused with the *alidade* (*al-‘idāda*) or rule (see above Cap. 4 line 1 note). See Kunitzsch, *Glossar*, no. 20, pp. 528-530.

The normal Arabic word for the *armilla reflexa* is *‘urwa* (عروة; “[ring-like] handle”) or sometimes *habs* (حبس; “holding”). See Cap. 1, figure (variants: *armilla reflexa*).

30 mediatricem certissime, ac propter hoc sit aliqua tortuositas in acceptione altitudinis, quod debes ita probare. Mittes per foramen filum et suspendes de eo aliquid ponderosum, post hec suspendes astrolabium per filum alterum ex eodem foramine. Tunc si abierit filum super filum, et non declinaverit ab eo, erit verax; si vero

- 28 mediatricem] diametritem Vv; mediam Vε; *add.* scilicet Pθ certissime] *ms* Pψ *begins*
ac] hac Sι; *add.* si Mγ Oo propter hoc] non Bα; tunc Bη sit] fit Dη Eη Mφ
Oζ Oτ Sι; fuerit Cβ Cθ Fβ Oτ aliqua] *om.* Mκ; alia Mθ; aliquas Oτ; quam Fβ
tortuositas] *om.* Sι; dortuositas Pv in acceptione] et accipe Pδ; et acceptione Wι
altitudinis] latitudinis Sθ
- 28-30 ac ... foramine] *om.* Bζ
- 29 quod] *om.* Fζ; hoc Eα Eβ Eη Fα Fβ Lβ Lε Mφ Oτ Pα Pμ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Wα;
om. Pv; vel Mδ ita] sic Dη probare] proponere Nα mittes] mittas Bε Mv
Oμ; mitte Bγ Wβ foramen] perforamen Oη filium ... eo] *om.* Vε
suspendes] suspendas Pφ; suspende Bγ Bε Bη Cδ Cη Eα Eη Eφ Fα Fβ Fζ Lβ Lγ Lε
Lη Mδ Mo Mv Mφ Oζ Oξ Oτ Ou Pα Pλ Pμ Pv Pρ Qβ Qγ Qλ Sδ Sλ Tδ Wα Wβ Xβ; *add.* *in*
marg. per filum Sθ de] Vβ(*interlin.*); ad Vv; cum Bα Bη Ev Pλ; ex Bγ Cη Eφ Wβ; in
Bε Eα Eη Fα Fβ Lβ Lγ Lε Lη Mγ Mo Mφ Mv Oζ Oμ Oξ Oo Oτ Ou Pα Pθ Pμ Pv Pρ Qβ
Qγ Qδ Qλ Rβ Sδ Tδ Vβ Vι Vv Wα Xβ de eo] *om.* Eo Mδ; *add.* *interlin.* de scilicet filo
Vβ eo] *add.* aliud Bη; *add.* *interlin.* scilicet filo Vβ
- 29-30 de ... suspendes] *om.* Eo Fδ
- 29-31 et ... filium₂] *om.* Uα
- 30 post hec] postea *some* hec] hoc *some*; huius Qδ suspendes₂] suspendas Fζ Pλ
Pμ Qβ; suspende Sλ per filum] *om.* Pλ per filum alterum] de manu tua Pφ
ex] *add.* de Sι
- 30-31 per filum ... filium₂] per alterum filum super filum Bη Wβ
- 31 Tunc si abierit] et si habent Eα si] sic Dγ Rα Wι abierit] abicias Vε;
abierat Eμ; abierit Sι; habierit Sθ Vα; obiciat Aα Bγ Bθ Bι Dη Dγ Eδ Eζ Eτ Eυ Lζ Mη Nα
Pο Pυ Rα Sκ Vβ Vκ Vπ Wι Xα; obiciatur Cη Eφ Pγ Pτ super filum] *om.* Eδ Pv
filium₂] *add.* scilicet (*or id est*) dyametram Mv Mφ; *add.* immo super diametrum Cζ
Eμ(*interlin.*) et] *add.* si Bη Bι Cη Cι Eδ Eζ Eτ Eφ Lβ Mδ Mη Mo Mv Nα Pγ Pδ Pθ Pυ
Qβ Sδ Sκ Uα Vψ Wβ Wι Xα Xβ et non] id est si non Bγ Pτ declinaverit]
haberit Eα ab eo] *om.* Bι si vero] sulo Eζ; si non et si non Xβ vero] *om.*
Dη; autem Bα Bε; non Aα Pγ
- 31-32 erit...ab eo] *om.* Bθ Cε Lβ Mη Oζ Pλ Vπ; *marg.* Pρ
- 31-33 et non ... filum] id est sunt illam lineam mediatatam qui est diameter circumdionalis(!) et
non declaverit (*add.* *in marg.* constitutionem horarum in regula) filum Sθ

the middle line, then because of this there may be some deflection [of the astrolabe] when measuring an altitude. And this you ought to test in this way. Pass a thread through the hole [in the throne] and hang something heavy from it; then hang up the astrolabe by another thread from the same hole. Then if thread lines up¹² on thread and [if there is] no divergence, it is true. But if

¹² Literally, “if thread falls on thread.” Michael Masi suggested this translation.

declinaverit ab eo, stude tunc adaptare eum removendo foramen ad ipsam partem
ad quam declinat filum, si deus voluerit.

32 ab eo] *om.* Dη Eα Eζ; *add.* erit fallax Vβ; *add.* male stabis Vα tunc] *om.* Bα Bζ Cι
adaptare] aptare *some* eum] *om.* Cζ Oμ

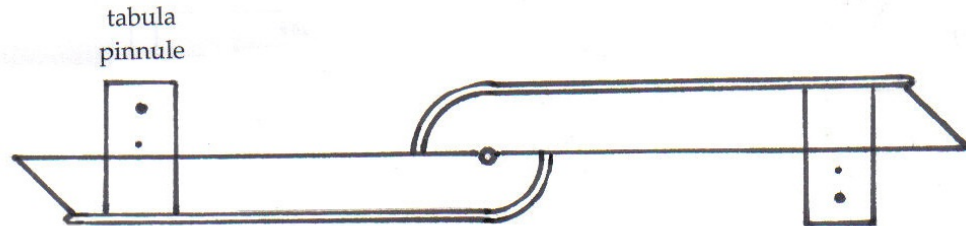
33 ad quam] in quam partem Bκ declinat] declinaverit Bα Cδ Cζ Dη Eμ Eο Eυ Fδ Mγ
Mθ Oα Oη Oκ Oμ Oο Oπ Pφ Si Vν Vπ Vυ Vχ; *add. interlin.* al' declinaverit Vβ si ...
voluerit] *om.* Aα Bα Bγ Bη Bθ Bι Bκ Cε Cζ Cη Dη Eδ Eζ Eυ Eφ Fδ Lζ Mγ Mλ Mo Nα Oο
Pγ Pο Pq Pτ Pυ Qδ Qμ Rα Rβ Sβ Sκ Tδ Uα Vα Vε Vκ Vν Vπ Wβ Wι Xα; ut patet Dγ

there is a divergence, then study to adjust it by moving the hole towards that side to which the thread diverges¹³ (God willing).

¹³ The instructions are too terse at this point. A thread through the hole in the throne is used to suspend the astrolabe, and a second thread with a weight is hung down from the same hole. Due to gravity the threads will always line up with each other, but what surely is really meant is that the thread with the weight hanging down should run along the central vertical line of the astrolabe, that is, along the vertical diameter (usually labeled AC) and across the central hole or axis on which the alidade rotates. If this thread does not line up with the vertical diameter, then the hole in the throne is off centre and needs to be adjusted.

[FIGURA 4]

Allidada – Regula – Mediclinium



[Complete diagram] Bε Bη Bκ Cη Eβ Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oτ Oυ Pα Pγ Pδ Pμ Po Pρ Pυ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vκ Vχ Wβ Wι Xβ

[Partial diagram] Bα Bθ Bι Cβ Cθ Cι Fδ Oσ Vα Vσ

[Outline, or space only] Aα Vβ Vπ

[No space] Bζ Cδ Cε Cζ Dγ Dη Eα Eδ Eζ Eν Eο Lβ Mγ Mδ Mκ Mυ Mφ Nα Oη Oμ Oξ Oο Oπ Pλ Pν Pτ Pφ Qα Qβ Rβ Sθ Sι Sλ Uα Vε Vν Vυ Vψ Wα Xα

[Combined with Fig. 5 (q.v.)] Bγ Vι

Pθ: "C"

[Caption]

allidada - regula - mediclinium¹⁴ Cη Eβ Eη Eτ Eυ Eφ Fα Fζ Lγ Lε Lη Mη Mλ Mν Mo Oτ Oυ Pα Pδ Pμ Po Pυ Qγ Qδ(alidade) Qλ Qμ Rα(allidadach) Sβ(allididich?) Sδ Sκ Tδ Vκ(alhdada) Wβ Xβ; om. Eμ Fβ Oα Oκ Vχ; allida Wι; allidada Oζ; allidada - regula Bη; allidadath(aldidadath Bκ) - mediclinium - regula - radius Bκ Lζ; allidada simplex Pγ; mediclinium que dicitur | allidada vel regula communis Bε; regula horarum Mθ

[Numbers on the rule]¹⁵

12 11 10 9 8 | 1 2 3 4 5 6 | 7 Mθ Oα Oκ; gradus latitudinis | 30 20 10 10 20 30 40 50 60 | regula fiducia Pρ

[Other information]

pinula Pυ; pinula (twice) Lγ Qδ; pinnula Cη Eβ Eτ Eφ Fα Fζ Lε Lζ Lη Mλ Mo Oζ Oτ Oυ Pα Qγ Qλ Qμ Sδ Tδ Vκ Wβ Xβ; pinnula (twice) Mη Mν Po Pμ Vχ; om. Bε Bη Eη Eμ Eυ Fβ Mθ Oα Oκ Pγ Pδ Pρ Sβ tabula Cη Eτ Eυ Eφ Fα Fζ Lγ Lε Mη Mo Oυ Pα Qγ Qλ Qμ Sδ Tδ Wβ; tabula (twice) Bη Pμ; om. Bε Eβ Eη Eμ Mθ Mν Oα Oζ Oκ Oτ Pγ Pδ Po Pρ Pυ Qδ Sβ Vχ; capula Xβ; tabella Fβ Lη Mλ Vκ; tabula perforata (twice) Bκ Lζ

¹⁴ See *Novum Glossarium Mediae Latinitatis*, ed. Franz Blatt et al. (Copenhagen, 1959-1998) M-N, col.

¹⁵ This reflects the influence of Figura 5.

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[CAPITULUM 5.] DE CONSTITUTIONE HORARUM IN REGULA, QUE DICITUR ALLIDADA HORARIA

Cum volueris constituere horas in regula, divide longitudinem unius tabularum que sunt in regula, in qua sunt foramina, per 12 divisiones, eritque ipsa tabula status. Deinde divides similitudinem ipsorum statuum in tabula vel in pergameno, vel in

- 1 De ... horaria] *om.* Bα Bε Bζ Bκ Cδ Cε Dγ Eα Ev Lζ Mγ Nα Oα Oη Oο Pγ Pφ Rα Sβ Sθ Sι Uα Vα Vε Vι Vκ Vυ Xα; *ms* Wκ *begins*; *diff. hand* Mυ; Constitutione horarum in regula Cβ Cζ Cθ Dη Eμ Mθ Mκ Oμ Oπ Oσ(*later hand*) Pψ Sλ Vσ Vχ; Constitutione horarum in regula. Rubrica Ev Oκ; Constitutione horarum in regula que allidada horaria dicitur Fβ; De allidada horaria Aα Bθ Cι Eζ Eτ Mη Mν Pδ Pθ Pο Pυ Qμ Vψ Wι; De allidada horaria. Rubrica Eδ Vπ; De compositione allidada horarie Sκ; De compositione allidada per horis naturalibus horis positionis in regula Pτ; De constitutione horarum in allidada Eφ; De divisione allidada: pro horis naturalibus Vβ; De horis constituens in regula Qα(*marg.*); De horis constituendis in regula que allidada horaria dicitur Cη; De horis in regula Mλ; De horis ponendis in regula Bι Fδ Vν; De inscriptione divisionum horarum in regula Bη Wβ; De regula horaria Bγ(*later hand*); Plo~ a radice tabula scilicet a superfacis regule usque in clavum ipsius concabule(?) Eo[*in a box*]; Rubrica Compositio alidada horarum secundum Messahala Wκ; Sequitur de allidadi horaria secundum 3 modos et primo secundum primum Eφ(*marg.*); Sequitur de constitutione horarum in allidada horaria. De constitutione hararum in allidada horaria Fα in] *om.* Xβ que ... horaria] *om.* Pυ Xβ horaria] *om.* Oυ; hora Lβ; *add.* sequitur Mυ
- 2 *before* Cum *add.* 5 Bε Cum] *add.* autem Bκ constituere] *om.* Ev; inscribere Eα; institutere Mδ; ponere Bα in regule] *om* Mφ; *add.* vel allidada horaria Fβ in regule divide] ... Vψ divide] deinde Xα unius] *twice* Nα tabularum] *add.* erectarum Qα; *add.* pinnularum Bη(*interlin.*) Eη Oη; *add.* id est [*illeg.*] a dicte tabule id est a superficie regule usque in similem ipius tabule Bκ; *add.* *interlin.* id est pinnularum Eμ; *add.* scilicet penule Cζ
- 2-3 divides ... regula] *in marg.* Rβ
- 3 sunt] est Cζ Pq in₁] *om.* Sι; *add.* reliqua Bζ regula] tabula Oμ; *add.* *interlin.* sicut vides in haec pinnula regule Eμ in₂ ... formina] *om.* Bα Cβ Cδ Cζ Cθ Dη Eμ Ev Fδ Mγ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vσ Vυ Vχ; *in marg.* Mθ quo] que Sκ sunt] fuerint Qδ Rβ 12] duodecim Sθ Vψ; .r. Mo divisiones] *om.* Cδ Cε Sλ; *add.* sicut vides in hac pinnula regule Cζ eritque] eruntque in Bα Fδ Mγ Pφ Sι Vν; erunt in Mν status] statuet Cε; *add.* *interlin.* id est terminabitur in tabula parva Vβ
- 3-4 status ... tabula *om.* Vα Vσ
- 4 Deinde ... tabula] *twice.* Cε similitudinem] *om.* Oμ; similitudines Eη Pφ; similitudines *corr.* to similitudinem Vβ; *add.* *interlin.* id est portiones Vβ statuum] *add.* *interlin.* id est divisionum Bη Eμ; *add.* *interlin.* id est tabularum parvarum in₁] *add.* ipsa Mγ Oο Vβ(*interlin.*) Vν tabula] tabella Oα Vσ; *add.* 1-line gloss Cζ] *add.* *interlin.* scilicet lignea Vβ pergameno] parcameno Pδ Vκ; pargameno Cι Mλ Mν Qβ Pψ Vβ Vν; parcameno Cζ Cθ Eμ Ev Oπ; perocameno Oκ vel₂] ut Sλ

[CHAPTER 5.] ON THE ARRANGEMENT OF THE HOURS ON THE RULE, WHICH IS ALSO CALLED
THE “TIME-TELLING” ALIDADE¹

When you wish to mark the hours on the rule, divide the length of one of the vanes which are on the rule, in which the holes are, into 12 divisions, and the vane itself will be a position. Then you will divide a diagram of the actual positions on a flat surface or on parchment, or on

¹ Also known as the “horary alidade.”

- 5 quovis, et divides eam, scilicet similitudinem, per punctos. Post hec pones regulam super 15 gradus ex altitudine et scies quantum habebit ex umbra versa. Et eriges circinum super quantitatem ipsorum graduum quos invenisti ad eandem altitudinem,
- 5 quovis] quo volueris *many* eam scilicet similitudinem] ea Oμ; eam Βα Fδ Mγ Oο Pφ Vα Vν; eas Cβ Cδ Cθ Mθ Mκ Mν Oη Oκ Oπ Oσ Pψ Sι Sλ Vε Vσ Vυ Vχ; eas *corr. to* eam Vβ; eas scilicet in longitudine *corr. to* eas scilicet similitudinem Rα; eas similitudines Bη Dη Eζ Oα(similitudines *interlin.*) Wβ; eas, scilicet similitudines Aα Bγ Bζ Bθ Bι Cε Cη Dγ Eδ Eμ Eο Eτ Eυ Eφ Lζ Mη Mλ Mο Nα Pγ Pο Pτ Pυ Qμ Sβ Uα Vκ Vπ Wι Xα; eos Cζ Ev Qα; eos *corr. to* eas Sθ; *add.* scilicet similitudines *interlin.* Vβ punctos] *add.* divisiones Oη Post hec] Post *many*; Postea *many* regulam] *om.* Oμ; *add.* id est allidadam Bη(*interlin.*) Cζ Eμ(*interlin.*) Mκ(*interlin.*) Oη
- 6 super] *add.* utrique Eα 15] *om.* Qλ; *marg.* Wα; 12 Bζ; 19 Xα; ab Vε; *add.* *interlin.* id est super altitudinem 15 gradus Vσ gradus] *om.* Cδ Cε Cθ Dη Ev Mκ Mν Oμ Oπ Oσ Pψ Qα Sι Sλ Vα Vσ Vυ; octlu Oκ; gradum Cι; graduum Eα Xα ex altitudine] altitudinem Oη; altitudinis Βα altitudine] latitudine et dorso scilicet astrolabii Mθ Oκ; *add.* *interlin.* dorso astrolabii Bη; *add.* id est in dorso astrolabii Cζ; *add.* pinnula Mη; *add.* scilicet in dorso Oη scies] *om.* Uα Vκ Xα; invenies Vε; mox Aα Bθ Bι Bκ Dλ Eδ Eζ Eο Lζ Mη Mλ Mο Nα Pγ Pο Pυ Rα Sβ Sκ Vπ Vψ Wι; mox iudebis Qδ Rβ; stico Oο; *add.* mox Bε Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qλ Qμ(*add. in marg.* scies) Sδ Tδ Vι Wα Wκ Xβ; *add.* *interlin.* in dorso scilicet astrolabii Eμ; *add.* *interlin.* in dorso astrolabii Bη scies quantum] modo Ev habebit] habebis Oυ Pφ Qδ Rβ; habebat Pα; *add.* *interlin.* in dorso Oα versa] *om.* Aα Sι; umbra Oα eriges] eries Wι; erigens Rα; nergens *or* vergens Qδ Rβ; *add.* *interlin.* scilicet aperies Oα
- 6-10 eriges ... et₂] *om.* Vα
- 7 circinum] circulum Mγ Sι Wι; circinum *corr. to* circulum Sθ super] secundum Fδ Mγ Oο Oυ Pφ Qδ Rβ Sι Vβ; *add.* secundum Mυ Mφ Vι; *add.* *interlin.* al' supra Vβ ipsorum] eorum Bι; *add.* punctorum Bγ Bε Bη Cε Cη Cι Dη Eα Eη Eο Eφ Fα Fβ Fζ Lβ Lγ Lε Mδ Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pμ Pν Pρ Qβ Qδ Qλ Qγ Rβ Sδ Tδ Vβ Vι Vψ Wα Wβ Wκ Xβ graduum] *om.* Pδ; graduorum Cε quos] quot Aα Bθ Vε; *add.* *interlin.* in dorso Oα altitudinem] similitudinem Eδ; *add.* *interlin.* scilicet 15 graduum Vβ

any surface you like; and divide this (that is, the representation) by points. Next you will place the rule on 15 degrees of altitude [from the vertical] and you will know how much it will have of the reverse shadow. Next you will place a pair of dividers over the distance of the degrees between these points which you have found for that same altitude, and

10 et pones ipsam quantitatem in regula a radice tabule, quam divisisti, quousque pervenerit; eritque hic finis hore prime. Deinde pones etiam regulam super 30 gradus, et scies quantum conveniet etiam ei ex umbra versa, et aperies circinum secundum quantitatem eorundem punctorum, et pones ipsam quantitatem in regula a radice

- 8 et] ex Nα pones] *om.* Mv; ponens Sθ ipsam] *om.* Cβ; *corr. in marg. to ipsarum* Qμ; ipsarum Mδ Pν Pq Qβ Rβ Sδ Tδ; ipsorum Bε quantitatem ... quousque] usque Vσ in regula] *om.* Eδ regula a] prima Vε a] ad Sβ; si Oμ radice] *add.* predicte Aα Bε Eα Eβ Eη Fα Fβ Fδ Fζ Lβ Lγ Lε Lη Mδ Mφ Pα Pν Pq Pτ(*interlin.*) Pφ Qα Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Vν Wα Xβ tabule] *add.* id est pinnule Bη(*interlin.*) Cζ Eμ(*interlin.*) Oη; *add.* dicte Pλ; *add.* predicte Mγ; *add. interlin.* silicet parve Vβ divisisti] dividisti Po; divisisti Qβ quousque pervenerit] *om.* Dη
- 9 pervenerit] *om.* Lη; evenerit Aα; perveneris Eα; *add.* ad finem umbre Bε Bη Cδ(*marg.*) Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mφ Mν Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pq Qβ Qγ Qδ Qλ Qμ(*marg.*) Rβ Sδ Sλ Tδ Vι Vψ Wα Wβ Wκ Cβ eritque ... prime] *marg.* Cδ; *after gradus* Cθ Eμ Ev Mθ Mκ Mν Oα Oη Oκ Oμ Oσ Pψ Qα Sθ(*marg.*) Vσ; eruntque [*lac.*] hore prima Mν hic] *om.* Mγ; hoc Oσ Pψ; idem terminus Cζ finis] *om.* Eη prime] *add.* et initium [*illeg.*] Bζ; predicte Oo Deinde] Postea Bα etiam] *om.* Bα Bζ Cδ Eδ Fζ Mγ Oα Oo Vβ Vκ Vν Vυ Vψ Wκ; eam Mν Pφ Sι; et Eζ; quam Aα; super Mδ etiam regulam] in regula Mλ 30 gradus] zodiacum Vψ gradus] *om.* Aα Bζ Bθ Cβ Cδ Cθ Dγ Eζ Ev Eo Eτ Eυ Lζ Mγ Mη Mθ Mκ Mλ Mν Mo Nα Oκ Oo Oπ Oσ Pγ Pψ Qα Rα Sβ Sι Uα Vυ Vε Vι Vκ Vν Vσ Vχ Xα; *add.* altitudinis Bα; *add.* eritque hic finis hore prime Sλ
- 9-12 hic ... eritque] *om.* Mν finis ... terminis] *om.* Fβ Wκ; Deinde ... hore] *marg.* Pα Qλ; *after line 20* Qγ; *om.* Wα prime ... finis] *om.* Fβ
- 9-13 Deinde ... hore] *marg.* Cζ
- 10 scies] mox Aα Bθ Bι Bκ Dγ Eδ Eζ Eo Eτ Eυ Lζ Mη Mλ Mo Nα Pγ Po Pυ Qμ Rα Sβ Sκ Uα Vκ Wι Xα; mox scies Qδ Rβ Vβ; scias Lε Pτ; *add.* etiam Mγ Oo Pφ Sι Vν; *add.* in Bζ; *add. interlin.* scies Bθ Qμ; *add.* mox Bγ(*interlin.*) Vπ quantum] quem Oη conveniet] contingit Lε Qβ Tδ; convenit Aα Bγ Bη Cη Eα Eβ Eζ Eη Eφ Fα Lγ Lη Mδ Mφ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pq Pτ Qα Qγ Qλ Sδ Vν Wβ; conveniat Qδ Rβ; eveniet Bζ; proveniet Vυ; *illeg.* Bε Cβ Lβ etiam] *om.* Aα Bγ Bη Bθ Cη Eα Ev Eφ Fδ Fζ Mγ Mφ Oo Pτ Sι Vβ Vψ Wβ; cum Sκ etiam ei ex] de Wκ ei] *om.* Qβ; cia (?) Vε; ea Bθ Bι Dγ Eδ Eζ Eo Lζ Mλ Mo Pγ Po Rα Sβ Sκ Uα Vκ Wι; ea *corr. to* ei Qμ; eis Oυ; in ea Aα Bθ Bκ Eυ Nα Qδ Pυ Rβ ex] *add.* ipsa Vψ umbra] unmbra Sθ versa] *om.* Mγ; umbra Mν aperies] capies Oη; apperies Bκ Dγ Mλ circinum] circulum Sι secundum] *add. interlin.* eamdem Bγ
- 10-12 conveniet ... pervenerit] *illeg.* Lβ
- 11 quantitatem] *interlin.* Cβ eorundem] *om.* Mν Mφ Vι; dictorum Cε Dη; eorum Bα Bε Bζ Bη Cη Eη Oη Oμ Qα Vε Wα Wβ; eorum *add. interlin* -dem Bγ; illorum Oυ; ipsorum Fδ Mδ Oo Vν punctorum] *om.* Mγ pones] *om.* Fζ; ponet Wι ipsam] ipsarum Fζ Pμ quantitatem] *om.* Dη Qα in regula] *om.* Mγ

you will transfer this distance onto the rule [beginning] from the base of the vane, which you have divided, as far as it [i.e., the dividers] will reach. And this will be the end of the first hour. Then also place the rule on 30 degrees and you will know how much the reverse shadow will be consistent with it. And you will open a pair of dividers according to the distance of [i.e., between] these points, and transfer this distance onto the rule [beginning] from the base

15 predicte tabule, quam divisisti, quousque pervenerit; eritque idem terminus finis 2^o hore. Item pones regulam super umbram 45, deinde super umbram 60, postea super umbram 75, qui est finis hore 5^{te}. Et quod residuum fuerit ex regula erit hora 6^{ta}, et non habet finem in regula. Postea revertetur umbra, eritque initium 6^{te} hore finis 7^{me}; et initium 5^{te} finis 8^{ve}; et initium 4^{te} finis 9^e; et initium 3^e finis 10^e; et initium 2^e finis 11^e; et initium prime finis 12^e.

- 12 predicte] *om.* Bα Mγ tabule] *tabelle* Eμ Vσ; *add.* vel *tabelle* Vα; *add.* *interlin.* id est pinnule Eμ quam divisisti] *om.* Eo Ev Vπ quam ... quousque] quousque scilicet Aα Bθ quousque] usque Bα Cθ; usque quo Cβ Oα Oπ Oσ Qα Vυ Vχ; *add.* *interlin.* al' usque quo Vβ; *add.* scilicet Ev pervenerit] *add.* ad finem umbre Bε Bη Cι Eα Eβ Eη Fα Fζ Lβ Lγ Lε Lη Mδ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qδ Qμ(*marg.*) Rβ Sδ Tδ Vι Vψ Wκ Xβ pervenerit ad finem] *ms* Lβ *ends (folio missing), begins again at Cap. 7, line 58 (secundum quantitatem ...)* eritque] eruntque Dγ; *add.* hec Oη idem] *om.* Dη; hic Cε Ev; eidem Wι; ibi Ev terminus] tunc Sι; *add.* se lxc Bζ 2^e] *secunde many; 2 some; 4^e Cε*
- 13 2^o hore] *om.* Bζ Item] iterum Mγ; *add.* *interlin.* al' Iterim Vβ super umbram₁] *interlin.* Sλ umbram₁] *om.* Eα; *add.* 60 post super Pν 45] 15 Ev; 42 Cζ Oη; *add.* gradus Eα Fβ Oη Qδ Rβ Xβ 45 ... umbram₂] *om.* Eη; *add.* *interlin.* Bε 60] *add.* gradus Oη Xα Xβ; 6 Dγ postea] deinde Mγ Oo; post Eζ Mφ Oξ Oυ Qγ Wι super₃] *om.* Cη Eφ Rβ; *interlin.* Bγ
- 13-14 45 ... umbram] *om.* Cε 60 ... umbram] *om.* Pρ Pψ 60 ... 75] *marg.* Pλ
- 14 75] 7 Mγ; *add.* gradus Fβ Oη Xβ qui] *add.* *interlin.* scilicet finimus Vβ hore] *om.* Mδ 5^{te}] *quinte many* quod] si Sβ ex regula] *om.* Bε Eα Eβ Eη Fα Fβ Fζ Lε Lγ Lη Mδ Mφ Mυ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Xβ ex] extra Vψ 6^{ta}] *sexta many; 5 Sβ; 8^a Pμ*
- 14-15 erit ... umbra] *om.* Aα
- 15 Postea] post hoc *or* post hec *many*; deinde Fδ Mγ Oo Vν eritque ... finis] *om.* Wι initium] finis Eδ; *add.* finis Qδ 6^{te}] *sexte many; om.* Rβ; 8^e Bκ hore] *interlin.* Mκ; *om.* Aα Bγ Bε Bι Bκ Cβ Cδ Cη Dγ Eα Eβ Ev Eo Ev Eφ Fβ Fδ Fζ Lγ Lε Lζ Lη Mδ Nα Oα Oζ Oπ Oτ Oυ Pα Pθ Pλ Pμ Pν Pυ Pψ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sθ Sκ Vε Vπ Vυ Vχ Vψ Xα Xβ hore finis] initium Eδ 7^{me}] *septime many; om.* Qδ; *interlin.* Sκ; 8^e Pγ
- 15-16 initium₁ ... 5^{te}] *marg.* Oξ 6^{te} ... initium₁] *om.* Dη Eζ 6^{te} ... initium₂] *om.* Cε 6^{te} ... initium₃] *om.* Vα
- 16 5^{te}] *quinte many* 5^{te} finis] *om.* Pγ; *add.* erit Bγ Cη 5^{te} finis 8^{ve}] *om.* Pμ 5^{te} ... initium₃] *om.* Wκ 8^{ve}] *octave many; septime Dγ* initium₂] *om.* Pγ; finis Mθ Oκ 4^{te}] *quarte many; om.* Bα; prime Oμ; *add.* erit Nα finis] initium Mθ Oκ 9^e] *none many* 3^e] *tertie many; secunde Mη* 10^e] *decime many* et initium₄] *om.* Pθ 2^e] *secunde many; om.* Oπ; prime Vε; 3^e Xα; 4^{te} Oμ finis₄] *om.* Bθ; *twice* Aα 11^e] *undecime many; 13^e Aα; linee Nα; illeg.* Pγ
- 17 et initium₄ ... duodecime] *marg.* Vχ prime] 1^e *some* finis] *twice* Pα 12^e] duodecime *some*

of the above-mentioned vane which you have divided, as far as it will reach. And this same terminus will be the end of the second hour. Likewise place the rule on the shadow of 45 [degrees], next on the shadow of 60, after that on the shadow of 75, which is the end of the 5th hour. And what remains on the rule will be the 6th hour and it does not have an end on the rule.

Afterwards the shadow will go back the other way, and the beginning of the 6th hour will be the end of the 7th; the beginning of the 5th will be the end of the 8th; the beginning of the 4th the end of the 9th; the beginning of the 3rd the end of the 10th; the beginning of the 2nd the end of the 11th; and the beginning of the first the end of the 12th.

20 Et si volueris extrahere umbras harum altitudinum ex tabula umbre, id est ex tabula altitudinis umbre per quam scitur umbra omnis altitudinis, fac, quia verius erit, si deus voluerit.

Item alia extractio etiam in positione horarum in regula levior prima, et omnes redeunt in unum et sunt in opere eedem. Cum hoc volueris, scito longitudinem linee

- 18 Et] *add. in marg.* Secundus modus divisionis ei per tabulam umbre verse Eφ Et si volueris] *twice* Vv extrahere] *om.* Oμ harum] *om.* Bα Bζ; horarum Bκ Mη Σκ; hore Vv; *add.* horarum Cζ ex]] et Σκ tabula] tabulis Vv; *add.* altitudinis Mδ umbre] *om.* Σι id est] *om.* Eυ; prime Aα
- 18-19 id est ... umbre] *om.* Eζ Lγ Mδ Pμ; *marg.* Pο id est ... altitudinis₂] *om.* Bα Cβ Cδ Cζ Cθ Eμ Eν Fα Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Pψ Qα Sθ Sλ Vα Vε Vν Vσ Vυ Vχ
- 19 altitudinis] *add. and canc.* fac quia verius erit Vπ per] et Dγ quia] quod Dη Fα Fζ Lη Oζ Oτ Oυ Qβ Qγ Qδ Rβ Sλ verius] *corr. from* numerus Wι
- 19- 20 quia...voluerit] *om.* Bα; ut p^{ius} Vε
- 20 si...voluerit] *om.* Aα Bα Bγ Bη Bθ Cη Eυ Eφ Fδ Lγ Lζ Lη Mδ Oη Oο Pα Pο Pρ Pτ Pφ Tδ Vβ Vε Vν Vπ Vυ Wβ; si deus vult Rα; si volueris Mν; *add.* Addendum 5 Oη
- 21 before Item] *add.* Aliud capitulum Cζ; *add.* De eodem per umbram Fδ Pτ Vν; *add.* Rubrica Oκ Oξ; *add.* Rubrica alia glasa Eο; *add. in marg.* Tertius modus divisionis allidada per quarta parte circuli Eφ alia] *om.* Mκ Vσ; *add.* horarum Sβ extractio] tractio Wι etiam in positione] eius impositione Qα; et impositio Bι Eα Eδ; est impositione Pδ; etiam impositione Bκ; etiam in compositione Vε; etiam positione Eζ; impositione Cζ Eμ Eφ Oμ Pα Pτ Pψ Vσ; in compositione Vβ; in impositione Bγ Bη Cη Wβ; ipsarum Sλ in regula] *om.* Dη levior] brevior Mφ; deinde Vε; remor Σκ omnes] *om.* Xβ
- 21-22 Item ... eedem]² *om.* Bα Bζ Cδ Fδ Oα Oη Oο Oσ Pφ Sι Vα Vν; *marg.* Cζ Mγ Sθ; Rubrica. Alia constituto horarum in regula levior prima secundum ad idem reddeunt Mθ Oκ; Sequitur de positione allidada horarie onū maiori omni Mν horarum ... eedom] *om.* Oμ et .. eedem] ad idem tamen rediens Sλ
- 21-23 Item ... tabulas] *marg.* Bθ
- 21-26 Item ... tabule₁] *om.* Aα Eυ Vπ
- 22 redeunt] repondent Vψ in₁] ad Bθ Cβ Cζ Cθ Eμ Mκ Oπ Qα Qγ Vυ in unum] *om.* Lη in₂] *add.* eodem Qδ Rβ et ... eedem] *om.* Qγ eedem] eadem Oπ Pψ; eodem Eο Oξ Pρ; heedem Eα Fα Fβ Lγ Oζ Pθ Qβ Qλ Wβ; heedem Cε; regule Nα; *add.* Alia extractio inpositione horarum in regula Oπ(*rubric*) volueris] *add.* facere Bε Bη Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lε Lη Mδ Mφ Mυ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Qγ Qδ Qλ Rβ Sδ Vι Vχ(*interlin.*) Vψ Wα Wβ Wκ Xβ; *add.* hoc facere Tδ; *add.* scire Cη Lγ scito] *om.* Sι; cito Mν lineae] *om.* Cδ Oη Pυ Sλ Vκ Vσ; hec Bζ; non Pρ
- 22-28 longitudinem ... post hoc] *twice in marg.* Pρ

² Many mss treat this opening sentence as a rubric.

And if you wish to extract the shadows of these altitudes from a shadow table, that is, from a table of the altitude of a shadow by which the shadow of every altitude is known, do so, since it will be more accurate (God willing).

Similarly, there is also another means of getting the position of the hours onto the rule, easier than the first. They all go back to the same [idea] and work the same. When you wish [to do this], know the length of the line

25 regule, que cadit inter utrasque tabulas, immo solum usque ad clavum, quia convenientius est ut inter clavum sint omnes umbre, et adde illi longitudini quatuor altitudines sive similitudines totius tabule a superficie regule usque ad summum ipsius tabule et sit plus quatuor similitudinibus totius tabule cum summitatibus suis, bene est;

- 23 regule] *om.* Sβ; prime Vε; recte Eα que cadit] *om.* Cδ Sλ cadit] cadunt Sι; radot Pρ inter] in Nα utrasque] *add.* regulas Cι tabulas] dentulos Cδ Sλ; *add.* id est longitudo que est inter duas pinnulas regule debet plus [esse quam] quadrupla ad ipsam pinnulam ad unius quadrupla alioque non possunt fieri omne hore in regula Eμ immo] *om.* Mδ; ymmo *many* solum] *om.* Xα; solis Sβ clavum] *om.* Vψ quia] quod Dη
- 23-24 immo ... umbra] *marg.* Mκ quia ... clavum] *om.* Eη Pθ Rβ Wι; *marg.* Bε
- 23- 26 immo ... tabule,] *om.* Bα Bζ Bθ Cβ Cδ Cζ Cθ Eμ Ev Fδ Mγ Mθ Mκ Mv Oα Oκ Oμ Oο Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vv Vσ Vυ Vχ immo ... plus] *om.* Oη
- 24 ut] *om.* Cε Dη Sκ clavum] *add.* et tabulam Dη omnes] *om.* Qβ; *add.* regule Pμ Pν illi] *twice* Pγ; ibi Uα quatuor] 4 *many*; 4^{or} *some*
- 25 sive similitudines] *interlin* Vβ; *om.* Bε Cε Cι Eα Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mo Mv Mφ Oζ Oξ Oτ Ou Pα Pγ Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qλ Qμ Rβ Sδ Sκ Tδ Uα Vι Vψ Wα Wι Wκ Xβ tabule] *add.* *interlin.* pinule Bη a superficie regule] *om.* Nα Pυ; *interlin.* Vβ superficie] summo Eτ Vα regule] *twice* Xβ ipsius] *om.* Bη Vβ; illius Xβ; *add.* regule Bκ
- 25-26 a superficie ... tabula,] *om.* Dη
- 26 et sit ... totius] *rep. line 25* (a superficie ... ipsius) Pν et sit ... tabule,] *om.* Dγ Xα et sit plus] et sic Oμ; et si sic non fuerit non sit unus eius Qδ; et si plus Cι Pδ Qα Wκ; et si plus fuerit Bη Cε Cη Dη Wβ; et si plus quam Ev; et si plus sit *or* et si sit plus Bε Cδ Eα Eη Fα Lε Lγ Lη Mδ Mv Mφ Oζ Oξ Oτ Ou Pλ Pμ Pν Pρ Pτ Qβ Qγ Rβ Sδ Tδ Vι Xβ; et sic plus Bα Bι Eο Eτ Eφ Lζ Mη Mo Nα Pγ; et sic plus quam Bθ Vπ sit] sint Sι quatuor] 4 *many*; *iiii*^{or} *some*; *om.* Vσ Wβ similitudinibus] *add.* altitudinis Pρ summitatibus ... est,] *marg.* Wα totius] conus Fα Fβ Lε Oζ Ou Pα Pλ Pμ Pρ Pψ Qβ Qδ Qλ Rβ; covus Oξ; *add.* id est conus Pθ(*marg.*); *add.* *interlin.* conus Bε; *add.* *interlin.* id est pinnule Mκ totius ... summitatibus] *om.* Eο tabule,] *om.* Mκ; *add.* id est pinnule Cζ Eμ(*interlin.*); *add.* sive dentuli Cδ Sλ cum] *om.* Mv summitatibus] foraminibus Aα Bε Bθ Cδ Cζ Eα Eβ Eη Ev Eυ Fδ Fζ Lγ Mγ Mδ Mθ Mκ Oα Oη Oκ Oμ Oξ Oο Oσ Ou Pθ Pλ Pν Po Pρ Pφ Pψ Qα Qγ Qδ Qλ Rβ Sδ Sθ Sι Sλ Tδ Vα Vε Vv Vπ Vσ Vυ Wα; *add.* *interlin.* in alio foraminibus Mκ Vβ suis] *om.* Qλ Lγ; *add.* id est longitudo que est inter 2 pinnulas regule debet plus esse quam quadrupla ad ipsam pinnulam ad unius quadrupla alioque non possunt fieri omne hore in regula Cζ bene est] *om.* Aα Bγ Bζ Bη Bθ Bι Bκ Cβ Cδ Cε Cζ Cη Cθ Dη Eδ Eζ Eμ Ev Eο Eτ Eυ Eφ Fβ Fδ Lζ Mγ Mη Mθ Mκ Mλ Mo Nα Oα Oη Oκ Oμ Oο Oπ Oσ Pα Pγ Pδ Po Pυ Pφ Pψ Qα Qλ Rα Sβ Sθ Sι Sκ Sλ Uα Vα Vβ Vε Vκ Vv Vπ Vσ Vχ Vυ Vψ Wβ Wι Wκ Xα; *marg.* Qμ; bene Bε
- 26-27 totius ... similitudinibus] *om.* Pτ cum ... est] *om.* Mv suis ... similitudinibus] et si scito fut ut minus 4 Bα

on the rule which falls between both vanes, more precisely only [the length] up to the pin,³ since it is more fitting that all the shadows should be between the pin [i.e., between one vane and the pin] and add to that length 4 times the height (or the equivalent) of the entire vane from the surface of the rule right up to the top of this vane, and if it [i.e., the length along the rule] is more than 4 equivalents of the whole vane up to its top, that meets with my approval.⁴

³ “*Clavus*” – see Cap. 6, line 1.

⁴ This is an awkward way of warning that the last mark will be along the alidade (from the vane) about 4 times the height of the vane, and therefore the height of the vane when made should be less than one quarter of either the length of the alidade between the vanes, or the length of the alidade from the central axis to the sighting vane, in order for the last engraved line to fit onto the alidade or to fit between the vane and the pin, whichever is more convenient.

- et si sic non fuerit, non sit minus eis quatuor similitudinibus, quia finis quarte similitudinis est finis hore 5^{te}. Post hoc pone ipsam lineam in tabula vel in pergameno vel in quo volueris. Deinde extrahe ex summitate linee lineam super erectum angulum, et accipe ex eo secundum quantitatem tabule, et scito ipsum punctum et extrahe ex eo puncto lineam super angulum erectum quousque volueris.
- 30
- 27 non] noti Aα fuerit] *add.* ut Qδ non sit] *om.* Vε sit] sunt Sι minus] *om.* Eo; minor Cδ Oμ; maius Oη; unus Cη Qδ Rβ Vβ Wβ eis] *om.* Aα Bζ Bθ Bι Cβ Cζ Cθ Dγ Eδ Eζ Eμ Ev Eo Lζ Mθ Mκ Mλ Mν Oα Oη Oκ Oπ Oσ Pτ Pφ Pψ Qβ Vα Vε Vκ Vν Vπ Vσ Vυ Vχ; ei Vπ; ei Vπ; eius Mγ Rα Sλ; eius *corr.* to eis Rβ; *add.* *interlin.* al' eius Vβ quatuor] *om.* Mγ; 4 *many*; 8 Nα; et Oμ; *add.* eius Aα Bζ Bθ Bι Cβ Cζ Cθ Dγ Eμ Eo Ev Lζ Mθ Mκ Mλ Oα Oκ Oo Oπ Oσ Pτ Pφ Pψ Qα Vα Vν Vσ Vχ; *add.* *sanu or sami* Wα; *add.* *interlin.* aliter eius Vβ quia finis quarte] *twice* Pγ finis] *om.* Wκ quarte] 4^e *many*; quatuor Oη; 5 *corr.* from 4^e Vπ
- 27-28 quia ... similitudinis] *om.* Vε
- 28 similitudinis] similitudinum Cζ Eμ Mθ Oη Oσ est] *twice* Mη; quia Lη est finis] *om.* Ev Pα est finis horis] *om.* Fβ Qλ; *marg.* Wα finis] linis Pμ 5^{te}] prime Vπ; *add.* et parvum plus Cζ Eμ(*interlin.*) Oη Post hoc] Postea *many* pone] *twice* Bι; pones *many*; ponemus Pα ipsum] *om.* Xα pergameno] parcameno Ev Oη; pargameno Mδ Mη Mλ Qβ Vβ Vν; percamemo Cβ; percameno Cζ Cθ Eμ Mκ Mν Oπ Vκ; percamento Oκ
- 28-29 Post hoc ... volueris] *om.* Pθ in₁ ... lineam] *om.* Mγ
- 29 vel ... volueris] *om.* Bα vel] aut Cβ Cζ Cθ Eμ Ev Fδ Mθ Mκ Mν Oα Oη Oκ Oμ Oπ Oσ Pφ Pψ Qα Sθ Sλ Vα Vν Vσ Vυ Vχ in quo volueris] *om.* Bα; alio Bκ Cι Dγ Dη Eτ Lζ Mη Mλ Mo Oo Pγ Qμ Vκ Wι Wκ; in alio Bγ Bη Bι Cε Cη Eδ Eζ Eφ Nα Oμ Pδ Po Pτ Pυ Qδ Qλ Rα Rβ Sκ Vψ Wβ Xα; in alio in quo volueris Bε Eα Eη Lγ Lη Mδ Oξ Oτ Oυ Pα Pμ Pν Pρ Qβ Qγ Sδ Tδ; in alio quo volueris Eβ Fβ Oζ Pλ Vβ Xβ; in aliquo in quo volueris Fα Fζ Lε Mδ; qua voluerit Ev; in quo Sβ; in quo vis Mυ Mφ Vι extrahe] *om.* Ev ex] *om.* Oη; a Bε Eα Eβ Eη Fα Fβ Fζ Lγ Lη Mδ Mυ Oζ Oξ Oτ Oυ Pλ Pμ Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα summitate] summitatem id est extremitatem Oη; *corr.* to id est extremitate Eμ(*interlin.*); *add.* id est extremitate Mκ(*interlin.*) linee] *om.* Oη lineam] hanc Bζ erectum] rectum Bζ Cδ Fβ Pv angulum] *add.* ut hic patet Eμ(*interlin.*) Mθ Oκ
- 29-31 angulum ... angulum] *marg.* Vβ
- 30 ex eo₁] *om.* Ev eo₁] ea Vχ secundum] *om.* Bζ secundum ... ex eo₂] *om.* Pμ quantitatem] compositionem Cδ; *add.* regule Xα tabule] *add.* perforate Pφ; *add.* pinule Oκ; *add.* *interlin.* id est pinnule Eμ scito] cito Mν punctum] *om.* Eτ Uα extrahe] accipe Cε Dη eo₂] ipso Bζ Qβ Qγ Sβ Xβ; *add.* scilicet Vβ
- 30-31 et₁ ... erectum] *om.* Nα ex eo puncto] *om.* Cζ Eμ Mθ Mκ Oη Oκ Vσ
- 31 puncto] *om.* Bα Cδ Fδ Mγ Mκ Mν Oμ Oo Oπ Pψ Qα Sθ Sι Sλ Vα Vν; etiam Cβ Cθ Ev Vχ; ibi Oσ Vυ; ibi *corr.* to puncto Oα lineam] *add.* hanc Cζ Eμ Mθ Oη Oκ; *add.* *and del.* hanc Mκ; *add.* unum in continuum et iterum extensverso(?) Tendendo in oppositum regule sed equedistet Sι erectum] rectum Bα Ev Pv

And if it be not so, it should not be less than these 4 equivalent, since the end of the 4th equivalent is the end of the 5th hour. After this lay out this line on a surface or on parchment or on whatever you wish. Then from the end of the line draw a line at right angles, and take from this, according to the size of the vane, and know [i.e., mark] that point; and draw from this point a line on the right angle as far as you wish.

35 Deinde pone punctum qui est finis tabule cuspidem et mensura quamlibet longitudinem quam volueris, et fac quartam partem circuli. Post hec divides ipsam quartam per 6 partes equales; deinde iunge divisiones punctos scilicet eorum cuspidi, et extrahe lineas quousque perveniant ad dictam lineam linee, id est usque ad regulam,

- 32 pone] ipsum Cδ Eμ Fδ Mθ Mκ Mν Oκ Oμ Oο Pφ Pψ Sι Sλ Vα Vν Vσ; *add.* angulum Pφ; *add.* ipsum Bζ Cζ Oη Sθ punctum] *add.* ipsum Eφ cuspidem] *add.* pone Bζ Cδ Eμ(*interlin.*) Eφ Fδ Mγ Mθ Mκ Mν Oκ Oμ Oο Pφ Pψ Sι Sλ Vα Vσ Vν; *add.* centrum Cζ; *add.* id est centrum Eμ(*interlin.*) Mκ(*interlin.*) Oη mensura] mensurare Cβ Cθ Eμ Eο Mθ Mν Oη Oκ Oπ Oσ Pψ Qα Vα Vε Vκ Vσ Vχ; mensurare *corr.* to mensura Oα quamlibet] *add.* cuitheus Lε
- 33 longitudinem] altitudinem Xα; magnitudinem Pλ quam] *om.* Cε quam volueris] *om.* Pρ Rα volueris] *add.* in linea lineam Ev partem] *om.* Bα Post hec] Post *many*; Deinde Cδ Sλ; Postea Bε Nα; quam Bα ipsam] *om.* Vσ ipsam quartam] *om.* Bα
- 34 quartam] *om.* Bε Sδ; partem Cε Qβ; *add.* partem Oη Oυ Pθ Vκ Vσ Vχ quartam per] in Wκ per] in Bκ; partem in Vα 6] 16 *corr.* to sex Bη; 60 Mγ deinde] dorsi Vε divisiones] *om.* Eα punctos] *om.* Vυ; positiones Eδ; punctis Wβ scilicet] videlicet Aα Bθ Eο Ev Vπ; *add.* circum Mν; *add.* divisiones Eα eorum] earum Aα Bη Bθ Bι Cβ Cζ Dγ Dη Eδ Eζ Eμ Ev Eο Eτ Ev Fδ Lζ Mγ Mθ Mκ Mλ Mν Mo Nα Oα Oη Oκ Oξ Oο Oπ Oσ Po Pv Pτ Pφ Pψ Qα Qδ Rα Rβ Sλ Uα Vα Vβ Vε Vκ Vν Vπ Vσ Vυ Vχ Wι Wκ Xβ; *add.* iunge Cβ Oα Oπ Oσ Vε Vχ cuspidi] *add.* iunges Eο
- 35 quousque] *add.* volueris Lγ perveniant] pervendis Eο; pervenerant Bα Bζ Cδ Fα Fδ Lγ Lζ Oη; pervenerat Xβ; pervenerint Bγ Bθ Bι Cε Cη Dγ Dη Eφ Mη Mλ Nα Pγ Pθ Po Pτ Pv Qδ Rβ Uα Vβ Vπ Wβ; pervenerit Bη Eδ Eζ Ev Mo Vε Vκ; pervenerunt Aα Eτ Pδ; *add.* *interlin.* al' pervenerint ad linea regule Vβ ad₁ ... regulam] *illeg.* Cι; ad dictam lineam a radice, id est usque ad regulam Pα; ad dictam lineam ad lineam ductam id est ad regulam Bζ; ad dictam lineam id est ad regulam Bα; ad dictam lineam linee et ad regule Mγ; ad dictam lineam linee id est ad regulam Fδ Oο Vν Vυ; ad dictam lineam linee regule id est usque ad regulam Qδ Rβ; ad dictam lineam linee regule id est usque ad secundam Pρ; ad lineam regule Vχ; linee ad dictam lineam et ad regulam Mθ Oκ Sι; linee ad dictam lineam id est ad regulam Cδ Cζ Eμ Mκ Mν Oα Oη Oμ Oσ Pφ Pψ Qα Sθ Vα Vσ; linee ad dictam regulam Cε Dη; linee id est usque ad regulam Sκ; linee illius id est usque ad regulam Qμ; linee in regula id est usque ad regulam Nα; linee recte id est ad regulam Cβ Dγ Lζ Sβ; linee recte id est usque ad regulam Eδ Pγ Wι; linee regule Bγ(*after* linee *add.* *interlin.* usque ad) Bη Cη Ev Eφ Oπ Pτ Wβ; linee regule id est ad regulam Bθ Bι Bκ Cθ Eο Ev Mη Mλ Rα Vκ Vπ Vψ; linee regule id est usque ad regulam Aα Eζ Eτ Mo Pδ Pθ Po Pτ Pv Uα Vβ Xα; usque ad regulam Wκ

Then, using this point, which is at [i.e., marks] the end of the vane, as centre, and measuring as much length as you wish [i.e., with any radius] draw a quarter circle. After this you will divide this quarter circle into 6 equal parts. Then join the division points with their centre [i.e., the centre of the quarter circle] and extend the lines until the lines reach the aforesaid line, that is, as far as the rule.

et quocumque se abscindant ipsa erunt puncta horarum: prime videlicet 2^{de}, 3^e, 4^{te} ac 5^{te}; et initium 6^{te} est finis 5^{te}, quia 6^{te} nullum habet finem. Cumque reversa fuerit umbra, ostendet tibi reliquas horas. Si autem fuerit linea sicut quatuor similitudines totius tabule, erit finis 5^{te} hore apud radicem secunde tabule (et apud clavum, quod convenientius est). Cumque reversa fuerit umbra ex altiori summitate, erit hic finis 6^{te}

40

- 36 quocumque] quecumque Mη Μλ Ρα Σκ; quodcumque Οη; ubicumque Qδ Ρβ; *add.* loco Qα Vχ(*interlin.*) se abscindant] scilicet Σι ipsa] *om.* Μυ erunt] *add.* pro Ρμ puncta] *om.* Vψ horarum] hore Dη Σι prime] *om.* Cζ Οη Vπ prime 2^{de}] scilicet Σι videlicet] *om.* Cδ Cε Dη Μγ Σλ Vν; scilicet Βα Cζ Cθ Εμ Ev Fβ Μκ Μν Oα Οη Οπ Ρψ Qα Sθ Vε Vσ Vυ Vχ; *add.* et *some* 2^{de}] secunde *some*; *add.* et *some* 3^e] tertie *some*; *add.* et *some* 4^{te}] *om.* Bθ Να Vπ; quarte *some* ac 5^{te}] *om.* Ev Ρμ 5^{te}] quinte *some*; *add.* et 6^{te} or et sexte Bζ Fβ Fδ Μγ Oο Ρα Vν
- 37 et] item Οπ et ... 5^{te}] *om.* Αα Bθ Vπ est] *om.* Wκ quia] *om.* Mη Ρq 6^{te} 1] sexte *some*; quinte Να; *add.* hore Ev 5^{te}] quinte *some*; et prime Vυ 6^{te} 2] sexte *some*; 8^e Mδ; gradus Fζ nullum] multam .d. Cθ fuerit] erit Οπ umbra] *om.* Fζ; *add.* ex altiori summitate erit hic finis Να(*repeat, cf. line 40*); *ms* Εφ *ends*
- 37-40 Cumque ... est] *om.* Vπ
- 38 ostendet] ostium debet Mθ [*cf.* Οκ (ostñ | d3)] tibi] *illeg.* Vψ; *om.* Βα; tibi Σκ reliquas] *om.* Σι; alias Εα reliquas horas] reliqua Cζ Sθ Vυ; regula Bζ Fδ Μγ Mθ Οη Οκ Oο Σλ horas] *om.* Βα Bζ Cβ Cζ Ev Μκ Μν Oα Οπ Ρψ Qα Vα Vυ Vχ Vψ Wι; *add.* post meridiem Bζ Ρφ fuerit] *add.* tibi Cβ Cθ linea] *om.* Οη; *marg.* Ρα; umbra Βα sicut] sic Bκ quatuor] 4^{or} many similitudines] *add.* vel sic si autem fuerit umbra sicut 4 similitudines Βα totius] *add.* *interlin.* id est pinnule Εμ Mθ; *add.* scilicet pinnule Οκ
- 38-40 ostendet ... umbra] *om.* Αα Bθ Ev Vπ
- 39 tabule 1] tabella Ρψ Vχ; umbre Βα; *add.* *interlin.* pinnule Εμ Μκ erit] erunt Ργ Ρδ Qμ Vψ erit ... tabule 2] *om.* Eζ 5^{te}] quinte many apud 1] *om.* Cι Εα Εη Fα Λη Mδ; ad Bε Εβ Fζ Λε Mη Μυ Μφ Οτ Ρδ Ρθ Ρλ Ρμ Ρq Qγ Qβ Qμ Sδ Tδ Vψ Wα Wκ Xβ; *apud some*; aut Ομ secunde] 2^e *some*; *om.* Bε Εα Εβ Fα Fδ Fζ Λγ Λε Λη Mδ Oζ Oξ Oτ Oυ Ρα Ρλ Ρμ Ρν Qγ Sδ Tδ tabule 2] tabelle Vχ et] et sic Bγ Cη Ρτ; *om.* Ρμ; vel Bε Bζ Εα Εβ Εη Fα Fζ Λγ Λε Λη Mδ Oζ Oξ Oτ Oυ Ρλ Ρν Ρq Qβ Qγ Qδ Ρβ Sδ Tδ Xβ quod] *om.* Dη; qui Qλ; qui est Ρα; et Ετ Σκ Uα
- 39-40 et ... est] *om.* Βα Cβ Cδ Cζ Cθ Εμ Ev Fδ Μγ Mθ Μκ Μν Oα Οη Οκ Oμ Oο Oπ Oσ Ρφ Ρψ Qα Sθ Σι Σλ Vα Vε Vσ Vυ Vχ
- 40 reversa] versa Wβ umbra] *om.* Να; *corr. from* tabula Cζ ex] ac Cη; ab Bγ Bη Wβ erit] erunt Cη hic] *om.* Cζ Εμ Mδ Οη; hoc *some*; ibi Ρq; is Vα 6^{te}] sexte many; 8^e Αα Εδ Ετ Μν Μο Να Ργ Σκ Uα Vκ Xα; 8^e *corr. to* 6^{te} Cβ Eζ

And wherever they cut off, these will be the points [i.e., divisions] of the hours; that is, the first, second, third, fourth and fifth; and the beginning of the sixth is the end of fifth since the sixth has no end. And when the shadow is reversed it will show you the rest of the hours.

If, however, the line is as 4 equivalents of the whole vane, it will be the end of the 5th hour near the base of the second vane (or near the pin which is more appropriate). And when the reversed shadow is along the upper edge, this will be the end of the 6th

hore et initium 7^{me}; et cum reversa fuerit ad finem 5^{te}, erit finis 7^{me} et initium 8^e; et cum pervenerit ad finem 4^{te}, erit finis 8^e et initium 9^e; et cum pervenerit ad finem 3^e, erit finis 9^e et initium 10^e, et cum pervenerit ad finem 2^{de}, erit finis 10^e et initium 11^e; et cum

- 41 hore] *om.* Aα Bα Fδ Mγ Mv Oμ Oo Sθ Si Sl Vv Vv et₁] cum Dη 7^{me}₁] *septime some; 4^e Sβ; add.* et initium Xα et₂ ... et₃] *om.* Cη Wβ; *marg.* Bγ Bη; et Vε cum₁] *om.* Oπ Xβ reversa] *om.* Bε Cι Eα Eβ Eη Fα Fβ Lγ Lε Lη Mδ Mη Mv Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pl Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Vψ Wα Wκ Xβ 5^{te}] *quinte some; 3^e Pγ; add.* hore Qδ Rβ finis] initium Bζ erit] est Lγ Pν Qβ Sδ Wκ; fuerit et Dη 7^{me}₂] *septime some; add.* hore Fβ et₃] cum Dη initium₂] *add.* 4 erit Pμ 8^{me}] *octave some; 4 Vε*
- 41-42 5^{te} ... finem₁] *om.* Tδ 7^{me2} ... finis₁] *om.* Fδ Vα et initium 8^e ... 8^e] *om.* Eo et cum₂ ... 8^e] *om.* Eη; *marg.* Bε
- 41-44 cum₂ ... 12^e] sic secundum ordinem Bκ
- 42 pervenerit₁] venerit Rβ ad₁] *add.* .9. Cι; *add.* none Vψ 4^{te}] *quarte some 4^{te} ... ad finem₂] om.* Pα Qδ finis₁] initium Qα 8^e] *octave some; om.* Vε 8^e ... finis₂] *om.* Xα et initium 9^e] *om.* Qβ initium₁] finis Qα 9^e] *none some; add.* et initium 8^e Wβ; 7^e *corr. to 9^e* Bη pervenerit₂] venerit Aα Bθ Ev Rβ Vπ ad finem₂] *om.* Bα 3^e] *tercie some; 4^e Bθ Vπ*
- 42-43 et₂ ... 9^e] *om.* Pρ et₂ ... 10^e] *om.* Sκ 3^e ... finem] *om.* Cζ Eμ Eτ Mo Pγ Pν UαVα Vυ 3^e ... 2^{de}] *om.* Nα finis 9^e et] *om.* Cθ Ev Mθ Mv Oα Oη Ok Oμ Oπ Oσ Pψ Qα Sθ Wβ
- 42-44 3^e ... 12^e] secunde erit initium prime Fδ; secunde prime erit initium Oo
- 42-46 et₁ ... figura] *repeated in marg.* Oo (*fol. 45^v*)
- 43 9^e] *none some 9^e et] om.* Cβ et₁] ad Eζ; cum Dη et₁ ... 10^e₁] *om.* Mκ 10^e₁] *decime some; 8^e Vε Wβ et cum₁] cum ergo Pα; cum vero Cι Eα Eβ Eη Fα Fζ Lγ Lε Lη Mδ Mη Mv Mφ Oζ Oτ Oυ Pθ Pμ Pν Pρ Qβ Qγ Qλ Qμ Sδ Tδ Vι Wα Wι; cumque Bα et cum₁ ... 10^e₂] *om.* Cε pervenerit] venerit Aα Bθ Qδ Rβ Sκ Vπ 2^{de}] *secunde some; 3^e Vπ; octave Ev Oπ erit finis 10^e] om.* Qλ; *marg.* Wα finis 10^e et] *om.* Cζ Cθ Eμ Ev Oα Oη Ok Oπ Oσ Oψ Qα Sθ Vα Vυ 10^e₂] *decime some et₃] cum Dη initium₂] principium Bε Fβ Fζ Lε Lη Mδ Oζ Oξ Oυ Pα Pl Pμ Pρ Qβ Qλ Sδ Tδ Wα 11^e] undecime some; secunde Vψ; 2 corr. to 11 Oξ; 13 Oτ et cum₂] cum vero Aα Bθ Bι Cε Dη Eδ Eζ Eτ Ev Lζ Mλ Nα Pγ Po Pυ Qδ Rβ Sβ Vα Vβ Vκ Vπ Xα; cumque Bα Cι Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mδ Mv Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pl Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vν Wα Wκ Xβ**
- 43-44 erit ... ad] *om.* Mη; *marg.* Mκ et initium 11^e ... prime] *marg.* Wι (*add. in marg.* erit finis 11^e) et cum₂ ... 11^e] *om.* Sκ

hour and the beginning of the 7th; and when the reversed [shadow] is at the end of the 5th it is the end of the 7th and the beginning of the 8th; and when it reaches the end of the 4th it will be the end of the 8th and the beginning of the 9th; and when it reaches the end of the 3rd it will be the end of the 9th and beginning of the 10th; and when it reaches the end of the 2nd it will be the end of the 10th and the beginning of the 11th; and when

- 45 pervenerit ad finem prime, erit finis 11^e et initium 12^e.
Post hec mutabis horas cum circino in regulam et pone initium regule iuxta radicem tabule, quemadmodum vides in hac figura.

- 44 pervenerit] *om.* Οπ; venerit Αα Βθ Qδ Rβ Sλ Vπ finem] faciem Αα; *add.* erit finis Pγ prime] 1^e *some*; 2^e Vπ finis] *add.* Χα 24 lines (fol. 94^m), marked “*va...cat*” finis 11^e et] *om.* Βζ Cβ Cζ Cθ Εμ Οη Οκ Ομ Οπ Οσ Pψ Qα Sθ Sλ Vα Vυ 11^e] undecime *some*; 12^e Nα; secunde Pρ Vψ et initium] *om.* Ev; *marg.* Sθ 12^e] duodecime *some*; *om.* Vv; 13^e Nα; *add.* si deus voluerit Βζ Cβ Cδ Cζ Cθ Εμ Ev Eo Mθ Mκ Mv Oα Oη Οκ Ομ Οπ Οσ Pψ Sθ Sλ Vσ Vχ
- 45 mutabis] circinabis Βα Cδ Εμ Fδ Mγ Mκ Mv Oη Οκ Ομ Oo Pφ Sλ Vv Vσ; initiabis Pψ; initiabis scilicet circinabis Oα Oσ Sθ Vα Vυ; sirtinabis Sι; *add.* in Vχ pone] propone Oτ iuxta] circa Vχ
- 45-46 Post ... figura] *om.* Qα; Sed mutabis horas ex percamento vel aloco in quo eas signasti cum circino in regule sicut sunt in percamento vel alia materia Pδ
- 46 tabule] tabelle Βγ Βι Βκ Cδ Cε Cθ Cι Dγ Dη Eδ Eζ Ev Eo Eτ Λζ Mη Mo Mv Oπ Pγ Pθ Po Pv Pψ Si Sλ Uα Vβ Vχ Wκ Χα ; *add.* vel tabelle Vα quemadmodum] sic Cε; sicut Αα Βθ Βι Βκ Cδ Cι Dγ Dη Eδ Eζ Ev Eτ Ev Λζ Mη Mλ Mo Nα Pγ Pδ Pθ Po Pv Qδ Qμ Rα Rβ Sβ Sκ Uα Vκ Vπ Vψ Wι Wκ Χα; *add.* et in regula prefiguratur ut Mθ Οκ quemadmodum ... figura] *om.* Βα quemadmodum vides] ut patet Βγ Βη Cη Pτ Wβ hac] *om.* Αα Βη Βθ Eτ Ev Nα Pδ Uα Wκ; presenti Dη; subiecta Fδ Mγ Oo Vv figura] *om.* Eo; *add.* et cetera Pλ; *add.* et(scilicet Cζ) in regula prefigurata Cζ Εμ Mκ Pψ; *add.* inferius posita Fα; *add.* istius eiusdem facies Fβ; *add.* scilicet in prima prefigurata Oη; *add.* sequenti Pτ; *add.* superiore Eτ Uα; *ms* Wκ ends

it reaches the end of the first, it will be the end of the 11th and the beginning of the 12th.

After this you will transfer the hours with a pair of compasses onto the rule and place the beginning of the rule [i.e., the scale of hours] against the base of the vane, just as you see in this figure.

[ADDENDUM 5-1]

Bη(marg.) Εμ(marg.) Μκ(marg.) Οη(after line 20) Οξ(marg.) Ου(marg.) Ρα(marg.) Qμ(marg.)

Nota quod punctus dicitur hic 12^a pars alicuius diei et cum umbra fuerit 12 punctorum, erit equalis sue diei. Et cum fuerit umbra 6 punctorum erit medietas linee diei et sic de aliis partibus. Intellige super quod umbra fuerit plurium punctorum aut paucorum.

- 47 hic] *om.* Οξ Ου Ρα Qμ diei] rei diei Qμ; vel Bη et] unum Οξ Ρα
- 48 sue diei] sue lé lizieí Ρα; sue rei Qμ Et] Si Qμ umbra] *om.* Οη Qμ linee]
 sue Εμ Μκ Οξ Ου Ρα diei₂] rei Qμ
- 48-49 linee ... aliis] suc lineus perconius Bη
- 49 Intellige ... paucorum] *om.* Qμ super] secundum Bη Μκ Ου Ρα aut]vel Οξ Ρα
 paucorum] pauciorum Εμ

[ADDENDUM 5-1]

Note that here a point is said [to be] a twelfth part of a day, and when the shadow comprises 12 points, it will be equal to the particular day. And when the shadow contains six points, the mid-point of the line will be [the middle point] of the day and so on regarding the other parts. Understand further that the shadow will consist of more or few points.

[ADDENDUM 5-2: TABULA]⁵

Bζ Bε Bι Eδ Eζ Eη Eμ Eτ Eυ Eφ Fα(*later hand*) Lε Lζ Mη Mθ Mκ Mλ Mo Oη Oκ Oξ Oτ Oυ Pθ Pλ
Po Pv Qγ Qδ Qλ Qμ(*marg.*) Rα Sβ Vβ Vχ Wβ Wκ Xα Xβ

50 TABULA UMBRE VERSE PER QUAM CONSTITUES HORAS IN REGULA

	Gradus	Puncta	Minuta
	15	3	13
	30	6	56
	45	12	0
55	60	20	47
	75	44	46
	90	infinita	

- 50 Tabula ... regula] *om.* Eδ; Tabula umbra recta Bε in regula] *om.* Fα
- 51 gradus] Ĝ or ĝ *many*; altitudo Oτ; gradus altitudinis Eμ Mκ Oη Oκ Vβ punta] P^a or
p^a *many* minuta] M^a or m^a or mi^a *many* add. 50^c [=Hore?] Eη; hō allidade Bε
- 52 15 44 46 5 Bε Eη
- 53 30 20 47 4 Bε Eη 56] 16 Wκ; 46 Oη
- 54 45 12 0 3 Bε Eη 12] 22 Xα 0] 12 Qδ Wκ
- 55 60 6 56 2 Bε Eη 47] *corr. from* 43 Bζ
- 56 75 3 13 1 Bε Eη
- 57 90 infinita] *om.* Bζ Bι Eδ Eζ Eμ Eτ Eυ Eφ Lζ Mη Mλ Mo Po Pv Qμ Rα Sβ Vχ Wβ Xα; 30 0
0 Pλ; 90 0 0 Fα Lε Oξ Oτ Oυ Pθ Pρ Qγ Qδ Qλ Wκ Xβ; 90 10800 Vβ; 90 0 0 0 Bε Eη
infinita] umbra infinita Oκ

⁵ Bε Eη: 4 columns; col. 1 normal; col. 2-3 reversed (top to bottom); col. 4 numbered from bottom to top. Pθ: The left column of the table is not visible because of the tight binding.

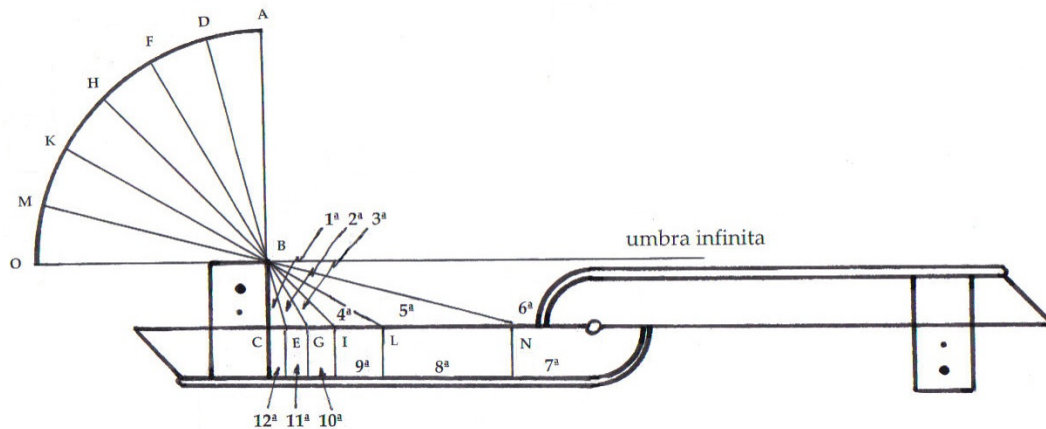
[ADDENDUM 5-2: TABLE]

TABLE OF REVERSE SHADOW[S] BY WHICH YOU
WILL POSITION THE HOURS ON THE RULE

Degrees [of the sun]	Points ⁶ [along the rule]	Minutes
15	3	13
30	6	56
45	12	0
60	20	47
75	44	46
90	infinite	

⁶ Each point is one twelfth the height of the vane.

[FIGURA 5]



Allidada horaria

[Complete diagram] Bγ (reversed) Bε Bη Bι Bκ Cη Cι (reversed) Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Lγ
Lε Lζ Lη Mη Mκ(reversed) Mλ Mν Mο Oα Oζ Oτ Oυ Pα Pδ(reversed) Pλ Pμ Pο Pρ Pυ Qβ Qγ
Qδ(reversed) Qλ Qμ Rα Sβ Sδ(illeg.) Σκ Tδ Vι(fol. 331^v) Vκ(reversed) Vσ Vχ Wβ Wκ(reversed)

[Partial diagram] Cβ Cθ Eα Eν Eο Pγ Qγ Vε Wα(reversed) Wι Xβ

[Outline, or space only] Bα Dγ Eδ Eζ Fδ Mθ Oκ Oσ Pφ Pψ Vα Vβ Vψ

[No space] Aα Bζ Bθ Cδ Cε Cζ Dη Lβ Mγ Mδ Mυ Mφ Nα Oη Oμ Oξ Oο Oπ Pν Pτ Qα Rβ
Sθ Si Sλ Uα Vπ Vυ Vν Wβ Xα

[illeg.] Eβ

Pθ: "D"

[Caption]

Allidada horaria] Bε Bη Cη Eη Eυ Fα Fζ Lγ Lε Lη Mη Oζ Oτ Oυ Pα Pδ Pλ Pμ Pρ Qβ Qγ Qδ Qλ
Qμ Sδ Σκ Tδ Vκ Vσ Vχ Wβ Wκ Xβ; om. Bι Bκ Cι Eμ Eφ Fβ Lζ Mκ Mο Oα Rα Sβ Vσ Wα Wκ; Allidada horaria -
mediclinium - regula Pυ; Allidada - regula horaria - mediclinium] Bγ; Allidada - regula -
mediclinium Vι; Allidada horaria Mλ; Regula horaria Eτ Mν Pο Vχ

add. pinnula Bγ(twice) Vι(twice); add. tabula Bγ(twice) Vι; add. longitudo regule inter duas
pinnulas eius Eμ Pμ

[Numbers on the rule]⁷

1 or 1^a] Bε Bγ Bη Cη Cι Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lη Mη Mκ Mλ Mο Oα Oζ Oτ Oυ Pα Pδ
Pλ Pο Pυ Qβ Qγ Qδ Qλ Qμ Tδ Vι Vκ Vσ Vχ Wβ Wκ Xβ; om. Bκ Lζ Pμ Pρ Vε Wα; 7 Bι Rα Sβ; illeg.
Mν Sδ 2 or 2^a] Bε Bγ Bη Cη Cι Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lη Mη Mκ Mλ Mο Oα Oζ Oτ
Oυ Pα Pδ Pλ Pο Pυ Qβ Qγ Qδ Qλ Qμ Tδ Vι Vκ Vσ Vχ Wβ Wκ Xβ; om. Bκ Lζ Pμ Pρ Vε Wα; 8 Bι
Rα Sβ; illeg. Mν Sδ 3 or 3^a] Bε Bγ Bη Cη Cι Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Lγ Lε Lη Mη Mκ Mλ

⁷ The major variation is the lack of the reversed hours on the alidade.

Mo Oα Oζ Oτ Ou Pa Pδ Πλ Po Pu Qβ Qγ Qδ Qλ Qμ Tδ Vι Vκ Vσ Vχ Wβ Wκ Xβ; *om.* Bκ Λζ Pμ Pρ Vε Wα; 9 Bι Rα Sβ; *illeg.* Mv Sδ 4 or 4^a] Bε Bγ Bη Cη Cι Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mκ Mλ Mo Oα Oζ Oτ Ou Pa Pδ Πλ Po Pu Qβ Qγ Qδ Qλ Qμ Tδ Vι Vκ Vσ Vχ Wβ Wκ Xβ; *om.* Bκ Λζ Pμ Pρ Vε Wα; 10 Bι Rα Sβ; *illeg.* Mv Sδ 5 or 5^a Bε Bγ Bη Cη Cι Eη Eμ Eτ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mκ Mλ Mo Oα Oζ Oτ Ou Pa Pδ Πλ Po Pu Qβ Qγ Qδ Qλ Qμ Tδ Vι Vκ Vσ Vχ Wβ Wκ Xβ; *om.* Bκ Λζ Pμ Pρ Vε Wα; 11 Bι Rα Sβ; *illeg.* Mv Sδ 6 or 6^a or 6^{ta}] Cη Eη Eμ Eυ Fα Fβ Fζ Λε Mλ Oζ Oτ Pa Qβ Qλ Qμ Sδ Tδ Vκ Vχ Xβ; *om.* Bκ Λζ Λη Mo Oα Pμ Pρ Qδ Vε Vσ Wα; 6 or 6^a et or + 7 or 7^a Bε Eτ Λγ Mη Πλ Pu Qγ Vι Wκ; 6^a et 7^a etiam Ou; 6^a et 7^a hora Mκ Pδ Wβ; 6^a hora et 7^a Bη; 6^a infinita Eφ; 6^a 7^a 3w f3? 6^a non habet fuben Po; hora 6^a Cι; prima Bι; p^a Rα Sβ; *illeg.* Mv

umbra infinita] Bε Cη Λζ Eη Eυ Eφ Fζ Λγ Λε Λη Mη Mλ Oζ Oτ Ou Pa Πλ Pρ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vκ Vχ Wβ Xβ; *om.* Bκ Fα Fβ Λζ Mo Oα Vε Wα Wκ; ; umbra infinita et est finis 6^e or sexte hore Bγ Mv Po Pu Vι; umbra infinita que est finis hore 6^e Cι Bη Eτ Mκ Pδ Vσ; initium prime hore et finis 12e Bι Rα Sβ; principium prime hore Sκ

7 or 7^a] Bη Eυ Eφ Fα Mλ Pa Vχ; *om.* Bγ Bκ Cη Cι Eη Eμ Eτ Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oα Oζ Oτ Pδ Πλ Pμ Po Pρ Pu Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vε Vι Vκ Vσ Wα Wβ Wκ Xβ; et 12^a Rα Sβ; vel 12 Bι; hora sexta non habet finem Ou; *illeg.* Mv Sδ 8 or 8^a] Bη Eυ Eφ Mλ Oα Ou Pa Po; *om.* Bγ Bε Bκ Cη Cι Eη Eμ Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oζ Oτ Pδ Πλ Pμ Pρ Pu Qβ Qγ Qδ Qλ Qμ Tδ Vε Vι Vκ Vσ Vχ Wα Wβ Wκ Xβ; 2 Bι Rα Sβ; *illeg.* Mv Sδ 9 or 9^a] Bη Eυ Eφ Mλ Oα Ou Pa Po; *om.* Bγ Bε Bκ Cη Cι Eη Eμ Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oζ Oτ Pδ Πλ Pμ Pρ Pu Qβ Qγ Qδ Qλ Qμ Tδ Vε Vι Vκ Vσ Vχ Wα Wβ Wκ Xβ; 3 Bι Rα Sβ; *illeg.* Mv Sδ 10 or 10^a] Bη Eυ Eφ Mλ Oα Ou Pa Po; *om.* Bγ Bε Bκ Cη Cι Eη Eμ Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oζ Oτ Pδ Πλ Pμ Pρ Pu Qβ Qγ Qδ Qλ Qμ Tδ Vε Vι Vκ Vσ Vχ Wα Wβ Wκ Xβ; 4 Bι Rα Sβ; *illeg.* Mv Sδ 11 or 11^a] Bη Eυ Eφ Mλ Oα Ou Pa Po; *om.* Bγ Bε Bκ Cη Cι Eη Eμ Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oζ Oτ Pδ Πλ Pμ Pρ Pu Qβ Qγ Qδ Qλ Qμ Tδ Vε Vι Vκ Vσ Vχ Wα Wβ Wκ Xβ; 5 Bι Rα Sβ; *illeg.* Mv Sδ 12 or 12^a] Bη Eυ Eφ Mλ Oα Ou Pa Po; *om.* Bγ Bε Bκ Cη Cι Eη Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mη Mκ Mo Oζ Oτ Pδ Πλ Pμ Pρ Pu Qβ Qγ Qδ Qλ Qμ Tδ Vε Vι Vκ Vσ Vχ Wα Wβ Wκ Xβ; 6 Bι Rα Sβ; *illeg.* Mv Sδ

[Lettering on the diagram]⁸

A] Bγ Bη Bκ Eτ Eυ Λγ Λζ Mη Mκ Mv Mo Pδ Πλ Po Qβ Qγ Qμ Vι Vσ Wα Wκ; *om.* Bε Bι Cη Cι Eη Eμ Eφ Fα Fβ Fζ Λε Λη Oζ Ou Pa Pμ Pρ Qδ Rα Sβ Tδ Wβ; B Vκ; A D Vε; O Pu Vχ; P Mλ; Z Oα; 90 Po Pρ Qγ; *illeg.* Qλ Sδ A-D] 1, 12 Bε Eη Oτ Pρ Qγ; 6 Sκ; 6^a, 7^a Fα; 90 Sδ B] Bγ Bη Eτ Eυ Λγ Mη Mκ Mλ Mv Mo Pδ Πλ Po Pu Qβ Qγ Qμ Vι Vκ Vσ Vχ Wκ; *om.* Bε Bι Bκ Cη Cι Eη Eμ Eφ Fα Fβ Fζ Λε Λη Λζ Oζ Oτ Ou Pa Pμ Pρ Qδ Qλ Rα Sβ Tδ Vε Wα Wβ; C Oα; *illeg.* Sδ C] Bη Bγ Eτ Mκ Mo Pδ Po Vι Vσ Vχ Wκ; *om.* Bε Bι Cη Cι Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mv Oζ Oτ Ou Pa Πλ Pμ Pρ Qβ Qγ Qδ Qλ Qμ Rα Sβ Tδ Vκ Wα Wβ; A Oα; B Bκ Λζ Vε; P Pu; Q Mλ; *illeg.* Sδ

D] Bγ Bη Eτ Eυ Λγ Mη Mκ Mv Mo Oα Pδ Πλ Po Qβ Qγ Vι Vσ Wα Wκ; *om.* Bε Bι Cη Cι Eη Eμ Eφ Fα Fβ Fζ Λε Λη Oζ Pa Pμ Qδ Qμ Rα Sβ Tδ Wβ; M Pu Vχ; N Bκ Λζ Mλ Vε; 75 Ou Po Pρ Qγ; *illeg.* Qλ Sδ Vκ D-F] 2, 11 Bε Eη Oτ Pρ Qγ; 5 Sκ; 5^a, 8^a Fα; 75 Sδ E] Bγ Bη Eτ Mκ Mo Oα Pδ Po Qγ Vι Vσ Vχ Wκ; *om.* Bε Bι Cη Cι Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mv Oζ Oτ Ou Pa Πλ

⁸ While some mss have the series A-O as on the diagram, the most common variation is either to omit all the lettering, or to omit all the lettering along the alidade. The least common variation is a different set of lettering. Note also that some mss have both letters and numbers on the quarter circle, or two sets of numbers (degrees and hours).

Ρμ Ρο Qβ Qδ Qλ Qμ Ρα Sβ Tδ Vκ Wα Wβ; G Vε; M Mλ; N Pυ; P Bκ Lζ; 6 Sκ; *illeg.* Sδ F] Bγ Bη
 Eτ Eυ Λγ Mη Mκ Mν Mo Oα Pδ Πλ Po Qβ Qγ Vi Vσ Wα Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eφ Fα Fβ Fζ
 Λε Λη Oζ Πα Ρμ Qδ Qμ Ρα Sβ Tδ Wβ; K Pυ Vχ; L Mλ; M Bκ Lζ Vε; 60 Ou Po Ρο Qγ; *cut off* Vκ;
illeg. Qλ Sδ F-H] 3, 10 Bε Eη Ot Ρο Qγ; 4 Sκ; 4^a, 9^a Fα; 60 Sδ G] Bγ Bη Eτ Mκ Mo Oα Pδ
 Po Qβ Vi Vσ Vχ Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mν Oζ Ot Ou Πα Πλ Ρμ
 Ρο Qδ Qλ Qμ Ρα Sβ Tδ Vκ Wα Wβ; K Mλ; L Pυ; Q Bκ Lζ R Vε; 5 Sκ; *illeg.* Sδ H] Bγ Bη Eτ Λγ
 Mη Mκ Mν Mo Oα Pδ Po Pυ Qβ Qγ Vi Vσ Vχ Wα Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eφ Fα Fβ Fζ Λε Λη
 Oζ Πα Ρμ Qδ Qμ Ρα Sβ Tδ Wβ; C Vε; G Eυ Πλ; I Mλ; L Bκ Lζ; 45 Ou Po Ρο Qγ; *cut off* Vκ; *illeg.* Qλ
 Sδ H-K] 4, 9 Bε Eη Ot Ρο Qγ; 3 Sκ; 3^a, 10^a Fα; 45 Sδ I] Bγ Bη Eτ Mκ Mo Oα Pδ Po Pυ Vi
 Vσ Vχ Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mν Oζ Ot Ou Πα Πλ Ρμ Ρο Qβ
 Qδ Qλ Qμ Ρα Sβ Tδ Vκ Wα Wβ; E Vε; H Mλ; R Bκ Lζ; 4 Sκ; *illeg.* Sδ K] Bγ Bη Bκ Eυ Λγ Lζ
 Mη Mκ Mν Mo Oα Pδ Πλ Po Qβ Qγ Vε Vi Vσ Wα Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eτ Eφ Fα Fβ Fζ Λε
 Λη Oζ Πα Ρμ Qδ Qμ Ρα Sβ Tδ Wβ; F Pυ Vχ; G Mλ; 30 Ou Ρο Qγ; *cut off* Vκ; *illeg.* Qλ Sδ K-M]
 5, 8 Bε Eη Ot Ρο Qγ; 2 Sκ; 2^a, 11^a Fα; 30 Sδ L] Bγ Bη Eτ Mκ Oα Pδ Po Vi Vσ Vχ Wκ; *om.* Bε
 Bi Cη Ci Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Mη Mν Oζ Ot Ou Πα Πλ Ρμ Ρο Qβ Qδ Qλ Qμ Ρα Sβ Tδ
 Vκ Wα Wβ; F Mλ; G Pυ; T Bκ Lζ Vε; 3 Sκ; 5 Mo; *illeg.* Sδ M] Bγ Bη Eυ Mη Mκ Oα Pδ Πλ Po
 Qβ Qγ Vi Vσ Wα Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eτ Eφ Fα Fβ Fζ Λε Λη Oζ Πα Ρμ Qδ Qμ Ρα Sβ Tδ
 Wβ; D Mλ Pυ Vχ; H Vε; N Mo; V Bκ Lζ; 15 Ou Ρο Qγ; *cut off* Λγ Vκ; *illeg.* Mν Qλ Sδ M-O] 6, 7
 Bε Eη Ot Ρο Qγ; 1 Sκ; 1^a, 12^a Fα; 15 Sδ N] Bγ Bη Eτ Mκ Pδ Po Vi Vσ Vχ Wκ; *om.* Bε Bi Cη Ci
 Eη Eμ Eυ Eφ Fα Fβ Fζ Λγ Λε Λη Lζ Mη Mν Mo Oζ Ot Ou Πα Πλ Ρμ Ρο Qβ Qδ Qλ Qμ Ρα Sβ Tδ
 Vε Vκ Wα Wβ; B Oα; E Mλ Pυ; X Bκ; 2 Sκ; *illeg.* Sδ O] Bγ Eτ Eυ Mκ Mo Pδ Πλ Po Vi Vσ Wα
 Wκ; *om.* Bε Bi Cη Ci Eη Eμ Eφ Fα Fβ Fζ Λε Λη Oζ Ot Ou Πα Ρμ Ρο Qβ Qδ Qμ Ρα Sβ Tδ Wβ; A Mλ
 Pυ Vχ; C Λγ Mη; CD Lζ; D Bκ; F Vε; R Qγ; *cut off* Bη Vκ; *illeg.* Mν Qλ Sδ OB extended] H Oα; P
 Eτ

[Comment on Capitulum 5:

The drawing of the [unequal] “hours” on the rule or alidade essentially turns one vane on the alidade into a gnomon, whose shadow will indicate the time. The text offers three methods of engraving these hours.

The first (lines 2-17) read off distances on the shadow square (for various elevations of the sun) along the *umbra versa* (reverse shadow) or the *umbra recta*⁹ (shadow) scale, which are then transferred to the alidade.

The second (lines 18-20) refers to the use of a table of the shadows cast which can then be marked on the alidade. Such a table is found as Addendum 5-2, which are figures also derivable from the shadow square in the first method.

The third method (lines 21-46) is to construct a full-scale diagram of the alidade and vane with a quarter circle (with its centre at the top of the vane) divided every 15 degrees and to then project lines from these points through the centre (at the top of the vane) down to the alidade where the hour lines across the alidade will lie. These lines are then transferred to the actual metal alidade.

For the use of these lines, see *Practica*, Cap. 11.

For a further discussion of this aspect of an astrolabe see Josefina Rodriguez-Arribas, “A Treatise on the Construction of Astrolabes by Jacob ben Abi Abraham Isaac al-Corsuno (Barcelona, 1378): Edition, Translation and Commentary”, *Journal for the History of Astronomy*, 49 (2018), 27-82, especially p. 33 and notes 31-34 (pp. 71-72), as well as Appendices 1-3 (pp. 76-79) and the accompanying notes.

Rodriguez-Arribas comments (p. 71 note 32) that very few (extant) Islamic and European astrolabes are actually marked with such hour lines on the alidade, referring to studies by David King.

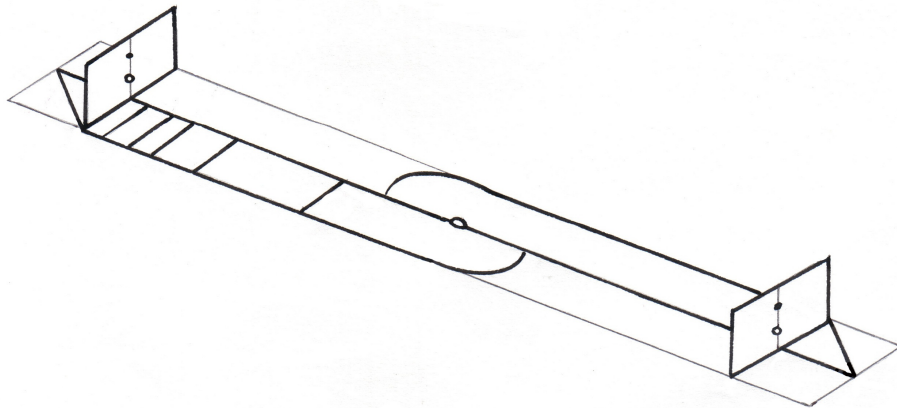


Figure 5A. Perspective view of the Alidade, with hour-lines

Samsó points out that “this kind of alidade, which assumes an increase of 15° in the solar altitude corresponds to the passage of one seasonal hour, is independent of the local latitude. It was known in the Greek and Byzantine world, as well as in early Medieval Europe and in early

⁹ *umbra recta*: also known as the *umbra extensa* – see the *Practica* section, Cap. 42.

Islamic astronomy, as described by Ḥabash al-Ḥāsib (fl. 831-860) and by Hermann Contractus (1013-1054).” In his footnote he cites David King (2005), pp. 253-255 and continues, “this kind of device was not unknown in the Andalusī tradition. As remarked by Martí and Viladrich (1983, pp. 69-70) a reference to it appears in Ibn al-Ṣaffār’s treatise on the use of the astrolabe: see Millás’ Arabic edition (Millás, 1955, pp. 63-64) and his Catalan translation in Millàs, 1931, pp. 39-40.”¹⁰

¹⁰ Samsó, *On Both Sides*, p. 420 and note. The full references for his sources are:
 King, 2005 – David A. King, *In Synchrony with the Heavens. II, Instruments of Mass Calculation* (Leiden: Brill, 2005).
 Martí and Viladrich, 1983 – Ramon Martí and Mercè Viladrich, “En torno a los tratados de uso del astrolabio hasta el siglo XIII en al-Andalus, la Marca Hispánica y Castilla,” in Juan Vernet, ed., *Nuevos Estudios sobre Astronomía Española en el Siglo de Alfonso X* (Barcelona, 1983), pp. 9-74.
 Millás, 1955 – José Maria Millás Vallicrosa, “Los primeros tratados de astrolabio en España,” *Revista del Instituto Egipcio de Estudios Islámicos*, 3 (1955), pp. 35-49 [Spanish], 47-76 [Arabic].
 Millàs, 1931 – Josep M. Millàs Vallicrosa, *Assaig d’història de les idees físiques i matemàtiques a la Catalunya Medieval* (Barcelona, 1931).

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[CAPITULUM 5 BIS.] DE COMPOSITIONE NOVELLE

Facies etiam aliam regulam, que “novella” dicitur, ut hic patet, que sit divisa per notas secundum divisiones linee meridionalis tabule latitudinis tue regionis per almucanthat et hoc curret super faciem rethis.

Cap. 5 BIS:

[*after Cap. 5*] Aα Bε Bθ Cε Cι Dη Eα Eβ Eη Eμ(*marg.*) Eτ Eυ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mo¹ Mυ Mφ Nα Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Po(*marg.*) Pρ Pυ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sκ Tδ Uα Vβ Vι Vπ Vψ Wα Wι Xβ

[*in Cap. 6*] Bγ Bη Cη Mκ(*marg.*) Mo Pτ Wβ

[*in upper marg.*] Eδ

om. Bα Bζ Bι Bκ Cβ Cδ Cζ Cθ Dγ Eδ Eζ Eν Eο Fδ Lζ Mγ Mθ Mλ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pγ Pφ Pψ Qα Rα Sβ Sθ Sι Sλ Vα Vε Vκ Vν Vσ Vυ Vχ Xα

- 1 De ... novelle] Dη Pλ Vβ; *om.* Aα Bε Bη Bθ Cε Cη Cι Eα Eβ Eδ Eη Eμ Eτ Eυ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mκ Mo₁ Mo₂ Nα Oζ Oξ Oτ Oυ Pα Pμ Pν Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sκ Tδ Uα Vπ Wα Wβ Wι Xβ; Compositio novelle Pδ Pθ Vψ; De novella Bγ(*marg.*) Mυ(*diff. hand*) Mφ Vι
- 1-3 Facies ... meridonalis] *cut off* Eδ
- 2 Facies] Fac Oυ; Post facies Fβ hic] *om.* Aα que,₁] *om.* Cε novella] novella Mφ Sκ ut hic patet] *om.* Mκ Wι patet] dicitur Uα sit] est Mκ
- 2-4 Eμ(*marg.*): Facies regulam que vocatur volnella et divides eam secundum divisiones almutantarath in linea meridionalis ad regionem que volueris et hoc curret super volnellum quemadmodem allidada hoc dorsum. Et est utilis ad multa.
- 3 notas] notam Bθ secundum] *om.* Eυ divisiones] divisionem Cι Eτ Fα; *om.* Mo per] *om.* Cε; et Aα
- 4 almucanthat] almicanch’ach Eτ; almicantarath³ Dη; almicantarath Eα; almicanthat Eδ; almicanthat Pλ; almihantha’t Bε; almitanth’ach Uα; almicancha’t Po; almicantarath Aα Bθ Eη Mδ Nα Pθ Pυ Rβ Vψ; almicanth’ Eβ Pτ; almicanth’ach Wβ; almicantha’t Sκ; almicanth’ath Bγ Fα; almicanthatrach Lγ Mυ Oξ Qμ Xβ; almicanthat Oυ Po Vι Wι; almicanthatrach Eυ Fς Lε Lη Mη Mo Mφ Oζ Oτ Pα Pμ Pν Pρ Qβ Qγ Qδ Qλ Sδ Tδ Vβ Vπ Wα; almicanthath Cη; almicatharath Pδ; almucha^{at} Bη; almuchachara³ Cε; almuchancarath Mo; almuchan^{rath} Mκ; almuchantarath Fβ; almukanthatrach Cι hoc] *om.* Bθ Cε Vπ; hec Po; hic Mφ super] supra Po(*marg.*) Vβ; secundum Aα Bθ Cε Eυ faciem] formam Eυ rethis] rethcis Po(*marg.*); retis Bθ Vψ; rettis Eα; rhetis Rβ

¹ Ms Mo contains this section twice, once following on Cap. 5 and again as part of Cap. 6.

[CHAPTER 5 BIS.] ON THE FABRICATION OF THE “NOVELLA”

You will also make another ruler which is called the “novella,”² as is shown here, which has been divided by marks according to the divisions of the meridian line by the almucantars of the plate of the latitude of your region. And this will rotate on top of the face of the rete.³

² “*Novella*” – something new. Perhaps so named because it seems to be a late addition to astrolabes (it does not seem to be found on Islamic astrolabes).

“*Novella*” is not to be confused with “*volvellum*,” which is another name for the rete. See Kunitzsch, *Glossar*, pp. 515-517.

³ The obvious implication here is that the novella is valid for only one latitude, i.e., it will work with only one plate (if the astrolabe has more than one plate).

[FIGURA 5 BIS]



Novella

[Figure] Bγ Bε Bη Cη Cι Eβ Eδ Eη Eμ Eτ Eυ Fβ Fζ Lγ Lε Lη Mη Mκ Oζ Oτ Oυ Pα Pδ Pλ
Pμ Pο Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sκ Tδ Wβ Xβ

[Caption, but no figure] Aα Bθ Cε Dη Eα Fα Mδ Mo Mυ Mφ Nα Oξ Pν Pρ Pτ Rβ Uα Vβ
Vι(fol. 331^v) Vπ Wα

[Figure, but no capitulum] Mν Pγ

Pθ: "E"

[Caption]

Novella] Bε Bη Eβ Eη Eτ Eυ Fζ Lγ Lε Lη Mη Mν Oζ Oτ Oυ Pγ Pμ Pο Qβ Qγ Qδ Qλ Qμ
Rβ⁴(*margin.*) Sδ Wβ Xβ; *om.* Cι Eδ Eμ Pυ Sκ Tδ; allidade sive r-a (= regula) Pα; Figura linee que
novella dicitur Fβ; novella regula Bγ Mκ Pδ; volvella Cη; volvella novella Pλ

⁴ Rβ has only the caption "Novella" in the margin, and no actual figure.

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[CAPITULUM 6.] DE COMPOSITIONE ARCHITOP ET ALFERAZ, ID EST EQUI

Peracta regula facies clavum rotundum et decenter compositum et perforatum et

- 1 De ... equi] Eη Lε Lη Lγ Mδ Mυ(*diff. hand*) Mφ Oζ Pλ Pμ Pν Pρ Qδ Rβ Vι; *om.* Bα Bζ Bι Bκ Cδ Cε Cθ Cι Dγ Eα Ev Eo Fβ Fδ Lζ Mγ Nα Oα Oη Oo Oσ Qα Pα Pγ Pφ Rα Sβ Sθ Sι Uα Vα Vε Vν Vυ Vχ Xα Xβ; Ad faciendum clavum qui dicitur axis Mλ; De clave Oμ; De clavo Eμ(*marg.*) Mκ Pυ Pψ Sλ Vκ(*marg.*) Vσ; De clavo faciendo Cζ; De clavo faciendo quod est equus, ar~ vel cavilla¹ Cη; De compositione ar~ Eζ Et Mν Pδ Pθ Po Qμ Sκ Vβ Vψ Wι; De compositione ar~ id est axis Bγ(*later hand*); De compositione ar~ id est axis et al~ id est equi. Rubrica. Dη(*om.* Rubrica) Mθ Oκ; De compositione ar~ al~ id est equi Qγ; De compositione ar~ id est equi Fα Mo; De compositione ar~ et al~ Ou; De compositione ar~ et al~ equi Tδ; De compositione ar~ et al~ sive equi Bη; De compositione ar~ et al~ et etiam de compositione equi Wβ; De compositione clavi sive cunei qui equus dicitur et novelle Pτ; De compositione clavi et cavilla scilicet equi Eβ; De compositione dap(?) archi. Rubrica Eδ; De constitutione clavi rotundi seu caville. Capitulum Qβ; De figuratione clavi Cβ(*marg.*); De fornicacione clavi Aα; De formatione clavi Bθ Ev Vπ; De formatione clavi clavi Mη; Opus clavi Oπ; Rubrica. De compositione ar~ et al~ id est equi Oξ Oτ Sδ Wα; Sequitur capitulum de compositione ar~ et al~ id est equus constugentes (?) Bε; Sequitur de clavo Eμ
- 1 architop (Mν)] alchitop Dη; alchitphot *corr. to* alchitoph Lγ; alchitrop Bγ Et; altotob Mθ Oκ; archicoph Mφ; archicophi Pλ; archithob Pν; archithop Vψ; archithoph Wβ; archithophi Pρ; architob Mo Ou Qδ Rβ; architop Eζ Mν Po Wι; architoph Bε Bη Eη Lε Lη Mδ Mυ Oζ Oτ Pα Pμ Qλ Sδ Sκ Tδ Vβ Vι Wα; arthithop Fζ Pθ; archytop Qμ; arthitob Cη; arthitop Pδ; arthitoph Oξ alferaz] alf'a Pμ; alf'aβ Oζ Oξ Pλ Qγ Sδ Tδ; alf'am Fζ Lγ Pν Pρ; alf'atβ Lε; alfa' Wα; alfarab Mφ Oκ; alfaras Dη; alfas Vι; alferab Bε Eη Lη Mδ Qλ; alferam Mν; alfora Mυ; alforab Oτ Ou; alforaζ Qδ Rβ; alforas; alfore Mφ; alpherab Wβ; alpheram Bη
- 2 Peracta] Aeracta Fα; Facta Bε Eη; Pertracta *corr. to* Peracta Rα; Post facta Bη; Seracta Mo Peracta ... facies] Post hoc fac Bα facies] *marg.* Eζ decenter] bene Cδ Sλ compositum] appositum Oμ; positum Oκ et₂] *om. many*
- 2-3 decenter ... factum] perforatum Bα
- 2-7 Peracta ... equi (sicut patet de utroque)] *repeated in marg. Oo (fol. 45^v)*; Peracta regula facies clavum que arabice vocatur alchitop alcoloti quem nos vocamus axem. Et sit perforatus in extremitate inter foramine imponatur tabellula ad modum equi ad tabulas retinendas Qα

¹ For *cavilla*, see the notes to Figure 6.

[CHAPTER 6.] ON THE FABRICATION OF THE “QUṬB”² AND THE “FARAZ”,³ THAT IS, THE
“HORSE”

Once the rule has been finished, you will make a round pin, both well fashioned
and pierced,

² The pin which holds all the rotating parts of the astrolabe together has various names in Latin: *clavus* (nail), *axis*, *cavilla* (wooden or metal peg), *vectis rotundus* (round bar). The arabic (القطب, *al-quṭb*) gives rise to a wide range of variants. See Kunitzsch, *Glossar*, no. 40, pp. 545-546.

³ The wedge (Latin: *cuneus*) which secures the pin in its hole is often in the shape of a horse and so is usually referred to as “the horse” (*equus*). In Arabic it is *al-faras* (الفرس), also meaning “the horse”. See Kunitzsch, *Glossar*, no. 9, pp. 520-521.

- habentem caput bene factum qui clavus sit utilis ad colligendas inter se tabulas, dum perforate fuerint, et vocatur arabice “architop”, quem nos latini vocamus “axem”.
- 5 Facies quoque in modum equi vel cunei sive cuiusvis alterius animalis tabulam parvam
- 3 habentem] habens Aα Bζ Bη Bθ Bι Cβ Cδ Cε Cζ Cη Cθ Cι Dγ Dη Eδ Eζ Eμ Ev Eo Et Eu Lζ Mθ Mκ Mλ Mo Nα Oα Oη Oκ Oμ Oπ Oσ Pγ Po Pv Pφ Pψ Rα Sβ Sθ Uα Vα Vβ Vε Vκ Vπ Vσ Vχ Wβ Wι Xα caput] capit Vv; capite Lζ bene] decenter Cδ Sλ bene factum] benefactum *many* qui] que Mη clavus] *om.* Bα Bζ Cβ Cδ Cε Cθ Eμ Ev Fδ Mγ Mθ Mκ Mv Oα Oη Oκ Oμ Oo Oπ Oσ Pφ Pψ Sθ Si Sλ Vα Vv Vσ Vv Vχ; clavis Mη ad colligendas] ad quod iungas Ev; ad coniungendes Vκ; *add.* ab Vι inter se] *om.* Bα Cδ Cζ Eμ Fδ Fζ Mγ Mθ Mκ Mv Oα Oη Oκ Oμ Oo Oσ Pφ Pψ Si Sλ Vα Vv Vσ Vv; in se Sκ; intra se Bι; infra se Ev; sub se Vχ tabulas] tabellas Bθ Mη MovPδ Vβ Vπ; cauillas Ev dum] cum Cζ Mγ Mv Oo Pφ Si Vv
- 4 perforate] forate Bα et] qui Vκ vocatur] *om.* Bα; vocabitur Mη Qδ Qμ Rβ architop] achicof Dγ; albocol *z* Vv; alcatali Cζ; alchichof Bκ Cθ Lζ Mλ Rα Sβ; alchithop Aα Mη Pγ; alchitof Cβ Eδ Eζ Eo Po Vε; alchitop Bι Vσ; alchitoph Bθ Qμ Vπ; alchitoph *corr.* to alchitroph Bγ; alchitos Xα; alcololi Bα Cδ Fδ Oo Pφ Pψ; alcololi Sθ Vα; alcololi *corr.* to alcololias Mκ; alcptop *corr.* to alchiptop Mκ; althithof Vκ; althoth Vχ; althothop Oα Oσ Vv; althirithof O; altitop Qδ Rβ; altitoph Bζ; altochli Ev; altocoli Mγ Sλ; altotoli Eμ Oη Oμ; archichob Xβ; archichop Pθ; archico *z* Nα; archicop Uα; archicoph Pλ; archithop Cε Pδ Vβ; archithoph Bη Eβ Fζ Lε Lη Oζ Oτ Pα Pv Qγ Qλ Qγ Tδ; archithops Pρ; architob Ov; architop Dη Et Ev Mv Vψ Wα; architoph Bε Cη Eα Eη Fα Mδ Mu Sδ Wι; architophi Pμ; architot Pτ; architrop Mo; arthichoph Fβ; arthithop Cι; arthithoph Oε Wβ; arthitoph Lγ Mφ Qβ Vι; artithof Pv; atotoh Mθ Oκ; catotale Si; *add. in marg.* archicoph Fβ; *add. in marg.* alcitob Sλ; *add. interlin.* id est equus Vβ quem] quamquam Sκ latini] *om.* Bα Bζ Bι Bκ Cβ Cδ Cζ Cθ Dγ Eμ Ev Eo Fδ Lζ Mγ Mθ Mκ Mλ Mv Oα Oη Oκ Oμ Oo Oπ Oσ Pφ Pψ Rα Sβ Sθ Si Vα Vε Vκ Vv Vσ Vv Vχ; latine Aα Bθ Dη Ev Nα Qδ Rβ Xα Xβ vocamus] notamus Vε; vocemus axcemus Sκ axem] *om.* Mγ; axcem Sκ; axens Mη; *corr.* to vectem vel axem Bη; *add.* dum ... axim *twice* Mκ; *add.* id est equi Oτ; *add.* DE EQUe VEL CUNEO Vψ
- 5 Facies quoque] Faciesque Bε Bι Pρ quoque] *om.* Sβ; ergo Cζ Oη; itaque Vε in ... animalis] *om.* Bζ Bι Bκ Cβ Fδ Mγ Oμ Oo Pφ Rα Vε Vv Wα; et Cδ Cζ Cθ Dγ Eμ Ev Eo Lζ Mθ Mκ Mλ Mv Oα Oη Oκ Oσ Oτ Pψ Sθ Si Sλ Vα Vσ Vv Vχ; hanc Sβ; in Oπ modum] eodem Pv modum ... animalis] *om.* Oπ equi vel] *om.* Eδ vel cunei] scunei Eζ cunei] canei Ev; simei Bη; stimei Eδ; symey Xα sive] *om.* Wι cuiusvis] cuius Aα Lη; cuiuscumque Dη alterius] *om.* Eδ Eζ Po Vκ Vψ; altitudinis Qδ; *add.* formi Tδ alterius animalis] axis Xα animalis] *om.* Cε; figure Dη parvam] *om.* Mv Sκ; per unum Mη
- 5-6 Facies ... factam] Fac dictam tabulam parvum Bα cunei ... factam] simel vel equis alterius alis (tabulam parvum [*marg.*]) Bη

having a well-formed head. This pin should be useful for holding the plates together when they have been pierced. And it [the pin] is called in Arabic “al-quṭb”, which we Latins call “the axis.” And you will also make in the shape of a horse or wedge or some other animal a small

et bene factam, quam mittes in foramen axis decenter ita ut retineat tabulas; et dicitur “alferaz” sive “equus,” quia ex consuetudine fit in modum equi.

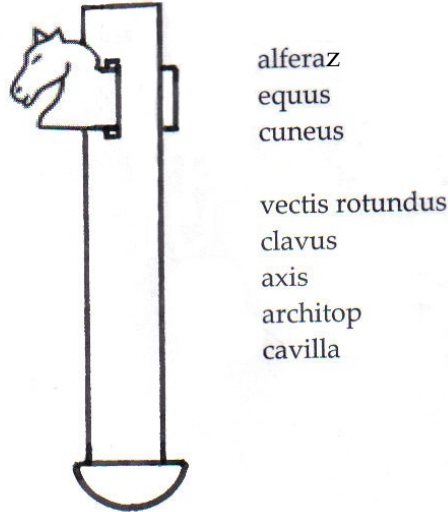
Huc usque intermisimus de diversis tractatibus, sed nunc redeamus ad librum.

- 6 et] *om. many* bene factam] benefactam *many; om.* Bη mittes] mittas Fζ; pones Tδ mittes in foramen] *marg.* Oξ foramen] foramem Mv; foramine Aα Bα Bη Dγ Eζ Mκ Rα Sβ Vβ Vε Vκ Vν Vσ Vχ; *add. interlin.* al' foramen Vβ axis] *om.* Pλ Pq; assis Bθ Vκ; axcis Sκ decenter ita] *om.* Bα ut] *om.* Vν retineat] detineat Pv; teneat Cδ Oμ; retineas Vκ; similiter contineat Fβ; *add.* omnes Vε tabulas] *add.* In matre exentes et rethe super ipsas exens Fβ et] *add.* haec tabula Cδ Vσ
- 6-7 et² ... sive] *om.* Si
- 7 alferaz] alf' aβ Pθ; alfera β Mδ; alforas Bε Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mφ Mv Oζ Oξ Oτ Pα Pδ Pν Pρ Qβ Qγ Qλ Sδ Wα Xβ; alforat Tδ; alphera β Pτ Wβ; alpheram Bη Cη; alphora β Bγ Oυ; alphas Pλ Pμ; *add. in marg.* alphorax Fβ alferaz sive] *om.* Aα Bα Bζ Bθ Bι Bκ Cβ Cδ Cζ Cθ Dγ Eδ Eζ Eμ Eν Eο Eτ Eυ Fδ Lζ Mγ Mη Mθ Mκ Mλ Mν Mo Nα Oα Oη Oκ Oμ Oο Oπ Oσ Pγ Pο Pν Pφ Pψ Qδ Qμ Rα Rβ Sβ Sθ Sκ Sλ Uα Vα Vβ Vε Vκ Vν Vπ Vσ Vυ Vχ Xα Wι sive] *om.* Bε Cε Cι Eα Eβ Fβ Eη Fα Fζ Lγ Lε Lη Mδ Mv Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qγ Qλ Sδ Tδ Vι Vψ Wα Xβ; id est Qβ equus] equus *many; add.* equi Mv; *add. interlin.* et alfera β Oα quia] quare Vσ quia ... equi] *om.* Bα fit] nominatur et sit Eν; sit Aα Eν Pγ Pρ; venit ut sit Bα Bζ Cβ Cδ Cθ Eμ Eο Fδ Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Pψ Sθ Sι Sλ Vα Vβ Vε Vν Vσ Vυ Vχ; venit ut ipsa Cζ; venit ut ipsa sit Cδ in] ad Lε Mγ equi] *add.* formata Bα Bζ Cβ Cδ Cζ Cθ Eμ Eν Eο Fδ Mγ Mθ Mκ Mν Oα Oη Oκ Oμ Oο Oπ Oσ Pφ Pψ Sθ Sι Sλ Vα Vβ Vε Vν Vσ Vυ Vχ; *add.* ut patet in presenti figura Fβ; *add.* sicut patet de utroque Fδ Mγ Oο Pφ Vν; *add. Cap. 5BIS* Bγ Bη Cη Mκ(*marg.*) Mo Pτ Wβ
- 8 Huc ... librum] *om.* Bα Cδ Fδ Oο Pφ Sλ Vν; Hic defininat de interioribus partibus astrolabii Mγ usque] *add.* nos Fβ de] ex Bζ diversis] diversitatibus Qμ tractatibus] *om.* Bε Eβ Eη Fα Fβ Fζ Lγ Lε Lη Oξ Oτ Oυ Pλ Pμ Pν Qβ Qγ Sδ Tδ Wα Xβ sed] *om.* Bθ Qα Vπ redeamus] accedamus Fα; deveniemus Qδ Rβ ad librum] *om.* Cη Pτ Qα Tδ librum] limbum Xβ; propositum Dη

well-made piece which you will insert neatly in the slot in the pin such that it holds the plates together. And this is called “al-faraz” or “the horse” since customarily it is made in the shape of a horse.

Up to this point we have interrupted [our text with material] from various treatises; but now let us return to our book.

[FIGURA 6]



[Complete diagram] Bε Bη Bι⁴ Bκ⁵ Eα Eη Eτ Eυ Fζ Lγ⁶ Lε Lζ Lη Mη Mκ⁷ Mλ Mν Mo Oζ Oτ
 Ou Pα Pγ Pμ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ⁸ Vκ Wβ Xβ
 [Partial diagram] Cη Eδ Eμ Fβ Pδ Pλ Po Sθ Tδ
 [Titling, but no figure] Vι(fol. 331^v)
 [Outline, or space only] Cι Eζ Mθ Pυ Vβ
 [No space] Aα Bα Bγ Bζ Bθ Cβ Cδ Cε Cζ Cθ Dγ Dη Eν Eο Fα Fδ Mγ Mδ Mυ Mφ Nα Oα
 Oη Oκ Oμ Oξ Oο Oπ Oσ Pν Pρ Pτ Pφ Pψ Qα Rβ Si Sλ Uα Vα Vε Vν Vπ Vσ Vυ Vχ Vψ Wα Wι Xα
 [illeg.] Eβ
 Pθ: "F"

[PIN]

vectis rotundus] Bε Bη Bι Eη Eτ Fζ Lγ Lε Lζ Mλ Mν Mo Oτ Ou Pα Qβ Qγ Qδ Qλ Qμ Rα Sβ Vι Vκ

⁴ In ms Bι part of the horse-in-pin diagram is in the gutter of the opening and the labels for the horse are cut off by the tight binding of the leaves. However, there is a second drawing of the horse only, with its labels, at the end of the capitulum.

⁵ In ms Bκ, there is a complete diagram but no labels.

⁶ The diagrams in mss Lγ and Pδ are partly cut off at the edge, leaving only the beginnings of some of the titling, e.g., "archi-".

⁷ The diagram in ms Mκ is partly cut off by the binding, leaving only the endings of some of the titling, e.g., "-hitop".

⁸ In ms Sκ, there is a complete diagram but no labels.

Wβ Xβ; *om.* Cη Ev Mη Pγ Πλ Pμ Po Sδ; vectis Eα Lη Oζ clavus] Bε Bη Bι Eα Eη Eτ Ev Fζ Lγ Lε Lη Lζ Mη Mλ Mν Oζ Oτ Ou Pα Qβ Qγ Qδ Qλ Qμ Rα Sβ Vι Vκ Wβ Xβ; *om.* Cη Mo Pγ Po Πλ Pμ Sδ axis] Bε Bη Eα Eη Eτ Ev Fζ Lγ Lε Lη Mη Mλ Mν Mo Oζ Oτ Ou Pα Pμ Qβ Qγ Qδ Qλ Qμ Sδ Vι Vκ Wβ Xβ; *om.* Bι Cη Lζ Pγ Pδ Πλ Po Rα Sβ; *add.* vel Wβ architop Bι Ev Mη Mλ Mν Mo Sβ; *om.* Cη Πλ Po; alchitob Lζ; alchitoph Bη Pγ; archicob Xβ; archipob Vκ; archithop Eα; archithob Lε; architob Eη Fζ Lη Oζ Oτ Ou Pα Pμ Qβ Qγ Qλ Qμ Sδ Wβ; architoph Bε Vι; architrop Eτ; arthitob Qδ; arthitop Rα cavilla⁹] *om.* Bη Cη Mλ Oζ Pγ Πλ Po; cauilla Bι Eα Eη Eτ Ev Fζ Lγ Lε Lη Lζ Mη Mν Mo Oτ Ou Pμ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Vι Vκ Wβ Xβ; et cauilla id est equus Bε; caiulla Pα *add.* almiznir¹⁰ Bι; almizanar Lζ

[WEDGE]¹¹

alferaz] Wβ; *om.* Cη Lε Lγ Pγ Pδ Πλ; *illeg.* Fζ; afferam Rα; alfa³ Oτ; alf'a³ Eτ Mν Qγ Qλ Xβ; alfare Vκ; alfera' Ev; alferaz Bι; alfera³ Eη Lη Lζ Mη Oζ Ou Qβ Sβ; alferat Bη; alferas Mo; alforā Qμ; alforas Vι; alforris Bε; alpheraz Mλ; alphora³ Pα Pμ Sδ; alphora^c Qδ; alphas Eα equus] Bη Bι Cη Eα Eη Eτ Ev Fζ Lη Lζ Mη Mλ Mν Mo Oζ Oτ Ou Pα Pμ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Vι Vκ Xβ Wβ; *om.* Lγ Lε Pγ Pδ Πλ Po; equus constringentes Bε cuneus] Bε Bη Bι Cη Eα Eη Ev Eτ Fζ Lζ Lη Mη Mλ Mν Mo Oζ Oτ Ou Pα Qβ Qδ Qγ Qλ Qμ Rα Sβ Sδ Vι Vκ Wβ Xβ; *om.* Lε Lγ1 Pγ Pδ Πλ Pμ Po; *add.* taballus Lζ

⁹ "Cavilla" (or "cauilla") is a medieval Latin word for a (wooden or iron) peg. See J. F. Niermeyer, *Mediae Latinitatis Lexicon Minus* (Leiden: Brill, 1976), s.v. "cavilla." Gunther misread Cη as "camilla."

¹⁰ For "al-mismār" (العسمار) as another Arabic term for the pin, see Kunitzsch, *Glossar*, no. 30, p. 535.

¹¹ The drawing of the wedge is one of the few places where some artistic creativity or licence (or lack thereof) appears in the text. One manuscript (Qγ) has an L-shaped geometric shape; several (Cι Mκ Pγ Pδ) have a horse's head on a straight piece, which is more or less what the actual metal wedge should be. By far the majority of mss (Bε Bη Bι Bκ Cη Eδ Eτ Fβ Fζ Lγ Lε Lζ Lη Mλ Mν Mo Oζ Oτ Ou Pα Πλ Pμ Po Pυ Qβ Qδ Qλ Rα Sβ Sδ Sθ Sκ Tδ Vκ Wβ Xβ) have an entire horse – head, forequarters and hindquarters – which would be impossible to insert through the pin even if the legs were folded in as if lying down. One (Eα), however, has only the head and fore legs while another (Mθ) depicts a horse – head and body, fore and hind – but with no legs.

A few mss have other animals – a lion's head (Vα), a whole lion (Eβ Eη). However, no matter how well a scribe may have copied the text, the range of scribal artistic ability quickly runs from excellent to questionable. Several of the horses look more like donkeys (e.g., Cη Oτ Pα Qβ); the lion in Eη could possibly be a rabbit; the lion in Eβ could be a bear; the horse in mss Bκ and Pμ might be mistaken for a dog; and the horse in Lη might also be a lion or a bear. Perhaps the scribes should have stuck to their letters.

[Construction, Section II]

[CAPITULUM 7.] PREAMBULUM AD COMPOSITIONEM RETHIS ET TABULARUM LATITUDINIS

Accipe tabulam quam volueris et cuiuscumque quantitatis, et facies in ea circulum, cuius dimidium diametri sit simile dimidio diametri eius quod cadit ex matre infra limbum. Et cum feceris circulum, abscindes quod superfluum fuerit extra

- 1 Preambulum ... latitudinis] *om.* Βα Βζ Βκ Cδ Cε Dγ Eο Eτ Λζ Μγ Nα Oα Oη Oξ Oο Pγ Pφ Qμ Rα Sβ St Uα Vα Vε Vυ Xα; Capitulum preambulium ad rethe et tabulas Aα(preambulam) Bθ Ev Mη Vπ(*om.* et); De figuracione tabularum Cβ(*marg.*); De impositione circuli capricorni, arietis, cancri Dη; De inveniende alterius per alterum trium unum circularum Bι Fδ; De inveniende alterius per alterum trium unum circularum viz. capricorni et arietis et cancri Vν; De inventione trium circularum Mθ Oκ; De reti Vκ; Descriptione trium circularum scilicet capricori, arietis et cancri Qα(*marg.*); Inicium operis tabularum Cβ Cθ Ev(*add. illeg.*) Μλ Oμ Oπ Oσ Pψ Sθ Sλ Vχ; Initium operis tabularum. Capitulum preambulium ad rethe et tabulas Vβ; Inicium operis tabularum et primo de reti Cζ Eμ(*marg.*) Mκ Vσ(*om.* et primo); Secunda pars Mν; Sequitur secunda pars Bγ Eδ Eζ Pο Wι; Sequitur secunda pars et est capitulum preambulium ad rethe et alias tabulas Pδ Pθ Sκ Vψ Preambulum] Capitulum in preambulium Bε; Capitulum. Preambulum Lη rethis] *om.* Mν Mφ Qδ Vι Wα et ... latitudinis] *om.* Pν Rβ Xβ tabularum] tabule Fβ(*text & marg.*); tabulas Pυ latitudinis] *om.* Oυ Pυ; altitudinis Oζ; *add.* Capitulum 7^{um} Bε; *add.* Rubrica Qβ; *add.* De compositione circularum Capricorni, Ariethis et Libre et Cancrī Bη; *add.* vel secunda pars de inscriptione circuli capricorni Mυ Vι
- 2 Accipe] accipies *many* quam ... cuiuscumque] qualibet Βα; quamcumque et qualiscumque Cδ Sλ cuiuscumque] cuiuslibet Mν Qδ Rβ; qualiscumque Bζ Cβ Cζ Cθ Eμ Ev Mγ Mθ Oη Oκ Oμ Oο Oπ Oσ Pφ Pψ Qα Sθ St Vα Vν Vυ Vχ et₁ ... quantitatis] in qualicumque quantitate volueris Vε quantitatis] *add.* fuerit Βα Βζ Cβ Cζ Cθ Eμ Eο Ev Fδ Mγ Mθ Mν Oα Oη Oκ Oο Oπ Oσ Pφ Pψ St Vα Vβ Vν Vυ Vχ; *add.* fuerit *and erased* Mκ ea] *add.* unum Pφ
- 2-14 Accipies ... circuli] *repeated in marg.* Oο (fol. 45^o)
- 3 cuius] eius Xα dimidium] *om.* Ev sit simile] *om.* Mν; *twice* Bθ; *add.* scilicet equale Vσ(*interlin.*) sit ... diametri₂] *om.* Aα simile] sicut Mγ Oο Vν; ilic Nα dimidio] *om.* Mo Uα; *marg.* Wι diametri] diametrique Sβ quod cadit] *om.* Bη Wβ cadit] accedit Cι Pθ; cecidit Βα Cβ Cδ Cθ Eμ Ev Fδ Mη Mθ Mκ Mν Oα Oη Oκ Oμ Oπ Oσ Pφ Pψ Qα Sθ St Sλ Vα Vε Vν Vσ Vυ Vχ; occidit Eο Oο; tendit Bζ; vadit Aα ex] in Bι Sκ
- 4 infra] id est Pq; in Xβ limbum] *om.* Pτ; *add.* 2-line gloss Cζ feceris] fecerit Sκ abscindes] abscindas Uα; abscindens Cε; abscindensque Nα; abscindet Oη; *add.* de eo Bζ Fδ Mγ Oο Pτ Vβ Vν; *add.* -que Eα Eβ Eη Fα Fζ Lγ Lε Lη Mδ Mφ Oζ Oξ Oτ Oυ Pλ Pν Qγ Qλ Sδ Tδ Uα Vι Wα quod] *om.* Sκ; *add.* aliquam Nα superfluum] perfluum Oη extra] ex Pν
- 4-5 abscindes ... circulum] *marg.* Eδ

[*Construction, Section II*]

[CHAPTER 7.] PREAMBLE TO THE CONSTRUCTION OF THE RETE AND OF THE LATITUDE PLATES

Take any plate you wish and of whatever size, and on it make a circle whose radius should be similar to the radius of the one which falls on the mother within the limb. And when you have made the circle, cut away from the plate what is superfluous outside

5 ipsum circulum de tabula preter quendam locum quem, ibi dimittes in modum denticuli ut intret in limbo in foramine ad hoc constitutum et bene factum. Cum intraverit tabula in matrem et ipse denticulus fuerit in suo foramine, ut non possit predicta tabula huc vel illuc moveri. Et cum hec feceris, extrahe diametra eiusdem

- 5 ipsum] *om.* Mγ Oμ Oo Vv circulum] *om.* Bα Vv; *add.* in tabula vel Dη de] in Cε Pγ Sκ Uα Wι de tabula] *om.* Qα Vv quendam] *corr.* from quem Mδ ibi] *om.* Bα Cε; in Dγ; sibi Bζ Lη Qδ Rβ dimittes] dimittas Oη; mittes Dγ in] per Bζ; ad Qγ in modum] *om.* Sβ
- 6 denticuli] tau(?) Sι; tenticuli Vπ; *corr.* in marg. from circuli Wβ ut intret] *om.* Xβ; intret] *corr.* from intrent Pγ; inde Oκ; inde *and add.* interlin. intret Mθ; *add.* denticulus Fβ limbo] limbum Aα Bα Mv Vβ Vπ Wι; *add.* scilicet Bα limbo ... constitutum] *add.* interlin. al' in limbo in faramine ad hoc constituto Vβ in₂] intra hoc Bζ foramine] foramen *some* hoc] *om.* Vε constitutum] restitutum Nα et bene factum cum] *om.* Cη bene factum] benefactum *many*; *om.* Aα Bγ Bη Bθ Bι Bκ Cε Dγ Dη Eδ Eζ Eτ Ev Lζ Mλ Mo Nα Pγ Po Pτ Pv Qδ Rα Rβ Sβ Sκ Uα Vβ Vκ Vπ Vχ Wβ Wι Xα; bene dictum Bζ; bene suum Fζ; *add.* ut Bζ Cβ Cδ Cζ Cθ Eμ Ev Fδ Mγ Mθ Mκ Mv Oα Oη Oκ Oπ Oσ Pφ Pψ Sθ Sι Sλ Vα Vε Vv Vv; *add.* in marg. ut Vσ ut cum] *twice* Eζ cum] *add.* scilicet Fβ
- 6-8 constitutum ... moveri] factum ut non moveatur tabula huc et aliie Bα
- 6-7 et ... foramine] *om.* Qα
- 7 tabula] tabulem Aα; tabulam Vπ; denticulus Qβ matrem] *lacuna* Xα denticulus] tenticulus Bθ Vπ suo] *om.* Vv; ipso Bε Eα Eβ Fβ Fζ Lγ Lε Lη Mδ Mφ Nα Oζ Oξ Ov Pα Pγ Pλ Pμ Pν Pρ Qβ Qλ Sδ Tδ Wα Xβ; sui Cδ Cθ Eμ Ev Fδ Mv Oα Oμ Oπ Oσ Pφ Sι Vα Vv Vv Vχ ut] *om.* Bζ Cβ Cδ Cζ Cθ Dη Eμ Ev Fδ Mγ Mθ Mκ Mv Oα Oη Oκ Oμ Oπ Oσ Pφ Pψ Sθ Sι Sλ Vα Vε Vv Vv Vσ Vχ; et] Mv
- 8 predicta] *om.* Bε Eη vel] et *many*; *om.* Qα et cum hec feceris] deinde Bα cum] *om.* Pψ Qλ hec] hoc *many*; *om.* Aα Sκ; is Vα feceris] fuerit Mv Sι; factum fuerit Mγ Pφ extrahe] *om.* Bθ Vπ diametra] diametrum Aα Bι Dγ Mo; *add.* ABCD. Deinde facies circulum Capricorni (= line 10) Oμ eiusdem] *interlin.* Vβ; eius Bε; cuiusdem Pμ; eius de Xα; illius Cδ Sλ

the circle itself except for a certain portion which you will leave there in the form of a small tooth in order that it may project into a hole in the limb located for it; and [it should be] well crafted. When the plate sits in the mother, and the small tooth itself is in its hole, so that the aforesaid plate cannot be moved one way or another, and when this has been done, extend the diameters of this same

10 circuli in directo quousque se abscindant super E cuspidem erectis lineis, et ista erunt diametra AC, BD. Deinde facies circulum Capricorni et circulum Arietis et Libre et circulum Cancri. Circulus autem Capricorni est circulus ABCD.

9 in directo] *om* Qα directo] recto Xα quousque] *rep.* Wι abscindant] abscinderit Mγ E] *om.* Aα Bγ Bη Bθ Bι Bκ Cβ Cη Cθ Dγ Eδ Eζ Ev Eο Eτ Mλ Nα Oπ Pγ Po Pτ Pv Rα Sθ Sκ Uα Vβ Vε Vκ Vπ Vχ Wβ Xα cuspidem] cuspidis Cι erectis] rectis CζEμ erectis lineis] *om.* Bα; *add. interlin.* id est secant ibi circulum ad angulo rectas Oα; *add.* id est super E cuspidem erectis angulis Vβ; *add. interlin.* id est dividendo circulum per quartas Vβ; *add. (later hand) in marg.* orthogonaliter Qδ lineis] *om.* Qδ; angulis Fδ Mγ Vν; *add. in marg.* Ego Iohannes de Calomonte: Ista littera “Id est super e cuspidem erectus angulis” rarissime invenitur in exemplarium nisi fora tamquam glosa vel tamquam litteram alterius positionis Vβ¹ ista] hec Bα; illa Eο; ipsa Pφ; ita Sι ista erunt diametra] sunt Qα erunt diametra] esset diametrum Mθ; essent diametra Oκ

10 diametra] *ms* Oμ *ends* AC, BD] ABCD Aα Bγ Bε Bη Bζ Bθ Bι Cβ Cη Cθ Cι Dη Eα Eβ Eδ Eζ Eη Ev Eο Eτ Ev Fα Fβ Fδ Fζ Lγ Lε Lη Mγ Mδ Mη Mλ Mo Mv Mφ Nα Oζ Oξ Oο Oπ Oτ Ov Pα Pγ Pδ Pθ Pλ Pμ Pv Po Pτ Pv Pφ Qα Qβ Qγ Qλ Qμ Rα Rβ Sβ Sδ Sκ Tδ Uα Vβ Vε Vι Vκ Vν Vπ Vψ Wα Wβ Wι Xα Xβ; *corr. from* ABCD Qδ; *add.* per 360 sitque omnis quarta circuli (*repeat of line 14*) Bζ; *add. interlin.* id est circuli Capricorni Vβ Deinde] Post Bα Deinde ... circulum₂] *om.* Et Sκ facies] *fac many* circulum Capricorni et] *om.* Bγ Cε Mo Pγ Pτ Pv Vβ Wι circulum₂] signum Cε et Libre] *om.* Uα

10-11 Deinde ... ABCD] *om.* Cη EvNα Vv

10-12 Capricorni ... circulum₁] *om* Dη

10-12 et₃ ... id est] *om.* Cε

11 circulum] *om.* Bζ Mv Sι Cancri] *add.* id est per quam vadit capud Cancri Eα Dη Pτ(*marg.*); *add.* per quam vadit capud Cancri Bζ Circulus₁ ... ABCD] *om.* Pα; Est autem Capricornus circulus ABCD Bε Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mδ Mv Mφ Oζ Oξ Oτ Ov Pλ Pμ Pv Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Xβ autem] *om.* Bα Mv Capricorni] *om.* Vκ circulus₂] *om.* Bα Eτ Pφ

11-13 Circulus₁ ... id est] *om.* Bζ

¹ Iohannes de Calomonte: unidentified. In the explicit to the *Practica*, Iohannes identifies himself as from Calomonte, Flanders. I have not been able to glean further information about “Calomonte” or “Calomonte.”

circle in a straight line all the way until they intersect at right angles at centre E, and these will be diameters AC, BD. Then you will make the circle of Capricorn and the circle of Aries and Libra and the circle of Cancer. The circle of Capricorn, however, is circle ABCD.

- 15 Cumque volueris facere circulum Arietis et Libre, id est circulum per quem vadit caput Arietis et Libre, et circulum Cancri, id est per quem vadit caput Cancri, divide circulum ABCD per 360 partes, sitque omnis quarta circuli ex 90 partibus. Deinde pone arcum AZ similem numero graduum totius declinationis, que est secundum
- 12 Cumque] cum Bγ Cη Fβ Lε Qλ; cum autem Bκ; *add. in marg.* De Circulo Arietis et Libre Vυ Cumque ... id] Deinde fac signum [*illeg.*] et hoc Cε facere] *add.* circulum Capricorni et Eυ circulum₁] *om.* Pτ Arietis ... circulum₂] *om.* Qα et Libre] *om.* Bε Bι Bκ Cθ Cι Eβ Eτ Dγ Eδ Eη Eο Fβ Fζ Lγ Lε Mδ Mη Mλ Mo Mυ Mφ Nα Oζ Oξ Oπ Oτ Oυ Pγ Pδ Pθ Pλ Pν Pυ Qβ Qγ Qλ Qμ Rα Sδ Sκ Tδ Uα Vβ Vε Vι Vκ Vχ Wα Wι Xα Xβ id est] *om.* Lγ Sλ Vχ; et Fζ Oο Pθ circulum₂] *om.* Bγ Bη Cη Wβ quem] *add.* scilicet Sλ
- 12-13 Cum ... Cancri₂] *om.* Bζ
- 12-13 id est ... Libre] *om.* Bα Bθ Mν Oη Pμ Pρ Vπ
- 13 Arietis ... caput₂] *om.* Aα Pτ Sλ et Libre] *om.* Bε et circulum ... Cancri₂] *om.* Fδ Mγ Oο Vυ Cancri₁ id est] *om.* Qα Rβ id est] *om.* Cζ Eν Tδ; *add.* circulum Sκ id est per quem] per quem scilicet Cβ Cδ Cθ Eμ Eο Mθ Mν Oα Oκ Oπ Oσ Pφ Pψ Sθ Sι Vα Vε Vσ Vυ Vχ id est ... Cancri₂] *om.* Bα Eδ Oη Pλ Pρ; *marg.* Mκ Cancri₂] Capricorni Mθ(*interlin.*) Oκ
- 14 divide] deinde Vυ divide circulum] *om.* Dγ circulum] *om.* Vσ; *add.* dyametri Vε circulum ... sitque] *interlin.* Vψ 360] *add.* ut Vκ; 60 *corr. to* 360 Po partes] *om.* Bζ Eτ Pγ Uα Vκ Wι; divisiones Fδ Mγ Mδ Mν Mo Nα Oο Pυ Pφ Sι Sκ Vν; divisiones per partes equales Vβ; gradus Bγ Bη Cη Pτ Wβ; *add.* equales Bε Cδ Cε Cι Dη Eα Eη Fα Fβ Fδ Fζ Lγ Lε Lη Mγ Mδ Mη Mκ(*interlin.*) Mυ Mζ Oξ Oο Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sι Sλ Tδ Vι Vσ Vν Vψ Wα Xβ partes ... 90] *om.* Dγ sitque] sicque Pρ Qμ; sit Wι sitque ... partibus] *om.* Dγ; ita quod qualibet quarta habet 90 partes equales Cδ Cε Dη Sλ(*om.* equales) omnis] *om.* Qδ; qualibet Bα; *add.* gradus Vψ quarta] ⁴/₄^{ta} many; *om.* Lγ; *add.* eiusdem Pφ circuli] *om.* Bα Qδ Rβ; *add. interlin.* erunt Pρ; *mss* Fδ Oο *end* ex] est Aα; est ex Bζ; per Qδ Rβ 90] Item Eν; nonaginta Vα partibus] partes equales divisa Qδ Rβ; *add.* equalibus Bε Bη Cι Eα Eη Fα Fβ Fζ Lε Lη Mδ Mκ(*marg.*) Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Vσ Vψ Wα Wβ Xβ; *add. interlin.* id est gradibus Vβ
- 15 AZ] A2 Fζ; A4^o Vκ; ad Wβ; 13 Vε²; A lac. Vα; A et or A ct Mγ Mυ Mφ Nα Pλ Vι; Z and erasure Pρ; scilicet Oη similem] *om.* Pψ; *interlin.* Sλ; simile Cη Mν Pρ; *add.* a Pδ; *add.* in Fζ simile numero] *om.* Sι declinationis] *add.* eius Bη Wα(*marg.*) est] sunt Bθ Vπ
- 15-16 totius ... gradus₁] *marg.* Bγ; *om.* Cη

² The scribe of Vε is almost random in this section in his use of numbers and diagram lettering. Most of the lettering used is confused and/or erroneous. The scribe of Nα also does not seem to know what he is copying, often misreading the lettering, or omitting it, or substituting letters that make no sense.

And when³ you wish to draw the circle of Aries and Libra, that is the circle through which the beginnings of Aries and Libra travels, and the circle of Cancer, that is through which the beginning of Cancer travels, divide circle ABCD into 360 parts, and each quarter of the circle should consist of 90 parts. Then set arc AZ similar to the number of degrees of the entire [obliquity of the ecliptic]⁴ which, according to

³ The first section of this chapter, lines 12 to 43, describes how to draw the circle of Aries/Libra and the circle of Cancer, working from the given circle of Capricorn around the outer edge of the plate.

⁴ The Latin properly reads “whole [or entire, *i.e.*, maximum] declination,” that is, the maximum number of degrees of the sun’s position measured from the celestial equator. I have substituted “obliquity [of the ecliptic]” for “declination,” as a more familiar term to the modern reader. However, this is actually a different concept (the angle of the ecliptic to the celestial equator at the equinoxes) although the value is exactly the same. Those wishing to be more precise in their translation can substitute “declination” for my “obliquity.”

Ptholomeum 23 gradus et 51 minuta, et secundum Albategni 23 gradus et 36 minuta,

16 Ptholomeum] Aα Bα Bε Bζ Bι Cβ Cδ Cε Cζ Cι Dγ Dη Eδ Eμ Eο Eτ Eυ Fα Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mο Nα Oζ Oη Oσ Oτ Pα Pγ Pδ Pθ Pλ Pμ Pν Pρ Pψ Qβ Qδ Qλ Qμ Rα Rβ Sδ Sθ Tδ Uα Vβ Vι Vσ Vυ Wα Wβ Wι; P̄hm Vκ; Phtolomeum Vπ; Ptolomeum Bγ Bη Bκ Eβ Eζ Eη Eν Fβ Mγ Mυ Mφ Mν Pο Pφ Qγ Sβ Sλ Vε Vχ Vψ; Tholomeum Cθ Eα Oα Oκ Oπ Pτ Pυ Qα Sι Vα Vν Xβ; Tolomeum Oξ Xα; Tpholomeum Bθ Sκ Ptholomeum ... et₁] *om.* Oυ 23] *om.* Cη; 32 Xβ; 33 Pμ gradus₁]⁵ *illeg.* Pψ; *om.* Vα; gradus Bι Cθ Eο Eμ Eν Oπ Oυ Pψ Vε Vκ; g^{al} Bα Bε Cδ Cι Dγ Eα Eβ Eζ Fα Fβ Lγ Lε Lζ Lη Mδ Mη Mλ Mο Mυ Mφ Nα Oζ Oη Oξ Oτ Pγ Pδ Pθ Pμ Pν Pο Pρ Pφ Qγ Qλ Sδ Tδ Vι Wα; graduum Aα Bγ Bζ Bη Bθ Cβ Cε Dη Eδ Eη Eτ Eυ Mγ Mθ Mκ Oκ Oσ Pα Pλ Pτ Pυ Qα Qβ Qδ Rβ Sκ Uα Vβ Vν Vπ Vσ Vυ Wβ Wι Xα; gradibus Mν Oα Xβ; gradibus *corr.* to gradus Vχ 51] *li* Eν; *interlin.* Mθ; *om.* Eη; 15 Aα Mφ Qβ Sδ; '1'51' Vε; 15 *corr.* to 51 Mυ; 36 Xβ; 52 Pθ 51 ... gradus₂] *om.* Cε Eη; *marg.* Bε Oτ; et 51 minuta Mθ(*interlin.*) minuta₁] *om.* Vα; minutorum Bε Cε Dη Mγ Mο Oξ Pα Qδ Rβ Vβ Vν; minuti Aα Pυ et secundum] *marg.* Eο; secundum aliter Cδ; que secundum Pρ et₂ ... minuta₂] *om.* Cε Oξ Oπ; *marg.* Eμ Oξ Albategni] Bγ Bη Bθ Cζ Cι Dγ Dη Eβ Eδ Eζ Eμ Eο Eτ Eυ Fα Fζ Lγ Lε Lζ Lη Mγ Mδ Mκ Mλ Mν Mυ Mφ Oα Oζ Oη Oκ Oσ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Pο Pρ Pτ Pυ Pφ Pψ Qα Qβ Qδ Qλ Rβ Sδ Sθ Sκ Tδ Uα Vα Vβ Vε Vι Vκ Vν Vπ Vσ Vυ Vχ Vψ Wα Wβ Xβ; Ablbategni *corr.* to Albategni Rα; Albadegni Mη; Albag *corr.* in *marg.* to Allutegni and *corr.* *interlin.* to Albitegni Wι; Albaregni Aα; Albatagni Bε; Albateg' Cδ Fβ Mο Qμ; Albategñ Cθ; Albatēni Bζ; Albatengni Bι; Albatesi Nα; Albateum Bα; Albathegni Xα; Albetagni Eα; Albetegñ Cβ Sλ; Albitē Eν; Albitegni Cη Qγ; *add.* et ista melior est que est Qδ Rβ 23] xxiii Eν; *om.* Cε Eη Mθ; 33 Sθ Uα gradus₂] Bζ Cθ Eμ Eν Eο Mν; *om.* Oη Vα Vε; g^{al} Aα Bα Bε Bθ Cδ Cι Dγ Dη Eα Eβ Eδ Eζ Eτ Eυ Fα Fβ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mο Mυ Mφ Nα Oζ Oσ Oτ Oυ Pα Pγ Pδ Pθ Pμ Pν Pο Pρ Pφ Pψ Qβ Qα Qγ Qδ Qλ Rβ Sδ Tδ Vι Vκ Vπ Wα Xα Xβ; graduum Bγ Bη Bι Cβ Cη Mγ Oα Oκ Pλ Pτ Pυ Uα Vβ Vν Vσ Vυ Wβ Wι; gradibus Xβ; gradibus *corr.* to gradus Vχ 36] *om.* Eο Nα; 26 Wα; 6 *corr.* to 36 Sλ minuta₂] *om.* Vα; minutorum Bθ Bι Dη Eβ Eη Eυ Fα Fζ Lγ Lη Mγ Mδ Oζ Pμ Pν Pρ Pυ Qδ Qλ Rβ Sδ Sκ Vβ Vν Wα; minutorum et sicut habemus Aα

16-17 36 ... et₁] *om.* Eο

⁵ Here and elsewhere there is great confusion over which case to use for *gradus* and *minuta*; some use the plural accusative (treating the number as an adjective), others use the plural genitive modifying the number as if the latter were a noun. Still other manuscripts simply abbreviate *gradus* and *minuta* without making the case explicit.

Ptolemy is 23 degrees 51 minutes, and according to Albategni⁶ 23 degrees 36 minutes,

⁶ Al-Battānī (Abū ʿAbd Allāh Muḥammad ibn Jabir al-Battānī; Latin: Albategnus), c. AD 858-929.

sed etiam in diebus Almeonis invenerunt observatores 23 gradus et 33 minuta et, sicut habemus ex Indis pervenit hec declinatio ad 24 gradus. Accipe ergo hanc declinationem secundum quem volueris, quia non erit ibi sensibilis discordia.

- 20 Cum igitur volueris extrahere circulum Arietis, divide circulum Capricorni, id
- 17 etiam] *om.* Βα Βη Βι Cε Εβ Εη Ev Fα Fζ Lη Fβ Lε Mγ Mδ Oπ Pα Pρ Qα Sθ Sλ Vε Vι Vκ Vσ Vυ Wα Xβ in diebus] in die QΛ; tempore Qδ Rβ Almeonis] Aα Bα Bγ Βη Bθ Bε Βι Cε Cη Cι Dη Eβ Eη Eτ Ev Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mκ Mo Mv Mφ Nα Oα Oζ Oξ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sκ Tδ Vβ Vι Vπ Vσ Wα Wβ Xβ; Albumazar Bζ; Alemenō Cβ; Almemam Cθ Eζ; Almeman Bκ Sβ Xα; Almemau Dγ Eα Eδ Lζ Po Rα Uα; Almeni Ev; Almeniam Oπ Vχ; Almeniau Mλ Vκ; Almenō Cδ: Almenōn Oκ; Almeō Si Vε; Almeom Qα; Almeon Eμ(*interlin.*) Mγ Mθ Mv Oα Oσ Pφ Sθ Sλ Vα Vν Vυ; Almeori Cζ Oη invenerunt] notaverunt Bθ Vπ observatores] conservatores Aα; *add. interlin.* conservatores Oα; *add.* et hoc numero reputatur Xβ 23] *illeg.* Mκ; *om.* Eo gradus] graduum Aα Bθ Βι Vβ gradus et 33] *om.* Mγ 33] 23 Eα Eδ Eζ Mη Mo Nα Pγ Po Pυ Rα Sβ Sκ Vψ; 36 Oπ; 33.36 Pμ minuta] minutorum Aα Fβ Vβ; *add.* sicut in diebus Nα et] que Pρ sicut] *om.* Aα; S^d *and add in marg.* sicut Sθ
- 18 habemus] habuisti Cη; *om.* Bζ; pervenit Qα habemus ex Indis] *repeats interlin.* Βη ex] *om.* Sθ; ab *some*; *add.* diebus Eζ ex Indis] *om.* Mv; per indos Oη Indis] Indith Mη; Yndis *some*; hyndis Pμ Pν pervenit] pervenitque Eβ hec] *om.* Bα Cδ Sλ declinatio] *om.* Bα Vι; *add. interlin.* maxime solis Pρ; *add.* usque Cδ Sλ 24] 34 Lγ Mθ Oκ Pμ Pν Qλ Vψ; 34 *corr. to* 24 Fβ gradus] *om.* Fα ergo] *om.* Sθ; igitur *many* hanc] *om.* Eα Mv
- 18-19 hanc ... secundus] *om.* Bα
- 19 quem] quod Cθ Dγ Pα Pγ P Qα Sκ Vβ Vι; *add.* auctorem Qα quia ... discordia] *om.* Bα erit] est Pφ Qδ Rβ Si Vα Vε Vπ; ē Bθ Ev ibi] *om.* Bζ Cε Pφ Qα Si Vε Vι; in Eβ; sibi Mκ Sκ; tibi Eα Nα
- 20 igitur] ergo *many*; vero Aα Bθ Dη Ev Qδ Rβ Vπ volueris] vis *many*; *om.* Pγ Pψ extrahere] *om.* Mθ; distrahere Cε Arietis] *add.* et Libre Qδ Rβ Arietis ... circulum₂] *om.* Pλ Pρ divide] deinde Cη
- 20-21 id est circulum] *om.* Bε Βι; et circulum Vε; in circulum Cη; qui est Cδ Sλ; qui est circulum Fβ; scilicet Bα

but even in the days of al-Mā'mūn⁷ observers found 23 degrees 33 minutes, and just as we have from the Indians, the [obliquity] approaches 24 degrees. Therefore take this [obliquity] following whom you wish, since there will be there no perceptible disagreement.

When, therefore, you wish to draw the circle of Aries, divide the circle of Capricorn, that

⁷ Al-Mā'mūn (Abū Ja'far Abdullāh al-Mā'mūn ibn Harūn, AD 786-833), Abbasid caliph, AD 813-833. His Latinized name, Almeonis, can be found in Campanus of Novara, *Theorica planetarum*, and in Kepler. Gunther erroneously identified Almeonis as "The son of Albumazar."

est circulum ABCD, per 360 divisiones. Et accipe ex eis secundum predictam declinationem ex puncto A versus D, et pone ibi aliquam notam. Et si volueris, divide ipsam quartam per 15, et accipe ex eis 4 ex parte A versus D, et pone ibi notam; et vide

- 21 circulum] *om.* Eα ABCD] Capricorni Nα; *add. ll. 12-13 (repeat: Cumque ... Cancrī₂) Mη*
 360] 36 Uα; 60 *corr. to* 360 Cβ divisiones] *om.* Mγ Mν Vε Pλ Pρ Pφ Vν; *add.*
 equales Fβ ex] *om.* Mθ; ab Bζ Eη; *add. interlin. gradibus* Oα ex eis] *add.* 24
 gradus Qα secundum] *om.* Mφ Oζ Pμ Pν Pρ Qγ Qλ Vι Vκ predictam] *om.* Bη
 Vψ Wβ; dictam Bα Cε Dη
- 21-22 Et ... declinationem] *om.* Eα
- 22 declinationem] *add.* scilicet 24 gradus vel circa Xβ ex] *add.* P Vε puncto] parte
 Eα versus D] *om.* Cβ Cζ Cθ Eμ Mθ Mν Oη Oπ Oσ Pψ Qα Vα Vν Vχ; *marg.* Mκ;
interlin. Oα pone] fac Bα; ponetes Nα ibi] *om.* Eν aliquam] *om.* Bγ Bε Bη
 Cδ Cη Pα Pτ; aliquantum Vπ notam] *add.* Z Cι Vκ; *add. interlin.* ut Z Oα Et₂] *add.*
 vel Bα Bε Dη Eη Fζ Lγ Lη Mγ Mδ Oζ Oτ Oυ Pμ Pν Pρ Qβ Qγ Sδ Tδ Vι Xβ; *et corr. to* vel
 Mκ; *add. interlin.* vel Vβ Et si volueris] *om.* Qλ Wα; vel Mν Mφ volueris] vis
 many divide] dividere Bα Bζ Cη Dη Mη Pδ Qα Wβ
- 22-23 ibi ... ibi] *om.* Nα 22-23 Et si volueris ... notam] *om.* Pα Vν
- 22-24 Et si vis ... equales] *marg.* Cβ
- 23 ipsam] *om.* Mλ Pα; aliquam per Bα; unum Oπ; *add.* in Uα; quartam] 4^{am} many; *om.*
 Mν; *add.* circuli Oα(*interlin.*) per] twice Vκ; ex Oη; partem Rβ; partes Qδ *and add.*
suprscr. in per 15] *om.* Sβ 15] iii Cθ; 5 Mθ Oκ ex₁] *add.* in alio Eο ex
 eis] exis Sκ 4] 4^{or}/iiii^{or}/quat(t)uor some; xi Cθ Oπ; 24 Qμ; 34 Mη; *add.* declinationem
corr. in marg. to divisiones Fβ; *add.* divisiones Bζ Bη Cε Cι Dη Eα Eβ Eη Eμ(*interlin.*) Eν Fζ
 Lγ Lε Lη Mγ Mδ Mκ(*interlin.*) Mο Mφ Oζ Oξ Oτ Oυ Pδ Pθ Pλ Pμ Pν Po(*interlin.*) Pρ Pφ
 Qβ Qγ Qδ Qλ Rβ Sδ Sθ Tδ Vν Vψ Wα Wβ Xβ; *add.* divisiones quarum qualibet habet 6
 gradus Mν Mφ Vι; *add.* partes *and interlin.* al' divisiones Vβ 4 ... D] quartam partem
 Vε ex₂ ... ibi] fac Bα versus D] *om.* Cδ Cζ Cθ Eμ Eν Mγ Mκ Mν Oα Oη Oκ Oπ
 Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vσ Vν Vχ(*interlin.*) ibi] *om.* Mν; *add.* aliquam Fβ
 notam] *add.* ex hiis 15 accipe 4 versus A Mη Qμ; *add.* S; [= scilicet Z?] Sθ; *add.* scilicet
 Z Bε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mδ Mθ Mυ Oξ Oτ Oυ Pδ Pθ Pλ Pμ Pν
 Po(*interlin.*) Pρ Qβ Qγ Qλ Qμ(*marg.*) Sδ Tδ Vι Vψ Wα Xα; *add.* versus Z Cε; *add.* Z Eμ Qδ
 Rβ et₂] sed Aα Bζ Bθ Cθ Dγ Eμ Eν Eυ Lζ Mκ Mλ Mν Oη Oκ Oσ Po Pυ Pφ Qδ Sβ Sι
 Vα Vκ Vν Vσ Vχ Xα; *add. interlin.* al' sed Vβ et vide] divide Sθ; et divide Xβ; hoc
 divide Vε; sit inde Aα
- 23-24 et₂ ... equales] *om.* Bα Sι

that is circle ABCD, into 360 divisions. And take of these, following the abovementioned [obliquity], from point A towards D, and set there some mark. And if you wish, divide this very quarter by 15, and of these take 4 from A towards D and place there a mark;⁸ moreover see

⁸ 90 divided by 15 equals 6, and 4 times 6 equals 24, an approximation of the obliquity of the ecliptic.

- 25 ut sint quarte equales. Et si volueris, divide quartam per 3^a et iterum divide ipsam tertiam, que fuerit iuxta A, per 5, et ex ipsis 5 accipe 4, que fuerint ex parte A, et ibi pones notam. Si autem certius volueris dividere, fac sicut dicemus. Postquam diviseris
- 24 ut] que Eδ; si Qα; *add.* ibi Bε Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lγ Lη Mδ Mη Mφ Oξ Oτ Pδ Pμ Pν Pρ Pυ Qβ Qγ Sδ Tδ Vψ Wα Xβ; *add.* ubi Pθ Vι sint] sicut Pγ quarte] 4^e many; *om.* Eο equales] *om.* Cζ et₁] vel Bα Cδ Sλ Vσ; et *corr.* to vel Mκ volueris] vis many divide₁] dividere Bζ Cη Cι Dγ Mη Mo Mu Mφ Oη Pθ Pτ Vι Wβ; divides Fβ; *add.* ipsam Cβ Eα Sι quartam] 4^{am} many; *om.* Mδ quartam ... divide₂] *marg.* Rα 3^a] tria/3 many; tres Oη Qβ; tertiam Pφ divide₂] *om.* Pφ ipsam] *om.* Bα Bκ Cδ Cζ Eδ Eμ Mγ Mκ Mu Mφ Oη Oκ Pφ Qα Sθ Sι Sλ Vα Vν; illam Mν
- 25 tertiam] 3^{am} many; 3 some; *om.* Mν; quartam Bθ Ev Vπ; *add.* *interlin.* partem Oα; *add.* per ipsam Mφ; *add.* per partem Mu que fuerit iuxta] versus Bε Eα Eη Fα Fβ Fζ Lγ Lε Lη Mδ Mu Mφ Oζ Oξ Oτ Ou Pλ Pμ Pν Pρ Pυ Qβ Qγ Qλ Sδ Sι Sλ Tδ Vι Vν Wα Xβ fuerit] fuit Aα Oη iuxta] infra Dη Pδ Pθ; in parte Cε; in quarta / 4^a Eδ Eζ Mη Po Mo Nα Pγ Pδ Qμ Rα Sβ Sκ Wι Xα; oc^a or x^u Ev; versus Aα Bθ Ev Qδ Rβ Vπ A₁] *om.* Mη Mν; *interlin.* Vσ; *add.* versus Eδ per 5] per quinque alii; per 4 Xα; per 5 divisiones Bζ Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mγ Mδ Mu Mφ Oξ Oτ Ou Pλ Pμ Pν Pρ Pτ Pφ Qβ Qγ Qλ Sδ Tδ Vβ(*interlin.*) Vι Vν Wα Xβ; per i Ev; *add.* per divisiones Bε et ex ipsis 5] *om.* Vυ Sκ; ex extrahe 5 Vε ipsis] *interlin.* Rα; eis Cζ Oη 5₂] *om.* Nα; quintis Pφ; quinque Pρ; *add.* divisiones Sι accipe] twice Pγ 4] 4^{or}/iiii^{or}/quat(t)uor some; *add.* in *marg.* scilicet qui valent 24^{or} gradus Vβ que] tunc Sκ que fuerint] *om.* Bα; divisiones Cε que₂ ... parte] versus Cδ Sλ fuerint] *illeg.* Eη; fiunt Vκ Vν Wβ; fuerit Eζ; fuerunt Oα; sunt Bε Eβ Fα Fζ Lγ Lε Lη Mγ Mδ Mκ Mu Mφ Nα Oζ Oη Oξ Oτ Ou Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vβ Vι Vχ Wα Xβ ex₂] a many ex parte] a capite Aα Bθ Ev Vπ; iuxta Qα Vχ A₂] *add.* versus D Cε ibi] twice Pψ
- 25-26 et₂ ... notam] fac Bα
- 26 pone] pones some notam] *om.* Xβ; notas Bη; *add.* scilicet Z Bε Cε Eα Eβ Eη Fα Fβ Lγ Lε Lη Lδ Lφ Mu Oζ Oξ Oτ Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Xβ; *add.* scilicet 2 Fζ; *add.* Z Oα(*interlin.*) Ou Qδ Rβ Vκ Si] Sed Sβ; *add.* in *marg.* Alter modus extrahendi predictos circulos arietis scilicet et cancri per circulum Capricorni Lζ certius] tertius Aα Nα Wβ; cercinus Pγ volueris] vis many; *om.* Vπ dividere] facere Bζ dividere ... dicimus] fac sic Bα; procedere in dividendo fac sic Cδ Sλ sicut dicemus] hoc sicut tibi narrabimus Bζ Cβ Cζ Cθ Eο Eμ Ev Mγ Mθ Mκ Mν Oα Oη Oκ Oπ Oσ Pφ Pψ Qα(*om.* tibi) Sθ Sι Vα Vβ(*om.* tibi; *add.* *interlin.* al' dicemus) Vε(*om.* tibi) Vν Vσ Vυ Vχ; nd(?) dicemus Cε; sic Bα Cδ; sicut narrabimus Qα; sicut diximus Vπ; sicut diximus *corr.* from sicut dicemus Bθ; ut dicam Bγ Bη Cη Pτ Wβ; ut dicemus Dη Mu; *add.* *Addendum* 7 (ll. 62-67) Wι

that the quarters are equal. And if you wish, divide the quarter by 3 and again divide that third, which will have been next to A, by 5, and then from these fifths take 4, which will have been next to point A,⁹ and place there a mark. If, however, you wish to divide [it] more precisely, do just as I will say. After you have divided

⁹ 90 divided by 3 equals 30, and 30 divided by 5 equals 6; 4 times 6 [i.e., a fifth of 30] equals 24, an approximation of the obliquity of the ecliptic.

30 tabulam per diametra et equales feceris quartas scripserisque litteras super capita diametrorum, utpote in superiori parte tabule que est sub armilla et signat meridiem A; et in occidente B, in septentrione C, et in oriente D, divides unam quartarum, scilicet ex A in D in 90 gradus, et accipies 23 gradus et 51 minuta secundum Ptholomeum, quia

- 27 et ... quartas] *om.* Bα; in equales quartas Bε Eα Eη Fζ Lε Lη Mδ Mφ Mv Oξ Oτ Ov Pζ Pλ Pμ Pν Pρ Qβ Qγ Sδ Tδ Vι; in 4^{or} 4^{as} equales Fβ quartas] 4^{as} many; *add.* si Nα scripserisque] scribensque Oσ: scribesque Vv: scripsens Pψ: scripsensque Bζ Cβ Pτ Qλ: scripsisque Oη: scripterisque Aα: *add.* lineas et Mδ litteras] *add.* A,B,C,D Oα(*interlin.*); dyametra Uα super capita] *om.* Vε
- 28 diametrorum] ipsorum Eδ utpote] ut Bα Ev; et pote Mv; ut pone Bθ Vπ; ut poste *corr.* to ut Sι; ut puncta Vv; *add.* *interlin.* al' puta Vβ superiori] inferiori Cη parte] *om.* Ev; *add.* meridiei Vv tabule] *twice* Mη; *om.* Mλ Ov Qλ Vι Vv Wα; *marg.* Mκ; *add.* meridies Bζ Mγ que] eque Qδ est] *om.* Sθ; *add.* quasi Qα sub] *om.* Vσ; super Oη armilla] *add.* A Oη et] que Bα signat]¹⁰ significat Cη Dγ Lε Mγ Mθ Oα Oη Oσ Pγ Pρ Pτ Pφ Tδ Vψ; sicut Nα A] *om.* Ev
- 29 et₁] quod Pρ B] s Xβ; *add.* et many C] *om.* Qδ; O Nα oriente] occidente Vε D] *om.* Eβ divides] *illeg.* Qλ; divide Cδ Ev Xβ; dividens Bγ Bι Cη Eδ Pγ Pο Pτ Pυ Uα Vν Wβ Wι; dividies Aα unum] numquam Aα unum quartarum] unamquamque Pρ unam ... scilicet] id est quartam Bα quartarum] 4^{arum} alii; quartam Bε Cδ Cε Dη Eα Eβ Eη Eτ Ev Fα Lγ Lη Lε Mδ Mθ Mv Mυ Mφ Nα Oζ Oη Oκ Oτ Ov Pα Pδ Pλ Pμ Pν Pτ Pφ Qβ Qγ Qλ Sδ Vβ Vι Vν Vσ Vυ Wα Xβ; quartam *corr.* to quartarum Oα; *add.* tam partium Cε scilicet] ut pote Bζ Cβ Cζ Cθ Eμ Ev Mγ Mκ Oα Oη Oκ Oπ Oσ Pφ Pψ Qα Sθ Si Vα Vε Vν Vσ Vυ Vχ; ut pone Mv
- 30 in D] *om.* Dγ 90] lx Ev gradus₁] gradibus Eo et₁ ... gradus₂] *marg.* Cβ accipies] accipie Cδ; *add.* *interlin.* ex eis Bγ 23] *om.* Oπ 51] hi Mθ; 15 Pν Qβ Sδ; 33 Sι; 33 *corr.* to 51 Vα Vπ; 33 minuta et 51 Bε; 33 minuta pro certo 51 Aα minuta] minutum Sκ Ptholomeum] Ph'm Vκ; Phtolomeum Bκ Oκ Vπ; Potholomeum Eζ; Ptholoium Sθ; Ptolomeum Bη Bι Eη Ev Fβ Mv Mυ Mφ Pφ Qμ Sλ Vα Vε Vχ Vψ; Tholomeum Bζ Eα Cθ Oξ Oπ Pυ Qα Si Vν Xβ; Tolomeum Oα; Tpholomeum Sκ quia] qui Bζ Mγ
- 30-31 23 ... moderni] *om.* Wβ; quia ... habeant] et fac notam Bα

¹⁰ Besides the listed mss which read *significat*, seven mss have *signat* (Bκ Cζ Pα Pδ Vα Vβ Vι), and one has the abbreviation *st* (Bε). All the rest – the vast majority – have the abbreviation *sig̃t*, which could be an abbreviation of either word.

the plate by its diameters and made the quarters equal, and after you have inscribed the letters at the ends of the diameters, as one would expect in the upper part of the plate, which is below the armilla/ring and signifies the south A, and in the west B, in the north C, and in the east D, you will divide one of the quarters, that is, from A to D into 90 degrees, and take 23 degrees 51 minutes according to Ptolemy, since

magis autenticus est, licet moderni sapientes 23 gradus et 33 minuta pro certo habeant.

Accipe igitur in predicto numero, ut diximus, notam et scribe super eam Z, eritque arcus AZ tota declinatio. Deinde iunges Z cum B per lineam ZB, abscindetque

- 31 magis] in A Oη autenticus est] autenticum Rα est] *om.* Qμ Σκ 23] 22 Mo; 32 Eδ Pο Pυ Rα Sβ Xα; 33 Mη Sθ gradus] *om.* Bζ; *corr. from gradibus* Eο 33] triginta 3 Bζ; *interlin.* Mθ; *lacuna* Eζ; *om.* Oκ; 23 Pψ Vα Vψ pro certo] *om.* Bη habeant] acceperint Bγ Bη Cη Pτ Wβ; accipiant Mν Pα Sι Vν; *add.* Hoc levissime facies sic. Protrahe lineam a nota Z usque ad centrum E secundo circulum Arietis, et ubi secat, pone notam M, et sic habes in circulo Arietis similem declinationem arcus, scilicet MH, et posthac fac ut docet littera. Oη¹¹; *add.* 3-line gloss Cζ habeant] *add.* Adendum 7 (ll. 62-67) Bγ Bε Bη Cε Cη Cι Dη Eα Eβ Eη Eτ Fα Fβ Lγ Lε Lη Mδ Mν Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pν Pμ Pρ Pτ Qβ Qγ Qλ Sδ Σκ Tδ Vβ Vι Vψ Wα Wβ Xβ; *add. in marg.* Ego Iohannes de Calomonte:¹² Nota que aliqui libri non habent istam litteram, scilicet, “Vel divides sic” usque ad litteram exclusum subsequentem, “Accipe ergo in predicto numero” [*i.e.*, *Addendum* 7] nisi pro extranea; tamen est valde, utilis et bona. Vβ
- 32 Accipe] Accipies Sλ Accipe ... diximus] *om.* Bα igitur] ergo many; quoque Vν in ... numero] *om.* Mγ predicto] *om.* Vι; dicto Tδ; *add.* etiam Fβ numero] *om.* Cθ; puncto Eα; *add.* accepimus Eη ut diximus] *om.* Cδ Sλ diximus] prediximus Bγ Bη Cη Mγ Pα Pτ Pφ Sι Vν Wβ; diximus *corr. to* prediximus Vβ notam] *om.* Bγ Cη Pα Pτ notam ... Z] super Z Cε et scribe super eam] *om.* Pλ super] *om.* Sβ Vε eam] earum Qγ; lineam eam Eν; *add.* notam Bγ Bε Cη Eα Eη Lε Mδ Mν Mφ Oζ Oξ Oτ Oυ Pα Pμ Pν Pρ Pτ Qβ Qγ Qλ Wα Wβ; *add. interlin.* id est notam Vβ eam Z] quam scribe Xβ Z] *om.* Qγ; et Mν
- 33 eritque] eruntque Bθ; *om.* Cε eritque arcus AZ] *om.* Vα; A et Nα; 82 Oη arcus] and elsewhere archus Sι arcus AZ] A et Mγ; A et Z Vκ; A arcus Xα tota] *om.* Uα tota ... B] *om.* Cι declinatio] *add.* circulo(*expunged*) solis Mθ; de circulo Vψ; de circulo solis Oκ iunges] *om.* Mλ Vψ Z cum B] B cum Z Bα Bζ Cδ Eμ Mθ Mκ Mλ Oα Oη Oκ Oσ Pψ Qα Sθ Sλ Vα Vν Vυ; BZ or ZB Aα Bγ Bι Bκ Cζ Cη Cθ Dη Eδ Eζ Eν Eο Eτ Lζ Mη Mo Mφ Nα Oζ Oπ Pγ Po Pτ Pυ Rα Sβ Sι Uα Vβ Vε Vχ Wι Xα; B cum Z *corr. to* ZB Vσ; Z et B Vκ Vπ; AB Bθ Σκ; B Dγ; B cum C Mν; ZCB Vψ per lineam ZB] *om.* Bε Dη Eη lineam] littera and *add. interlin.* lineam Mθ; *add.* rectam Σκ ZB] *om.* Aα Bθ Bι Bκ Cη Eδ Eζ Eτ Eυ Mη Mo Nα Pγ Po Pτ Pυ Qμ Sβ Uα Vβ Vπ Wι Xα; *erasure* Rα; AB Dγ Lζ Σκ; BZ Mθ; EB Mν Vκ; et B Mγ abscindetque] *corr. from* abscindesque Oα; et abscindet Bα Bι; abcindeque Pμ; abscindesque Oκ; abscindentque Mδ; abscindes Oη; abscindesque Eν Mθ Mν Vχ; scindetque Dγ; ascinditque *corr. to* scindet que Qδ

¹¹ This additional material was included by Gunther as part of his text (pp. 149, 203), but in fact it appears in only this one manuscript.

¹² See note to Cap. 7 line 9.

he is more authoritative, although modern learned men know for certain it is 23 degrees 33 minutes.

So take the mark for the abovementioned number [for the obliquity], as we have said, and write on it Z, and arc AZ will be the entire [obliquity]. Then join Z with B by line ZB, and it will intersect

- lineam AC super punctum H; tunc pones ei punctum E cuspidem, et fac circulum
 35 secundum quantitatem longitudinis EH (id est, pones circinum ex una parte super E et
 ex alia super H) et fac circulum qui erit HTKL, et ipse erit circulus, per quem vadit caput
 Arietis et Libre.
- 34 lineam] *om.* Qλ; *marg.* Wα AC] AD Vε; A Pα; ut Nα; *add.* id est Sι punctum₁] *om.*
 Mθ H] *om.* Nα tunc] Item Mν; et Eδ pones] pedes Bη; *add.* ex Bα Cβ Cδ
 Cθ; pedes cercini immobile super Bη; *add. and canc. by later hand* circulum ex una parte
 super Eδ ei punctum E] *marg.* Wα ei¹³] *om.* Aα Bγ Bε Bη Bθ Bι Bκ Cη Dγ Eα
 Eβ Eδ Eζ Eη Eτ Ev Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Nα Oζ Oξ Oτ Ov Pγ Pλ Pα Pμ
 Pν Po Pq Pτ Pv Qβ Qγ Qδ Qλ Rα Rβ Sδ Tδ Uα Vβ Vκ Vπ Vv Wβ Wι Xα Xβ; eius Sι; super
 ei Bζ; *add.* H Oα(*interlin.*); tunc pones Sκ punctum E] *marg.* Qλ E] *om.* Cι; G Vε
 cuspidem] *add.* sibi Dγ Eζ Po Rα Sβ
- 35 secundum] super Bα quantitatem] quadrantes Xα EH] E ex H Bκ Cβ Cθ Dγ Eδ
 Eζ Ev Eo Lζ Mλ Oπ Po Qμ Rα Sβ Vε Vκ; et ex hoc Mη; CH Mν; E et H Vκ; E Nα id
 est] *om.* Sκ; A Pγ; et Eη; idem Pλ; tunc Eτ id est pones] ponendo Vv circinum]
 circulum Bγ Bζ Cη Cθ Eδ Ev Mθ Mo Oκ Pγ Po Pv Pτ Uα Xα; *corr. from* circulum Qδ;
 tertinum Vκ una] *om.* Oη super] *interlin.* Wι
- 35-36 id est ... H] *om.* Qα id est ... circulum] *canc.* Pq ex₁ ... erit₁] scilicet Bα ex₁
 ... circulum₁] *om.* Bζ E ... alia] *om.* Vα E ... super] E cuspidem et fac circulum
 secundum quantitatem longitudinis *marked "va...cat"* Vπ
- 36 alia] *add.* parte Bε Cβ Cδ Cε Dη Eη Lγ Nα Mv Oη Qγ Qδ Rβ Sι Sλ Vκ Vv; *add. interlin.*
 scilicet parte Vβ H] B Cη et₁] id est Pγ fac] facies Cδ Sλ fac ... erit₁] sit
 circulus Qα qui] quod Cβ qui erit] *om.* Bκ Cδ Dγ Eδ Eζ Mλ Sβ; *del.* Mκ; *add.*
 circulus Cζ Cθ Eμ Ev Mθ Oα Oκ Oσ Pψ HTKL] HI et TL Bζ; H.CBA Vε; HCKL Sι; HIKL
 Eδ; HKL Vψ; HTHL Xα; BCL Nα; KL Rβ HTKL ... erit₂] *om.* Oπ ipsi] *om.* Vε
 erit₂] est Mγ Pφ circulus] *om.* Pτ per] super Sι per ... caput] *om.* Qα
 caput] capud *many*
- 37 Libre] *add.* 3-line gloss Cζ; *add.* Addendum 7 (ll. 62-67) Qδ Rβ

¹³ The most common version here is “pones (ei) punctum E cuspidem” with *ei* appearing in about half of the mss. At line 41 the text is “pones (ei) punctum E (eius) cuspidem” with *ei* appearing in about half of the mss and *eius* in about half (although some mss have neither). Perhaps some scribe(s) might have expanded *ei* to *eius* in order to give it meaning. In this phrase at lines 52 and 59, neither *ei* nor *eius* appear.

the line AC at point H; then you place point E on it [i.e., line AC] as the centre and make a circle with radius EH (that is, you will set a compass with one part [i.e., leg] on E and the other on H); and you make the circle, which will be HTKL and this will be the circle along which the beginnings of Aries and Libra travels.

40 Iterum divides istum circulum per 360 aut quartam eius, ut supra, et pone super numerum graduum predicte declinationis, ut supra dictum est, notam et scribes super eam M, et iunges M cum T per lineam MT; et abscondet linea MT lineam AC super

- 38 istum] illum Bγ Cη Nα Wβ circulum] *om.* Mθ Qα Vα; *add. interlin.* scilicet capitis Arietis et Libre Vβ; *add.* Arietis quod docuit invenire Sι per] *om.* Tδ 360] *add.* divisiones Bζ Mγ Qα Vκ Vν; *add.* gradus Bε Cδ Cι Dη Eα Eβ Eη Fβ Lγ Lη Mδ Mη Mκ(*marg.*) Mν Oζ Oξ Oτ Oυ Pθ Pλ Pμ Pα Pρ Pφ Qβ Qγ Qδ Qλ Rβ Sβ Sδ Vι Vσ Wα; *add.* gradus et/vel divisiones Mν Sι; *add.* partes Oσ Vυ; *add.* vel divisiones Pφ; *add. interlin.* scilicet divisiones Vβ aut] sit autem Oη; vel Bα; *add.* per Bθ Mδ(*interlin.*) Oπ Vπ; et Dη eius] *add. interlin.* per 90 scilicet Cβ supra] dictum est in 90 gradus Mδ; *add.* dictum est Cε Cι Dη Eα Pδ Vψ; *add.* dictum est in 90 gradus Bε Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mν(*om.* gradus) Mφ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pρ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Wα Xβ et pone super] *om.* Nα
- 38-39 ut ... declinatione] *om.* Bη Vε Wβ et₂ ... supra] *om.* Pθ et₂ ... est] *om.* Eα
- 39 declinationis] *add.* totius Pα ut ... est] *om.* Pτ supra] *om.* Bι Rα Vκ; dictum est Lζ notam] de quibus accipies 24 gradus Bη; *add. illeg.* Pρ scribes] scribe *many*; scribetur Nα super] *om.* Dγ; *add.* notam sive Bα
- 39-40 notam ... lineam₂] *marg.* Mθ(iunges ... per lineam *cut off*)
- 40 eam] notam Bη M₁] *om.* Mν M₁ ... lineam₁] *om.* Pμ Pφ M₁ ... MT₁] minut c (?) *canc. and add. suprascr.* M et per linea MT Pρ et iunges M] *marg.* Cβ Vσ; *om.* Xα iunges M] iungendo Vε M₂] eam Dη Wι M cum] in eam Cε T] de Bα per] cum Mγ Vν per lineam MT] *om.* Oκ Pδ per ... lineam₂] cum Sι lineam₁] *add.* hoc Wβ; *add. interlin.* subtilem Vβ MT₁] MF Vε; in T Eδ; M et T Pλ et₂] *add.* illa Nα Qα; vel Mo Pγ Wι et₂ ... MT₂] *om.* Mλ Uα et₂ ... AC] *om.* Dη abscondet] abscondat Wι; absinde de Vπ; abscondes Oκ Pρ; abscondit Mη Qμ linea] *om.* Cζ Eμ linea MT] *om.* Bζ Bη Mν Pρ Qα MT₂] inter Mν Wβ; ā Xα lineam AC] *om.* Pτ AC] AC et HK Aα Bθ Bι Bκ Cβ Cθ Dγ Eδ Eζ Eο Eυ Lζ Mλ Oπ Po Rα Vκ Vπ; AC et lineam HK Cδ; ACHK Ev; AE Fβ; AT Pα; AT et HK Sβ; AT et HZ Vε; MC et HK *corr. ad* AC et HK Vχ; *add. interlin.* et HK Vσ; *add. interlin.* scilicet HK Vβ; *add. 1-line gloss* Cζ

Once more divide this circle into 360 or a quarter of it as above, and place above the number of degrees of the aforementioned [obliquity], as described above, a mark and write on it M, and join M with T by line MT; and line MT will cut line AE at

punctum N, et pones punctum E eius cuspidem et facies circulum secundum quantitatem longitudinis E ex N, et facies circulum, qui erit circulus NSOV, et per hunc

- 41 punctum₁] *om.* Oη; spacium Mv Mφ Wα; super punctum Nα N] M Mδ; ei Wι et₁] tunc Wβ; *add.* tunc Cδ et₁ ... E] *marg.* Wι pones] *add.* ei Qμ; *add. and canc.* spacium Wα punctum₂ ... cuspidem] circinum ex una parte super E et ex alia parte super N Bη Wβ E] *om.* Pγ eius] *om.* Bα Bγ Cε Cη Dγ Dη Eτ Mo Nα Pρ Pτ Qμ Sk Uα Vυ Wι; ei¹⁴ Aα Bζ Bθ Bι Bκ Cβ(*twice*) Cδ Cζ Cθ Cι Eδ Eζ Eμ Ev Eο Lζ Mη Mθ Mκ(*interlin.*) Mλ Mν Mυ Mφ Oα Oη Oκ Oπ Oσ Pγ Pδ Pθ Pο Pυ Pψ Qα Rα Sλ Vε Vι Vκ Vπ Vσ Vχ Wψ Xα; eius *and* ei Mv Mφ Vι; N Ev; *add.* N Oα(*interlin.*) et facies] *twice* Sk facies] *fac many; om.* Eα facies circulum] pones circinum Vβ circulum] *om.* Eο; *add.* alium Fβ; *add.* super cuspidem *and add.* in *marg.* alium circulum Oυ secundum] per Cε Cι Dη Pγ Pυ Sk; pro Nα Vψ Wι; vero Pδ
- 41-42 N ... NSOV] *corr. in marg.* Wβ 41-42 secundum quantitatem] per quantitate Aα Bθ Eτ Mη Mo Vπ
- 42 longitudinis] *om.* Oη E ex N] E Eδ; EN Bα Bη Cδ Dη Fα Lε Mκ Pα Pλ Qα Rβ Vσ Wβ; ET 4 ex N Mη; O ex N Si; T ex N Vε; *add. and canc.* circulus Mv; *add.* id est pones circinum ex una parte super E et ex alia super N Cβ N ... circulus] *om.* Fζ et facies circulum] *om.* Bα Bγ Bε Cη Eβ Fα Lγ Lε Lη Mγ Mδ Mυ Mφ Oζ Oυ Pλ Pμ Qβ Qγ Pα Pν Pρ Pτ Pφ Qλ Sδ Si Tδ Vι Vν Vυ Wα Xβ facies ... erit] sit Qα circulum] *lac.* Mv qui erit circulus] *om.* Bκ Cδ Dγ Eζ Rα Sλ Vκ Wβ; *del.* Mκ erit] *om.* Bα; est Eβ Ev Lγ Lε Mv Mφ Oξ Pμ Qλ Vι circulus] *om.* Qδ NSOV] *om.* Mv; NFAV Vι; NFOV Mφ; NS Oκ; NSCB Cε; NSO Vψ; NSO et v Bζ Ev; NSOL Ev; NST Cι; •N•SV Rβ; NSVO Bγ Cη Mθ; NVOS Wβ; NVVC Vε; VSON Bη Mo Nα Sk hunc] istum Cζ Eμ Mθ Oα Oη Oσ Pψ Qα Vα Vσ Vυ; istud Oκ; quo Bκ
- 42-43 hunc circulum] quem Bα Bγ Bη Bι Cδ Cη Dγ Lζ Mγ Mλ Mν Pα Pτ Pφ Rα Sβ Si Sλ Vκ Vν Wβ

¹⁴ See note to line 34.

point N, and you will take point E as its centre and you make a circle with radius EN, and you make a circle, which is circle NSOV; and along this

circulum vadit caput Cancri. Et hec est figura.

45 Et si constituerimus circulum HLKT, qui est circulus Arietis et Libre, et vellemus ex eo extrahere circulum Capricorni et circulum Cancri, divideremus circulum HLKT per

43 circulum] *om.* Bκ; *add.* per quem Eλ vadit] *interlin.* Cβ; incedit Fα Lγ Lη Oζ Oξ Ou Pλ Qβ Qγ; incidit Lε Mη Mφ Oτ Pδ Pμ Pν Pρ Tδ Vψ Wα; pendit Pψ; red(d)it Aα Bθ Vπ; *add. in marg.* id est vadit Oξ Cancri] Capricorni Eo; *add. in marg.* qui vocatur tropicus estivalis¹⁵ Pρ Et hec est figura] *om.* Bα Bζ Qα; cuius hec est figura Mγ; cuius hoc sub est figuracio Vν; et hec patet in figura proposita evident~ Bη; et huius erit subscripta figura Dη; ut apparet in figura Bκ; ut est in figura Eν; ut est in figura subscripta Bι Eδ Eζ Eo Lζ Mλ Vε; ut est in figura suprascripta Dγ Eα Po Rα Vκ Xα; ut est in proposita figura Sβ; ut patet in figura Aα Bθ Cδ Mκ Nα Sλ Vπ Vσ hec] *om.* Eτ; *add.* eius Bε est] *add.* precedens Bε Cε Ci Eη Fβ Fζ Lγ Lη Mδ Mν Mφ Oξ Oτ Ou Pδ Pθ Pμ Pν Qβ Qγ Qλ Sδ Vi Vψ Wα Xβ; *add.* presens Eβ Fα Tδ figura] *add.* que precedit Eτ; *add. interlin.* scilicet que procedit Vβ; *add.* scilicet figura Si; *add.* scilicet figura predicta Mν; *add.* scilicet prenotata Mθ Oκ; *add.* scilicet presens [*illeg.*] Oα; *add.* secunda Mo; *add.* subsequens Lε Pτ; *add. interlin.* scilicet que prenotata Eμ; *add.* Primo scilicet figurando ipsum quod cum non est faciendum maxime cum mater sit prius mensurata et figurata Oη; *add. 1-line gloss* Cζ figura] *add.* Addendum 7 (ll. 62-67) Aα Bθ Eν Vπ

44 Et] *add. in marg.* Hoc pot[est?] alium modum Fβ; *add. in marg.* Idem per circulo arietis Bε; *add. in marg.* Hic docet per circulum Arietis invenire Cancri et Capricorni circulos Lζ circulum] *om.* Mγ si] cum Vν; sit Bζ HLKT] HKLT Bι Si; HKLET Pα; HLBCC Aα; HLKC Vψ; HLKT *corr.* to HTKL Sθ; HLTC Nα; HTKL Bε Pρ Sλ; H|HTKL Mη; H et LK et T Bζ; KLHT Cη qui est] *om.* Bι Bκ Dγ Eα Eδ Eζ Lζ Mλ Rα Sβ Vκ et₂] *add.* si Xα

44-45 constituerimus ... eo] volueris Cδ

45 ex eo] *om.* Sκ extrahere] intrare Aα; abstrahere Pα; subtrahere Oη; trahere Pδ extrahere ... Cancri] circulum Cancri et Capricorni extrahere Bι Eα Eδ Eζ Lζ Mλ(*om.* circulum Cancri) Po Rα Sβ Vε Xα circulum Capricorni et circulum Cancri] circulum Cancri et Capricorni ex circulo Arietis et Libre iam constituto qui est HTKL Cδ; *add.* id est Fζ circulum₂] *om.* Bκ Bη Cη Dγ Pτ Sλ Wβ divideremus] *twice* Bζ; divides istum Cδ circulum₃] *om.* Bα Cζ Eμ Mγ Mθ Mκ Mν Oη Oκ Oσ Pφ Pψ Qα Si Sλ Vν Vσ Vν HLKT] *om.* Cδ; *corr.* to HTKL Sθ; HKL Pλ; HKLT Bι; HTKL Bη Eν Pρ Sλ; KLC Vψ

45-46 circulum ... divideremus] *om.* Vα

¹⁵ "Tropicus estivalis" ("summer tropic"), a term used by many, e.g., Sacrobosco (*Sphere*, chap. 2).

circle the beginning of Cancer travels. And this is the diagram.

But¹⁶ if [first] we have determined circle HLKT, which is the circle of Aries and Libra, and we wished to draw from it the circle of Capricorn and the circle of Cancer, we would divide circle HLKT into

¹⁶ The first section of this chapter, lines 12 to 43, describes how to draw the circle of Aries/Libra and the circle of Cancer, working from the given circle of Capricorn around the outer edge of the plate. This section (lines 44-54) describes how to draw the circles of Capricorn and of Cancer having been given the equatorial circle of Aries/Libra.

360 partes vel divideremus quartam, ut supra. Post hec poneremus arcum TQ sicut totam declinationem. Post hec iungeremus H cum Q et extraheremus lineam donec abscinderet diametrum LT super punctum B. Deinde poneremus punctum E cuspidem et faceremus circulum secundum quantitatem longitudinis E ex B, qui esset circulus ABCD,

- 46 360] 30 *corr. to* 360 Pα; *add.* divisiones Lε partes] *om.* Vκ; divisiones Bα Pλ Pρ Pφ Sι Vν Vν; gradus Dη Eδ Fβ; *add.* equales Lγ; *add. interlin.* al' divisiones Vβ vel divideremus] *blacked out* Mη vel ... quartam] vel quartas Cδ divideremus] *om.* Bι Bκ Dγ Lζ Mλ Rα Sβ Vκ quartam] 4^{am} many; *add.* in 90 partes equales Bε Eα Eβ Eη Fα Fβ Fζ Lε Lγ Lη Mδ Mν Mφ Oζ Qλ Oξ Oτ Oυ Pλ Pμ Pν Qβ Qγ Sδ Tδ Vι Wα Xβ; *add.* eius in 90 partes equales Pρ; *add.* scilicet in 90 partes equales Bζ Pα Pτ Vν; *add. interlin.* in 90 partes scilicet equales Vβ ut supra] *om.* Oξ supra] prius Aα Eυ Qδ Rβ Vπ; supra *corr. to* gradus Xα; *add.* in 90 scilicet partes equales Mγ; *add. 1-line gloss* Cζ post hec] postea *some*; *add.* autem Oα Vν poneremus] ponamus Cδ; ponemus Bζ arcum] circulum Nα TQ] CQ Aα Bθ Vπ Vψ; KQ Sι; QT Mλ; eius Vε; T Mα Nα; T4 Xβ TK Ev sicut] secundum Bε; super Bκ Eδ Eζ Lζ Mλ Po Rα Xα; vel sicut super Eo
- 46-55 Post ... divisiones] *om.* Fβ Pν Qλ Wα; *marg.* Pα
- 47 declinationem] *add in marg.* si placet totam hoc Bγ post hec] post Bα; deinde Cδ; et Bγ Bη Cη Pτ Qλ Wβ iungeremus] iunge Cδ; coniungeremus Vσ H cum Q] H cum 4 Xβ; HL cum Q Xα; N cum A Vε; N cum F Qλ(*corr. to illeg.*) extraheremus] extrahe Cδ; ex H traheremus Mθ; ex eo traheremus Oκ lineam] *om.* Cζ Oη; *add.* ipsam Mν Mφ Vι
- 48 abscinderet] abscindat Pφ; abscinderit Cδ; abscindet Mγ Mη; scindat Bζ diametrum] *add. in marg.* transiendi diametrum extra circulum Cδ LT] *om.* Mφ; CT Mυ Vι; F Mδ; H Vκ; HT Bη; HT *corr. in marg. to* CA Wβ; LC Aα Bη Bθ Vπ; LT *corr. in marg. to* HT Dη punctum₁] *om.* Bγ Cη Pτ Wβ B] H Rα deinde] et Cη Pτ poneremus] pone Cδ punctum₂] *om.* Bγ Cη Oη Wβ; *add.* super Aα Bθ Eτ Eυ Mo Pγ Pυ Sκ Wβ; *add.* super E Uα punctum₂ ... cuspidem] circinum super E cuspidem ex una parte et ex alia parte super B Bη E] D Rα; E super E Nα; H Ev; super E et Vκ Vπ Wι E cuspidem] *corr. in marg. to* circinum super E cuspidem ex una parte et ex alia parte super [?] et faceremus circulum super Wβ
- 49 faceremus] fac Cδ circulum] *om.* Pθ; cuspidem Cη secundum] per Vκ longitudinis] *om.* Eα E ex B] EB Bα Bγ Bη Cδ Cη Cθ Eα Eβ Eη Eμ Fα Lγ Lη Mδ Mκ Mν Mφ Oζ Oξ Oτ Pλ Pρ Qγ Vι Vσ Wβ; EB ex N Bε(*marg.*); E ex H Aα; E ex N esset] erit Bα Mγ Vν; est Vκ; est esset Oξ(*and esset canc.*) circulus] *om.* Oη
- 49-53 E ex B ... longitudinis] *om.* Mη Vυ
- 49-50 esset ... Capricorni] est vel sit ABCD per quem vadit capud Capricorni Cδ: esset circulus Capricorni Bγ Cη; esset circulus Capricorni capitis Bθ Vπ

360 parts, or we would divide divide the quadrant, as above. Next we would take arc TQ as the entire [obliquity]. Then we would join H with Q and extend the line until it has cut diameter LT at point B. Then we would take point E as centre and we would make a circle with radius EB, which would be circle ABCD,

- 50 essetque hic circulus capitis Capricorni. Post hec etiam absunderemus arcum HM sicut totam declinationem et iungeremus M cum T et absunderet linea MT lineam HK super punctum N, et post hec poneremus punctum E cuspidem et faceremus circulum secundum quantitatem longitudinis E ex N, qui esset circulus NSOV, per quem vadit caput Cancri.
- 50 essetque] esset Cε Dη; erit Eζ; eritque Bζ Bι Eδ Dγ Lζ Mγ Mθ Mλ Oκ Pο Rα Vκ Vν Xα
 essetque ... circulus] per quem vadit Sλ essetque ... Capricorni] circulus
 Capricorni Pτ; scilicet circulus Capricorni Bα hic] om. Bι Lζ Rα Sβ Vκ capitis]
 om. Cζ Qα hec] om. Bα etiam] om. Aα Bθ Bζ Cδ Pγ Tδ Pπ Sλ
 absunderemus] absconde Cδ; abscondemus Mγ arcum] om. Cζ Eμ; circulum
 Nα HM] in AB Vε; BM Eο; KM Nα sicut] super Cη Vε
- 50-51 sicut ... M] om. Rα
- 50-52 Post hoc ... N] om Cε
- 51 et iungeremus] om. Bα iungeremus] iunge Cδ; iunges Mγ cum T] per lineam
 MT Rβ T] C Vψ; add. per lineam MT Bε Bη Cδ Cι Eα Eβ Eη Fα Fζ Lγ Lε Lη Mδ Mν
 Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pρ Qβ Qγ Qδ Qμ Rβ Sδ Sλ Tδ Vι Vψ Wβ Xβ
 absunderet] abscondet Bγ Bζ Bη Bι Cβ Cδ Cη Dγ Eα Eβ Eμ Eν Eο Eτ Lε Lζ Mγ Mθ
 Mκ Mλ Mν Oη Oξ Oπ Oσ Pλ Pρ Pτ Pφ Pψ Qδ Rβ Vι Vε Vν Vπ Vσ Wβ Xβ linea]
 om. Uα linea MT] om. Cδ Qμ MT] inter Mν MT lineam] om. Vα HK]
 illeg. Bη; BD Mγ Vν; BH Eδ; DLVE Pρ; HBD Bζ; HE Cζ Wβ; KH Dγ Eζ Lζ Mλ Pο Rα Vκ; KL Xα
- 52 N] F Pρ; M Wι; N N Mγ N ... punctum₂] om. Pλ et₁ ... cuspidem] om. Pρ
 post hec] om. Bγ Cη Pτ Wβ; post Bα; postea Bθ Bι Cδ Dγ Mλ Sβ Sι Vκ Vπ
 poneremus] om. Qα; ponamus Mγ; pone Cδ; ponemus Bζ; add. in marg. circinum
 super punctum E cuspidem ex una parte et ex alia super N et faceremus circulum Wβ
 punctum₂] om. Cη Pτ punctum E cuspidem] circinum super punctum E scilicet
 cuspidem ex una parte et ex alia super N Bη E] C Vψ; T Nα faceremus] fac Cδ;
 faciemus Mγ; add. interlin. E cuspidem et Pρ
- 53 E ex N] EN Bα Bγ Bη Cδ Cη Mν Mφ Pτ; E ex B Rβ; EF Pρ; E ex U Oτ; T ex N Nα Vε; corr. to
 EN Mκ; add. scilicet Bε; add. bottom marg. id est pones cercinum ex una parte super E et ex
 alia super N Cβ N qui esset circulus] om. Eη qui] quia Bζ qui esset
 circulus] scilicet circulum Bι Bκ Dγ Eδ Eζ Lζ Mλ Pο Rα Sβ; scilicet circulus Arietis Xα;
 similem circulum Vκ esset] erit Bα Cδ Mγ; est Nα Oη circulus] add. interlin.
 Cancri Wι NSOV] et NOV Bθ Vπ; meridiei Vε; NGVS Eν; NOGS Oπ; NOV S Bι Bκ Dγ Eδ
 Eζ Eο Lζ Mλ Pο Rα Vχ Xα; NSO Bζ; NSOB Cε Mθ Oκ; NSON Bα Pγ Pυ Vψ; N solus Aα;
 NVOS Cβ Cθ; OV Cζ; VSON Mο Nα Vκ Wα
- 53-54 circulus₁ ... Cancri] circulus Cancri NSOV Qδ Rβ per ... Cancri] om. Aα Bα Bη Bθ Bι
 Bκ Cζ Cθ Dγ Eδ Eζ Eμ Eν Eο Eτ Eυ Lζ Mθ Mκ Mλ Mν Mο Nα Oα Oη Oκ Oπ Oσ Pγ Pυ
 Pψ Qα Rα Sβ Sθ Uα Vα Vε Vκ Vπ Vσ Vυ Vχ Wι Xα; circulus Cancri Bγ Cε Cη Pτ Wβ;
 esset circulus cancri Dη; essetque hoc circulus capitis cancri Cβ; add. gloss Nota et hoc est
 faciendum Cζ
- 53-60 longitudinis ... longitudinis] om. Sκ

and this would be the circle of the beginning of Capricorn. After this we would also cut off arc HM as the entire [obliquity] and we would join M with T and line MT would cut line HK at point N, and after this we would take point E as centre and make a circle with radius EN, which would be circle NSOV, along which the beginning of Cancer travels.

55

Et si vellemus extrahere circulum Arietis et Libre et circulum Capricorni ex circulo Cancri, divideremus circulum NSOV per 360 divisiones. Post hec poneremus arcum SF sicut totam declinationem, et iungeremus N cum F per lineam NF, et

- 55 Et₁] *add. in marg.* Idem per circulo Cancri Bε si] *add. ex hoc* Bγ Cε Dη Pτ Wβ(*interlin.*) vellemus] volueris Cδ Mγ extrahere] facere Eα Arietis ... circulum₂] *om.* Cη et₂] vel Sλ
- 55-56 Et si ... divisiones] Per 360 divisiones divideremus circulum NSOV si vellemus extrahere circulum Arietis et Libre Bζ et₃ ... Cancri] *om.* Sβ Capricorni ... Cancri] *om.* Rα
- 56 ex] *add. hoc* Bι Vv ex circulo Cancri] *om.* Aα Bγ Bη Bθ Bκ Cβ Cε Cζ Cη Cθ Dγ Dη Eδ Eζ Eν Eο Eτ Eυ Lς Mλ Mν Mo Nα Oα Oη Oπ Oσ Pγ Po Pυ Pτ Pφ Pψ Uα Sθ Sι Vα Vβ Vε Vκ Vπ Vυ Wβ Wι Xα; *marg.* Mκ; *interlin.* Eμ; de circulo Cancri, supt(?) Vχ(*interlin.*); *add. constituto* Cδ; *add. et Libre* Vψ ex circulo ... circulum] divideremus per circulum Cancri et circulum Bα Cancri] *add. constituo* Vσ divideremus] dividemus Fζ Mγ; divide in Mη; *add. istum* Sλ divideremus ... NSOV] qui est NSOV. Divide istum circulum Cδ divideremus ... divisiones] *om.* Qα circulum] *add. qui est* Sλ NSOV] NBOS Mθ; NBOS *corr. to* NOS Oκ; NGVS Eν Vε; NOSV Cι Mη Mν Pγ Pδ Pθ Qμ Uα; NOVS Aα Bθ Bι Dγ Eδ Eζ Eο Eυ Mλ Po Qδ Rα Rβ Vπ Xα; NSOBV Eη; NSON Cε Pυ Qγ; NVOS Bα Cβ Cζ Cθ Eμ Mκ Oα Oπ Oσ Pψ Sθ Sι Vα Vσ Vυ Vχ; VSON Mo Nα; Cancri Bη Wβ divisiones] *om.* Bα; *add. scilicet* VSON Wβ NSOV per] NS super Vψ Post hec] et Bγ Bη Cη Pτ Wβ; post Vκ; postea Sι Vε poneremus] pone Cδ; ponemus Mγ
- 56-58 Post hec ... punctum T] *om.* Mν
- 57 arcum] *om.* Bα Eν Nα Qδ Rβ; *add. scilicet* Sι SF] *om.* Cη Pτ; ES Vα; F Uα; FN Fβ Wα; FS Mη; FS Mφ Vι; HC Eν Vχ; SG Bι Bκ Cβ Cθ Dγ Eδ Eζ Eο Lζ Mλ Oπ Po Rα Sβ Sλ Vε Vκ Xα; *corr. from* FN Qλ; *corr. from* SG Cδ; scilicet F Pφ Qμ; similem Bη Wβ sicut] super Vε totam declinationem] tota declinatione Fα; *add. in marg.* id est 24^{or} gradus circuli Cancri et ibi erit F Vβ et] in alzuc Eο iungeremus] iunge Cδ; iungemus Mγ; iungeretur Wι N] M Rβ N cum F] eum NF Wι; id est cum G Dγ; VFG Vε; S cum F Oη F] C Eν Oπ Vχ; G Bι Bκ Cβ Cθ Eδ Eζ Eο Lζ Mλ Po Rα Sβ Sλ Vκ; T Vα; *corr. ex* G Cδ per lineam NF] *om.* Bε Eβ Eη Fβ Mν Mφ Nα Oη Pα Qλ Vι Wα NF] *om.* Vπ; A Bθ; FNF Vψ; MT Bι Bκ Eζ Dγ Lζ Mλ Rα Sβ Vκ; NC Eν Oπ Vχ; NG Cβ Cθ Eδ Eο Po Sλ Vε Xα; *corr. from* NG Cδ; *add. and canc.* postea Eα
- 57-58 NF ... lineam] *om.* Vα

And¹⁷ if we wished to draw the circle of Aries and Libra and the circle of Capricorn from the circle of Cancer, we would divide circle NSOV into 360 divisions. After this we would take arc SF as the entire [obliquity], and join N with F by line NF, and

¹⁷ This third section (lines 55-61) describes how to draw the circles of Aries/Libra and of Capricorn having first been given the circle of Cancer.

60 extraheremus lineam in directo, donec se abscinderet cum diametro VS super punctum T. Post hec poneremus E cuspidem et faceremus circulum secundum quantitatem longitudinis E ex T, qui esset circulus THLK, qui est circulus Arietis et Libre. Post hoc

- 58 extraheremus] extrahe Cδ; *add. and canc.* circulorum Eα lineam] NF Mγ; *add.* NF Aα Bα Bζ Bθ Ev Pτ Pφ Sι Vβ(*interlin.*) Vν Vπ [NF] in directo donec se abscinderet cum diametro] *twice* Bζ se] *om.* Nα abscinderet] abscondet Cδ Mγ Oξ Qγ Sλ; abscondet Pφ VS] BD Be; CA Eβ Fβ Lη Mδ Mu Mφ Pμ Pv Qγ Qλ Vι Wα; CA *corr. to* DB Eα; ^{DB}_{CA} Lε Lγ Oζ Oξ Pα PA Tδ; DB Eα Fα Fζ Ot Ov Xβ; DLS Pq; HS Ev; M Nα; N Eζ; NF Pθ Vψ; NL Mη; NO' Vκ; NS Eδ Et Mθ Mo Ok Pδ Po Pv Vκ Wι; SDAB (scilicet DAB?) Qδ Rβ; SADB (scilicet ADB?) Qβ Sδ; ut Vν; VB Eη; VF Cι; VLS Bζ; VS *corr. to* VES Vβ; VS et VS *corr. to* VS Eμ; VS *corr. in marg. to* DB (or AB) Qμ; *add. in marg.* transiundo diametrum ut prius extra circulum scilicet ubi supponant alii circuli Cδ; *add. in marg.* aliter C.A vel H Ov super] per Mη
- 59 T] BT Nα; E ex T Vε; H Eβ Fβ Lη Mδ Mu Mφ Pμ Pv Qλ Wα; HD Pλ; HT Fζ Qβ Qδ Qγ Rβ Sδ Tδ Vι; H *add.* T Oξ; H *add. suprascr.* T Oζ; *corr. from* H Lγ Lε; *corr. from* HT Pα; *corr. from* HD Pq; *add. in marg.* aliter H Ov hec] *om.* Rα Sβ poneremus] pone Cδ; ponemus Mγ; *add.* circinum super Bη; *add.* punctum Mγ Vκ Vν E] *om.* Mθ; *add. supscr. illeg.* Mθ; circulum Ok faceremus] fac Cδ circulum] B Nα secundum] *ms* Lβ *begins again* quantitatem] *om.* Dη
- 59-60 Post ... T] *om.* Vα
- 60 longitudinis] *om.* Aα Bα Bζ Bθ Bι Bκ Cβ Cζ Cθ Dγ Eδ Eζ Eο Et Ev Lζ Mθ Mκ Mλ Oα Oη Oπ Oσ Pψ Qα Rα Sβ Uα Vε Vκ Vπ Vν Vχ Xα; *marg.* Wι; *interlin.* Vβ; longitudinem Dη E ex T] ET Bα Bγ Bη Cδ Fa Mκ; et Cη; *interlin.* Cθ Vσ; E ex C Mν; E ex H Eβ Fβ Lβ Lη Mδ Mφ Oζ(*add.* T *suprascr.*) Pλ Pμ Pv Qλ Vι Wα; E et ex H Lγ(*add.* T *suprascr.*); E ex HT Fζ Qβ Qγ Qδ Rβ Sδ Tδ; E ex HNLT Xβ; *corr. from* E ex H Lε; NT *corr. to* MT Pq; circulus C scilicet T Nα T] *add. in marg.* aliter H Ov qui₁] *om.* Dη qui₁ ... THLK] *om.* Vε qui esset] *om.* Lζ esset] erit Bα Cδ Mγ Vν; est Sβ circulus.] *om.* Bα THLK] *illeg.* Eη; CHLK Nα; HKLT Pq; HLKT Eβ Fa Fβ Fζ Lβ Lγ Lε Lη Mδ Mu Mφ Oζ Oξ Ot Ov Pα PA Pμ Pv Qβ Qγ Qλ Sδ Tδ Wα Xβ; HTKL Bε Oη; THLKE Bζ; THSE Oπ; THKL Bκ; TKLH Cδ Sλ; TLCD Pψ THLK ... circulus₂] *om.* Eα Pφ qui est] scilicet Bα Bγ Bη Cη Pτ qui est circulus] *om.* Bι Bκ Dγ Lζ Mλ Qγ Rα Sβ; per quem vadit capud Cδ Sλ; scilicet Vκ est] esset Eο Qδ Rβ; *om.* Pv Arietis et] *add.* scilicet Mλ Rα Sβ Libre] *add.* secundum artem predictam Fβ Lβ Oξ Pv Qλ Wα Post hec] postea Ev Rα Sβ; Hec Pδ hec] *om.* Bζ Eβ; *add.* ex isto circulo Cδ Sλ Sθ(*marg.*)
- 60-61 Post ... Libre] *om.* Fβ Lβ Oξ Pv Qλ Qμ Wα; *marg.* Pα

extend the line directly until it has cut the diameter VS at point T.¹⁸ After this we would take E as the centre and make a circle with radius ET, which would be circle THLK, which is the circle of Aries and Libra. After this

¹⁸ There is a great deal of (systematic) confusion in this clause. Diameter VS is the same line as diameter DB, but is perpendicular to diameter CA. And for the point of intersection to be H (never “HT”) the original arc would have to be 24 degrees to the left of point N.

extraheremus circulum Capricorni ex circulo Arietis et Libre.

- 61 extraheremus] extrahe Cδ; trahemus Eδ; *add.* de Pv ex ... Libre] ABCD secundum artem predictam Cδ Sλ(*om.* ABCD) et Libre] *om.* Dη Xα Libre] *add.* secundum artem predictam Bε Cι Eα Eβ Eη Fα Fζ Lγ Lη Lε Mδ Mη Mκ(*marg.*) Mυ Mφ Oα Oζ Oσ(*interlin. later hand*) Oτ Oυ Pδ Pθ Pλ Pμ Pφ Qβ Qγ Qδ Qμ Rβ Sδ Tδ Vι Vσ Vυ Vψ Xβ; *add.* secundum artem supradictam et declaratam Pα; *add.* ut supra Cβ; *add.* ut supra dictum est Bα Dη; *add. interlin.* scilicet eodem modo Vβ; *add.* secundum artem predictam ut in hac presente(?) figura Pq

we would construct the circle of Capricorn from the circle of Aries and Libra.

[ADDENDUM 7]

line 26 in marg. W ι

following line 31: B ϵ B γ B η C ϵ C η C ι D η E α E β E η E τ F α F β F ζ L γ L ϵ L η M δ M ν M ϕ O ζ O ξ O τ O ν
P α P δ P θ P λ P μ P ν P ρ P τ Q β Q γ Q λ S δ S κ T δ V β V ι V ψ W α W β X β

following line 37: Q δ R β

following line 43: A α B θ E ν V π

65 Vel divides sic omnem circulum: posita tabula in matre et ea diametrata, accipe in limbo ex A in D 24 gradus, si vis, et in termino ipsorum et super E pone regulam et fac subtilem lineam, que vocetur EZ, et hoc includit cum linea EA spatium 24 graduum omnis circuli infra inscripti. Et nota quod hoc modo in quolibet circulo infra limbum scripto tot sunt gradus accepti quot in limbo accepimus; et hic modus est melior, serva eum.

62 divides] dividas B ϵ E τ L ϵ F β F ζ ; dividemus A α Q δ R β sic] om. E β circulum] corr. from circa Q δ et ea] vel E α ea] eas D η diametrata]¹⁹ diametra B ϵ C ϵ C η C ι E η E τ F α F β L γ O τ P δ P λ Q γ V β ; dyametrum A α ; diametros D η P ρ

63 ex] om. V ψ D] B M δ ; corr. from Z S δ 24] 23 gradus vel 24 B η ; 23 and add. in marg. vel 24 W β ; et quatuor V ψ gradus] om. A α si vis] om. V ψ ; add. in marg. si placet B γ et] etiam S κ termino] circulo C ϵ ; initio E τ ; tertio C η ; tercio termino P τ ; 3 corr. to termino R β ipsorum] ipsarum A α B γ ; add. ibi est Z F β ; add. ubi est P θ ; add. ubi est z B ϵ B η C ϵ C ι D η E α E β E η F α F ζ L γ L ϵ L η M δ M ν O ζ O ξ O τ O ν P δ P λ P μ P ν P ρ Q β Q γ Q δ R β S δ T δ V ψ W α W β ; add. ubi sit Z M ϕ Q λ V ι X β ; add. [illeg.] Z W ι regulam] om. M ν S κ

64 EZ] E E ν ; E corr. to ZE X β hoc] in V ψ ; add. modo A α B θ V π includit] om. E ν ; interlin. P ρ EA] eodem P ρ ; scilicet A X β 24 graduum] 54 V ψ

65 infra₁] om. E α ; intra A α B γ B η B θ C η C ι E τ E ν P α P θ P ρ P τ V π W β W ι ; interra P δ ; MF V ψ inscript] scripti B ϵ B η E τ L γ L ϵ M δ P δ Q γ R β W β ; in spati corr. to scripti F ζ quolibet] quolicec S κ infra₂] intra A α B γ B η B θ C ϵ C η C ι D η E τ E ν P α P δ P θ P τ Q δ R β S κ V π W β W ι

66 tot ... accepimus] quotquotlibet (quotlibet S κ) gradus accipimus A α B γ B θ C η E τ E ν P τ S κ V β V π W ι tot] om. P ρ quot] add. in marg. gradus W β limbo] add. gradus P α melior] rator A α

¹⁹ From *diametro*, *diametrare*, “to draw diameters.” An uncommon word, but see *Dictionary of Medieval Latin from British Sources*, vol. 3 (1986), p. 650.

[ADDENDUM 7]

Or you will divide all the circles thus: after the plate has been positioned in the mother and its diameters drawn, measure along the limbus from A towards D 24 degrees (if you wish), and place the rule at the end of them [i.e., of the 24 degrees] and on point e and make a fine line, which should be labelled EZ, and this with line EA encloses a distance of 24 degrees on every circle inscribed within. And note that by this means we mark on whatever circle inscribed within the limbus, there are as many degrees as we had on the limbus; and this method is better – preserve it.

[FIGURA 7]

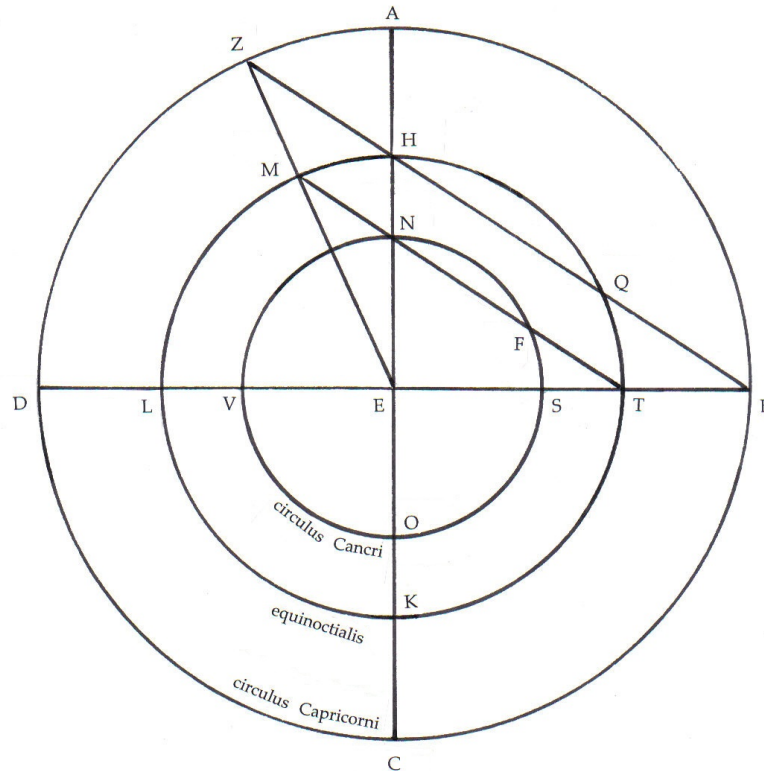


Figura inscriptionis trium circularum super totam declinationem

[Complete diagram] B α (fol. 79^v) B γ B ϵ B η B θ B ι B κ C β C δ C η C θ ²⁰ C ι E β E η E μ_1 (fol. 52^r)
 E μ_2 (fol. 52^v) E ν E ρ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M θ M κ M λ M ν M ρ M υ O ζ O η
 O κ (reversed) O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β (fol. 50^r) Q γ Q δ Q λ Q μ R α
 S β S δ S θ S ι S κ T δ V α_1 (fol. 201^r) V α_2 (fol. 201^v) V β V ϵ V ι (fol. 332^r) V κ V ν (rotated 90° counterclockwise)
 V σ V χ_1 (fol. 60^r) W β W ι X β

[Partial diagram] E α M υ (fol. 406^v) V χ_2 (fol. 60^v; cut off) W α

[Outline, or space only] A α B ζ C ϵ D γ D η E δ E ζ F δ M ϕ N α O α P ν P ϕ U α V π V υ V ψ

[No space] R β S λ V ι X α

P θ : "G"

[Combined with Fig. 1] V κ

[Combined with Fig. 8] B γ V ν

[Combined with Fig. 8 and 9] B η E ρ W β ²¹

²⁰ There are two diagrams in C θ (fol. 107^r and fol. 107^v) with identical lettering.

²¹ Mss B η (fol. 120^r), E ρ (fol. 186^r), and W β (fol. 1^{va}) have Fig. 7, 8 and 9 all superimposed as one diagram. In E ρ the lettering for Fig. 9 is not included and in W β an attempt has been made to distinguish the figures in part by different coloured inks.

[Caption]

Figura ... declinationem] Bε Bθ Cη Eη Eτ Eυ Fβ Fζ Lγ Lε Lη Mη Mν Mυ Oτ Oυ Pα Pλ Pρ Pτ Qβ Qδ Qλ Sδ Σκ Tδ Vι; *om.* Bα Bι Bκ Cβ Cδ Cθ Eα Eμ₁ Eμ₂ Eν Lζ Mγ Mθ Mκ Oκ Oπ Oσ Pψ Qα Qγ Rα Sβ Sθ Sι Vα₁ Vα₂ Vε Vν Vσ Wα; *cut off* Vχ₂; Ars [ad accipiendum(?)] circulos capricorni, equinoxis et cancri per [maximus] declinationem secundum Tholomeum Oη; Figura descriptionis trium circulorum super tota declinatione. Et circuli signorum. Et divisionis zodiaci per arcus super polum medie declinationis Bη; Figura descriptionis trium circulorum super tota declinatione. Et figura descriptionis circuli signorum. Et figura divisionis zodiaci per arcus super polum medie declinationis Wβ; Figura inscriptionis circuli Capricorni, equinoctialis et circuli Cancrī super medie declinationem polum Eο; Figura inscriptionis circulorum Cancrī et Capricorni Qμ

Figura] Circulus Pο Figura inscriptionis] Inscriptio Mδ Oζ Pρ inscriptionis] *om.* Pγ; subscriptionis Xβ trium ... declinationem] circuli Capricorni, equinoctialis et Cancrī Cι Pδ circulorum] *add.* Arietis, Cancrī et Capricorni Vκ Wι; *add.* Arietis, scilicet Cancrī et Capricorni Mο Pυ; *add.* scilicet Arietis (et) Cancrī et Capricorni Bγ Pμ Pο; *add.* scilicet Cancrī, Arietis, et Capricorni Mλ; *add.* scilicet Cancrī, Arietis et Libre, et Capricorni Vχ₁; *add.* scilicet Capricorni, Arietis et Cancrī Vβ super ... declinationem] *om.* Eβ Fα; Capricorni, Arietis et Libre, ac Cancrī Pγ totam] *om.* Xβ declinationem] *add.* et similiter zodiaci Bγ; *add.* inscriptorum Mδ; *add.* scilicet Capricorni, equinoctialis et Cancrī Oξ Qλ(*marg.*) Xβ; *add.* zodiaci Pλ

[Lettering on the diagram]

A] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oζ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vα₂ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Wα Wβ Wι Xβ; *cut off* Vχ₂ B] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Oη Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vα₂ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Vχ₂ Wα Wβ Wι Xβ; D Mθ Oκ Vε C] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vα₂ Vβ Vε Vι Vκ Vσ Vχ₁ Wα Wβ Wι Xβ; *om.* Oζ; *cut off* Bθ Vν Vχ₂ D] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Mυ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Vα₁ Vα₂ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Wα Wβ Wι Xβ; *cut off* Qα Tδ Vχ₂; B Mθ Vε E] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oζ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Vα₂ Wα Wβ Wι Xβ; *cut off* Vχ₂ F] Bα Bγ Bε Cδ Cη Cι Eβ Eη Eμ₁ Eμ₂ Eο Eτ Eυ Fβ Fζ Lγ Lε Lη Mγ Mδ Mη Mκ Mν Mο Mυ Oζ Oη Oξ Oσ Oτ Oυ Pα Pλ Pρ Pτ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Σκ Tδ Vα₁ Vα₂ Vβ Vι Vσ Wβ Xβ; *om.* Bη Bθ Eα Eν Fα Mθ Oκ Pγ Pδ Pμ Pο Qα Sι Vν Vχ₁ Wα; *cut off* Vχ₂; G Bι Bκ Cβ Cθ Lζ Mλ Oπ Pυ Rα Vε Vκ Wι; S' Sβ H] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oζ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vα₂ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Wβ Wι Xβ; *om.* Wα; *cut off* Vχ₂ κ] Bα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eν Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oζ Oη Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Sι Σκ Tδ Vα₁ Vα₂ Vβ Vε Vι Vκ Vν Vσ Vχ₁ Wβ Wι; *om.* Wα Xβ; *cut off*

V χ_2 L] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M κ M λ M ν M ρ M υ O ζ O η O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V ι V κ V ν V σ V χ_1 W β W ι X β ; *om.* W α ; *cut off* V χ_2 ; T M θ O κ M] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M θ M κ M λ M ν M ρ M υ O ζ O η O κ O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V κ V ν V σ V χ_1 W β W ι X β ; *om.* V ι W α ; *cut off* V χ_2 N] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M θ M κ M λ M ν M ρ M υ O ζ O η O κ O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V ι V κ V ν V σ V χ_1 W β W ι X β ; *om.* W α ; *cut off* V χ_2 O] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M θ M κ M λ M ν M ρ M υ O ζ O η O κ O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V ι V κ V ν V σ V χ_1 W β W ι ; *om.* W α X β ; *cut off* V χ_2 ; V S ι Q] B α B γ B ϵ B ι B κ C β C δ C η C θ C ι E β E η E μ_1 E μ_2 E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M κ M λ M ν M ρ M υ O ζ O η O ξ O π O σ O τ O υ P α P δ P λ P μ P ρ P τ P ψ Q β Q γ Q δ Q μ R α S δ S θ S κ T δ V α_2 V β V ι V κ V σ V χ_2 W β W ι X β ; *om.* B η B θ E α E ν M θ O κ P γ P υ Q α Q λ S β S ι V α_1 V ϵ V ν V χ_1 S] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M κ M λ M ν M ρ M υ O ζ O η O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ι V κ V ν V σ V χ_1 V χ_2 W β W ι X β ; *om.* E η W α ; B O κ ; T V ϵ ; V M θ T] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M κ M λ M ν M ρ M υ O ζ O η O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V ι V κ V ν V σ V χ_1 V χ_2 W β W ι X β ; *om.* W α ; L M θ O κ V] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M κ M θ M λ M ν M ρ M υ O ζ O η O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S κ T δ V α_1 V β V ϵ V ι V κ V ν V σ V χ_1 V α_2 W β W ι X β ; *om.* S ι W α ; *cut off* V χ_2 ; S M θ O κ Z] B α B γ B ϵ B η B θ B ι B κ C β C δ C η C θ C ι E α E β E η E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α F β F ζ L γ L ϵ L ζ L η M γ M δ M η M θ M κ M λ M ν O ζ O η O ξ O σ O τ O υ P α P γ P δ P λ P μ P ρ P τ P υ P ψ Q α Q β Q γ Q δ Q λ Q μ R α S β S δ S θ S ι S κ T δ V α_1 V α_2 V β V ϵ V κ V ν V σ V χ_1 W β W ι X β ; *om.* E ρ M υ O π V ι W α ; *cut off* V χ_2 ; R O κ

[Other information]

circulus Cancr[i] B γ B η C ι E α F β F ζ L γ L ϵ M ρ O ζ O ξ O σ (*later hand*) P α P δ P μ P ρ P τ P υ Q β Q γ Q δ Q λ T δ V β V χ_1 V ι W ι X β ; *om.* B α B θ B ι B κ C β C δ C η C θ E β E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α L ζ M η M θ M κ M ν M υ O η O κ O π P γ P λ P ψ Q α Q μ S κ V α_1 V α_2 V ϵ V ν V σ W α ; *cut off* V χ_2 ; Cancer P ρ (*twice*); Cancr[i] B ϵ (*twice*) E η L η M δ M λ O ζ O τ O υ S δ V κ ; *add. in marg.* NSOV est circulus Cancr[i] capitis W β equinoctialis B ϵ (*twice*) C ι E η F β F ζ L γ L ϵ L η M δ O ζ O ξ O τ O υ P δ P ρ P τ Q β Q γ Q δ Q λ S δ T δ ; *om.* B α B η B θ B ι B κ C β C δ C η C θ E β E μ_1 E μ_2 E ν E ρ E σ E τ E υ L ζ M η M θ M κ M ν M υ O η O κ O π O σ P α P γ P λ P ψ Q α S κ V α_1 V α_2 V ϵ V ι V σ V ν W α ; *cut off* V χ_2 ; Aries et Libra P ρ (*twice*); Arietis M λ V κ W ι ; circulus Arietis M ρ P μ P ρ P υ Q μ T δ ; circulus Arietis et Libre B γ E α F α V χ_1 ; circulus Arietis scilicet et Libre V β ; circulus equinoctialis O ξ X β ; equitoris M δ ; *add. marg.* HLKT est circulus Arietis et Libre W β circulus Capricorni] B γ B ϵ C ι E α F β F ζ L γ L ϵ M λ M ρ O ξ O σ (*later hand*) P α P δ P μ P ρ P τ P υ Q β Q γ T δ V β V χ_1 W ι ; *om.* B α B η B θ B ι B κ C β C δ C η C θ E β E μ_1 E μ_2 E ν E ρ E σ E τ E υ F α L ζ M η M θ M κ M ν M υ O η O κ O π P γ P λ P ψ Q α Q λ Q μ S κ V α_1 V α_2 V ϵ V ι V ν V σ W α ; *cut off* V χ_2 ; Capricorni B ϵ E η L η M δ O ζ O τ O υ Q δ S δ V κ X β ; Capricornus P ρ (*twice*); *add. in 90 gradus* Q γ ; *add. in marg.* ABCD est circulus Capricorni capitis W β

add. meridies] B γ B ϵ B η C η C ι E β F β F ζ M δ O ζ O ξ P δ P μ P ρ P τ Q β Q γ Q λ S δ V κ V ν V χ_1

Wα Wβ Wι Χβ; *om.* Βα Βθ Βι Βκ Cβ Cδ Cθ Εα Εη Εμ₁ Εμ₂ Εν Εο Ετ Ευ Fα Lγ Lε Lζ Lη Mη Mθ
 Mκ Mλ Mν Mo Mυ Oη Ok Oπ Oσ Ot Ou Πα Pγ Πλ Pτ Pυ Pψ Qα Qδ Qμ Tδ Vα₁ Vα₂ Vβ Vε Vι Vσ;
cut off Vχ₂ *add.* occidens] Bγ Bε Bη Cι Fβ Fζ Mδ Mλ Mo Oζ Oξ Oσ Ou Πα Pδ Pμ Po Pρ Pυ Qβ
 Qγ Qδ Qλ Sδ Vν Vσ Vχ₁ Vκ Wα Wβ Wι Χβ; *om.* Βα Βθ Βι Βκ Cβ Cδ Cη Cθ Εα Εβ Εη Εμ₁ Εμ₂ Εν
 Εο Ετ Ευ Fα Lγ Lε Lζ Lη Mη Mθ Mκ Mν Mυ Oη Ok Oπ Ot Pγ Πλ Pτ Pψ Qα Qμ Tδ Vα₁ Vα₂ Vβ
 Vε Vι; *cut off Vχ₂* *add.* septentrio] Bγ Bε Bη Cι Fβ Fζ Mδ Mo Oξ Ou Πα Pδ Pμ Po Pρ Qγ Qλ
 Vκ Vν Vχ¹ Wβ; *om.* Βα Βθ Βι Βκ Cβ Cδ Cη Cθ Εα Εβ Εη Εμ₁ Εμ₂ Εν Εο Ετ Ευ Fα Lγ Lε Lζ Lη Mη
 Mθ Mκ Mλ Mν Mυ Oζ Oη Ok Oπ Ot Pγ Πλ Pτ Pυ Pψ Qα Qβ Qδ Qμ Sδ Tδ Vα₁ Vα₂ Vβ Vε Vι Vσ
 Wα Wι Χβ; *cut off Vχ₂*; *illeg.* Oσ *add.* oriens] Bγ Bε Bη Bκ Cι Fβ Fζ Mδ Mλ Mo Oζ Oξ Oσ (*later
 hand*) Ou Πα Pδ Pμ Po Pρ Pυ Qβ Qγ Qδ Qλ Sδ Vκ Vν Vσ Vχ₁ Wα Wβ Wι Χβ; *om.* Βα Βθ Βι Cβ Cδ
 Cη Cθ Εα Εβ Εη Εμ₁ Εμ₂ Εν Εο Ετ Ευ Fα Lγ Lε Lζ Lη Mη Mθ Mκ Mν Mυ Oη Ok Oπ Ot Pγ Πλ Pτ
 Pψ Qα Qμ Tδ Vα₁ Vα₂ Vβ Vε; *cut off Vχ₂*

line EZ] add. linea totius declinationis Vβ
 declinatio Bθ; *add.* declinatio maxima solis Pρ
zodiac added: Bγ Bη Βι Eo Oσ Rα Sβ Vν Wβ

arc AZ] add. 23 g^a 33 m^a Ευ Mη; *add.*
arc HM] add. 24 Pρ; *add.* declinatio Bθ

[CAPITULUM 8.] DE INSCRIPTIONE ZODIACI

Et post constitutionem horum trium circulorum, scilicet Capricorni, Arietis et

- 1 De ... zodiaci] Dη Εβ Εη Fα Fζ Lβ Lγ Lε Lη Mδ Mφ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pρ Pτ Qγ Qδ Rβ Sδ Sθ Wι; *om.* Aα Bα Bκ Cδ Cε Cη Cθ Dγ Eν Eο Lζ Mλ Nα Oα Oπ Oσ Pγ Pφ Qλ Rα Sβ Sι Uα Vα Vε Vκ Vυ Vχ Wα Xα; Capitulum. De inscriptione zodyaci Fβ(*repeated in marg.*); Cuius facere circulum zodiaci Eα(*marg.*); De circulo signorum et eius divisione Qα(*marg.*); De compositione rethis et primo de inscriptione zodiaci Bθ(*rescriptione; add. Rubrica*) Eυ Mη Pυ Vβ¹ Vπ(*rescriptione; add. Rubrica*); De constitutione zodiaci et eius divisione Cζ Eμ(*repeated in marg.*) Mκ Pψ Sλ Vσ; De constitutione zodiaci. Rubrica Mθ Oκ; De constructione zodiaci et eius divisiones Oη; De descriptione zodiaci Bη Wβ Xβ; De factione circulum signorum Eτ; De inscriptione circuli signorum Mν Pδ Pθ; De inscriptione circuli signorum et divisione eius Sκ; De inscriptione signorum Qβ; De inscriptione zodiaci scilicet 8^{um} Bε(*and add. in marg. 8^{um}*); De inscriptione zodiaci seu circuli signorum Mυ; De positione circuli signorum in tabulam et eiusdem divisione Cβ(*marg.*); Inscriptio circuli signorum Bγ(*later hand*) Cι Eζ Pο(*repeated in marg.*) Qμ Vψ; Invenio zodiaci et divisionis eiusdem Bζ Vν; Inventio zodiaci et eiusdem divisio Mγ; Zodiaci invenio et eiusdem divisio Bι (*and add. in marg. Hic de rethi [et] divisione signorum [cut off] situatione stella[rum] sicut divisimus*); [*illeg.*]tione circuli signorum vel zodiaci Eδ(*marg.*)
- 1 zodiaci] *add.* Rubrica Mο; *add.* sequitur Pν; *add.* sive circuli signorum Vι; *add.* vel circuli signorum Tδ
- 2 post] *add.* hanc Eη constitutionem] compositionem Aα Bθ Eυ Lε Qδ Rβ Vπ horum] *om.* Vε; eorum Xα trium] *om.* Sλ circulorum] *om.* Vι scilicet] *add.* circuli Cβ Cθ Eμ Eο Mγ Mθ Mκ Mν Oα Oη Oπ Oσ Pφ Sθ Sλ Vα Vε Vυ Vσ Vυ Vχ Capricorni] *add.* et circuli Cβ Cζ Cθ Eμ Eο Mγ Mθ Mκ Mν Oα Oη Oπ Oσ Pφ Sθ Sι Vα Vε Vσ Vυ Vυ Vχ et₂] *add.* circuli Cθ Sλ
- 2-3 Et₁ ... signorum] Post hoc facies circulum signorum super dictos circulos transire sic Cδ Arietis et Libre] *corr. from* Libre et Arietis Wα

¹ Ms Vβ is misbound. This rubric begins on fol. 50^v and then skips over to fol. 91^r

[CHAPTER 8.] ON THE ENGRAVING OF THE ZODIAC²

After the construction of these three circles, that is, of Capricorn, of Aries and

² Those manuscripts which add “et eius divisione” (“and the dividing of it”) as in Gunther, are generally those which combine Capitulum 8 and Capitulum 9 as one.

- Libre, ac Cancri, fac circulum signorum. Hoc est ut dividas lineam AO per medium et facies super lineam AO circulum transeuntem per puncta T, L. Si sic, iam invenisti opus.
5 Et si non transierit per hos duos punctos errasti; reitera ergo opus donec verificetur. Et hic circulus est circulus signorum.
- 3 Libre] *om.* S; *add.* necnon Cβ Cζ Cθ Eμ Ev Eo Mγ Mκ Mν Oα Oη Oκ Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vσ Vυ Vχ; *add.* qui est circulus ABCD necnon Mθ ac] et *multi*; *add.* circuli Cβ Cζ Cθ Eμ Ev Eo Mθ Mγ Mκ Mν Oα Oη Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vσ Vυ Vχ Cancr] Capricorni Bη fac] faciamus Bα Bζ Cβ Cθ Ev Eo Mγ Mθ Mν Oα Oη Oκ Oπ Oσ Pψ Qα Sθ Sι Vα Vε Vν Vχ; faciamus *corr.* to fac Mκ; facies Sλ Hoc ... dividas] Divide primo Cδ; Hoc modo divide Bη; sic divide Sλ ut] *om.* Dη Ev Mν dividas] *add.* ipsam Qλ lineam] *add.* in Vε AO] A° Bζ; AC Aα Dγ Sβ Uα Wβ; AD Xα; AG Cθ Ev Oπ; AS10 Eo; A vel AO Cε; AE *corr.* to NE Bη per] *add.* r Oκ medium] *add.* ut in praetacta(?) figura Qα
- 3-4 per ... AO] *om.* Pφ et ... AO] *om.* Eδ Eζ Po Pυ Uα Wι Xα
- 4 facies] fac *some*; facias Fβ Lε Qγ; *add.* circulum Bε Eη facies ... AO] *om.* Et Sκ super lineam AO] *om.* Qα Sβ lineam] *om.* Bα AO] AC Dγ Oη Wβ; AC *corr.* to AE Bη; AG Cθ Ev Oπ circulum] *add.* .c. Eα transeuntem] qui circulus si transierit Bζ Cβ Cζ Cθ Eμ Eo Mγ Mη Mκ Mν(insierit) Oα Oη Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vσ Vυ Vχ; qui circulus non transierit Mθ(non *canc.*) Oκ; qui si transierit Bα Cδ Ev per] *om.* Vπ; *add.* 2 Bγ Bη Wβ; in Pλ Pρ; super Xβ puncta] predicta Pγ; *add.* prima Mγ T, L] T, H Mν; A Sκ Vε; CL Pγ; id est S Ev; *add.* qui erit ATOL Pρ Si] *om.* Wι Si sic] *om.* Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mγ Mθ Mκ Mν Oα Oη Oκ Oπ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vσ Vυ Vχ iam] *om.* Et; idem Vν invenisti] *add.* T, L iam invenisti Oπ(*twice*)
- 4-5 per ... transierit] *marg.* Mκ
- 5 Et ... errasti] Sin autem errasti Bα Qα Et ... ergo] *om.* Bζ si] *om.* Cζ Oη; hoc Eo non] *interlin.* Cβ transierit] transit Nα transierit per] pertransierit Bκ duos] 2 *many*; 20 Qμ duos punctos] iam Vε punctos] puncta *some* reitera] *om.* Oπ Sι Vν; itera Bα Cδ Cζ Eμ Eo Mγ Mθ Mκ Oκ Oα Oη Oσ Qα Sθ Sλ Vα Vν; ita Pψ Vσ; *add.* vel Pα ergo] *om.* Bα Cζ Cθ Eμ Ev Mγ Mθ Mν Oα Oη Oκ Qα Sθ Sι Sλ Vα Vν Vυ Vχ opus] *add.* tuum Cε; *add.* iterim Sθ; *add.* and *canc.* et si non transierit per hos Xα verificetur] modo iam dicto transeat Cδ; riverificetur circulus Bζ
- 6 Et ... signorum] *om.* Bα circulus₁ est] *om.* Xα; erit Cδ Sλ; circulus eius circulus est Cζ signorum] *add.* scilicet zodiacus Cε; *add.* scilicet zodiacus patet in figura Dη; *add.* scilicet patet in sequenti figura Sβ; *add.* Addendum 8: *many*

Libra, and of Cancer, make the circle of signs. This is when you divide line AO in half and make a circle on line AO passing through points T and L; if so, you have already done your work. And if it does not pass through these two points you have erred; return then to the work until it is correct. And this circle is the circle of signs [i.e., the ecliptic].³

³ While the title of this capitulum makes reference to the zodiac, the text is really about drawing the circle of the ecliptic. The zodiac is technically a band within which the sun moves “up and down” as well as along, the edges of the band marking the maximum deviations on both sides. The ecliptic is the centre line of the zodiac and as a line it is a circle with no breadth.

[ADDENDUM 8]

Bα Bε Bζ Bη Cβ(marg.) Cδ Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mγ Mδ Mη Mυ Mφ Oα(marg.) Oζ
 Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Pφ Qβ Qγ Qδ Qλ Qμ Rβ Sβ(marg.) Sδ Sθ Tδ Vβ Vι Vν Vψ
 Wα Wβ Xβ

Et tunc fac alium circulum in quo possint gradus designari. Iterum intra illum fac alterum ad scribendum litteris numerorum. Ad huc infra facies tertium ubi scribantur signa .

- 7 Et] *add. in marg.* Ego Iohannes⁴ de Calomonte. Istum a littera. Et(?) tunc fac alium circulum usque ad litteram exclusivem. Cumque feceris circulum signorum in paucis reperitur exemplaribus et habetur pro extranea Vβ Et tunc] Quo facto Bα circulum] *add.* infra circulum signorum Cβ possint] *om.* Bα; possunt Cδ Pν gradus] *add.* signorum Cβ designari] assignari Bη Pδ; insignari Wβ; scribamit Bα; signari Cβ Fβ Pθ; signari vel designari Pα Iterum ... illum] Post etiam Bα intra] infra Cβ Cδ; iuxta Bζ Bη Lη Mγ Pτ Pφ Vβ Wβ Xβ
- 8 fac] *om.* Cβ; fit Pφ fac alterum] alium Qδ Rβ alterum] alium fac alium Cδ; alium Oα Pφ; alium circulum Bε Bζ Eη Mγ Vν ad scribendum] in quo possent Cβ scribendum] inscribendum Bε; describendus Pφ; *add.* gradus Vν; *add.* gradus et Vβ litteris numerorum] gradus numerorum et litteris Mγ; numeros Bα; numerum~ circulorum miorum(?) z litteras Bζ; *add.* scribi Cβ Ad ... infra] *om.* Bα Bζ Pτ Vβ Vν Ad ... facies] Et iterum Cβ infra] *om.* Bη Pρ; intra Oα Pα; iuxta Pφ; *add.* illum Oυ Qδ Rβ; *add.* istum Cδ facies] fac Bε Mφ Qδ Rβ; est faciendum Pρ; *add.* etiam Bα Bζ Mγ Pτ Vβ Vν tertium] unum Bη; *add.* si volueris Cδ tertium ubi] alium in quo Qδ Rβ; circulum Sθ ubi] et ibi Pφ; in quo Bη Cβ Fβ; ut Bζ Mγ Pτ Vβ Vν
- 9 scribantur] inscribantur Pτ Vβ Vν; inscribentur Mγ; possent scribi Cβ signa] *om.* Vβ; *add.* ipsa Pτ; *add.* .xii. sicut vides Cδ; *add.* long marginal note in a later hand Wα(fol. 80^v-81^r)

⁴ See note to Cap. 7 line 9.

[ADDENDUM 8]

And now make a second circle in which degrees can be marked. And again inside this one make another one for writing the figures. Now make a third one inside [the first two] where the signs are written.

[FIGURA 8]

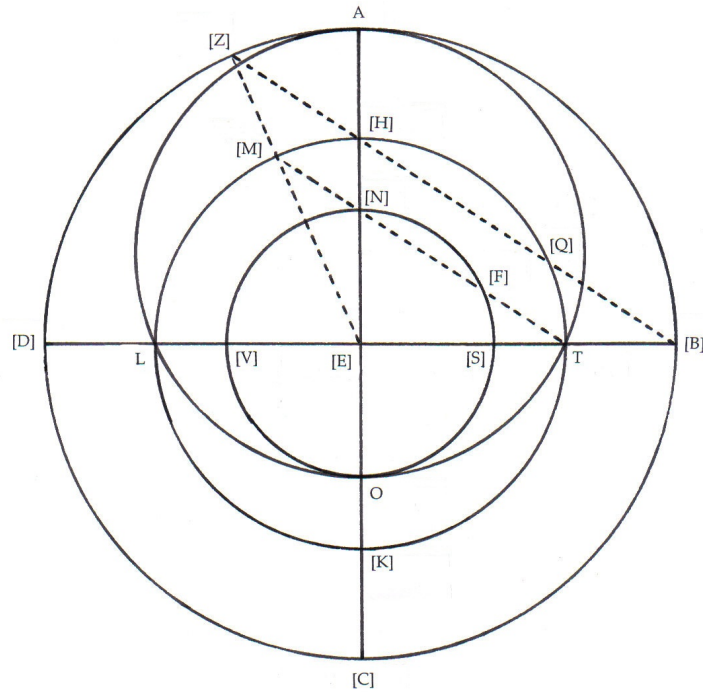


Figura inscriptionis zodiaci

[Complete diagram] Bα(fol. 79^v) Bε Bι Cβ Cδ Cη Cθ? Cι Eβ(very faint) Eη Eμ Eτ Eυ⁵ Fα Fβ Fζ
 Lγ Lε Lζ Lη Mδ Mη Mθ(reversed) Mκ Mλ Mν Mο Mυ(fol. 406^v) Oζ Oκ(reversed) Oξ Oπ Oσ Oτ Oυ
 Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ(fol. 185^v) Qμ Rα Sβ Sδ Tδ Vα Vβ(fol. 50^v) Vε Vι(fol.
 332^v) Vκ Vσ Vχ Wι Xβ

[Partial diagram] Bθ Eα Mγ Wα

[Outline, or space only] Aα Cε Dη Mφ Nα Pν Qα Vπ Vυ

[No space] Bζ Bκ Cζ Cθ Dγ Eδ Eζ Eν Lβ Oα Oη Pφ Rβ Sθ Sι Sλ Uα Vψ Xα

Pθ: "H"

[Combined with Fig. 7 (q.v.)] Bγ Bη Eο Vν Wβ⁶

[Combined with Fig. 9 (q.v.)] Cβ₁ Sκ

⁵ In ms Eυ, D, K and V have been shifted to the left; the place for V is blank, L is v, d is L, and "D" has been set on the limbus.

⁶ Mss Bη (fol. 120^r), Eο (fol. 186^r), and Wβ (fol. 1^{va}) have Fig. 7, 8 and 9 all superimposed as one diagram. In Eο the lettering for Fig. 9 is not included and in Wβ an attempt has been made to distinguish the figures in part by different coloured inks.

[Caption]

Figura ... zodiaci] Βε Βθ Cι Eη Eτ Eυ Fα Λγ Mη Μλ Mν Mo Μυ Oτ Pγ Pδ Πλ Po Pρ Pυ Qγ Qλ Qμ Vβ Vι Vκ Vχ Wι; om: Βα Βθ Βι Cδ Eα Eμ Λζ Mγ Mθ Mκ Oκ Oξ Oπ Pψ Rα Sβ Vα Vε Vσ Wα; illeg. Eβ Figura inscriptionis circuli signorum Fζ Λε Pα Pτ Qβ Qδ Sδ Tδ; Figura inscriptionis circuli signorum id est zodyaci Fβ(*twice in marg.*); Figura inscriptionis circuli signorum sive zodiaci Oυ Pμ Xβ; Figura iscriptionis zodiaci Qλ; Inscriptio zodiaci Cη Λη Mδ Oζ; Ista figura [*illeg.*] Oσ(*later hand*)

[Lettering on the diagram]

A] Βα Βε Βθ Βι Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Mκ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wα Wι Xβ L] Βα Βε Βι Cδ Cη Cθ Cι Eα Eη Eμ Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Mκ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wι Xβ; illeg. Eβ; om. Wα; c Βθ; v Eυ
O] Βα Βε Βι Cδ Cη Cθ Cι Eα Eη Eμ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Mθ(illeg) Mκ Μλ Mν Mo Μυ Oζ Oκ Oξ Oσ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qμ Rα Sβ Sδ Tδ Vα Vβ Vι Vκ Vσ Vχ Wι Xβ; illeg. Eβ; om. Βθ Wα; G Oπ Vε T] Βα Βε Βι Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Mκ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wι Xβ; om. Wα; B Βθ

Many of the diagrams (unnecessarily) repeat other lines and letters from Figure 7: B] Βε Βθ Βι Cβ Cη Cθ Cι Eα Eβ Eη Eτ Eυ Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Vχ Wα Wι Xβ C] Βα Βε Βθ Βι Cβ Cη Cθ Cι Eα Eη Eτ Eυ Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Vχ Wα Wι Xβ; illeg. Eβ D] Βε Βθ Βι Cβ Cη Cθ Cι Eα Eβ Eη Eτ Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pδ Πλ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Wα Wι Xβ; L Eυ; cut off Pμ Vχ E] Βα Βε Βθ Βι Cβ Cη Cθ Cι Eα Eβ Eμ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Wα Wι Xβ F] Cη Eβ Fβ Fζ Λγ Λε Λη Mδ Μυ Oζ Oξ Oτ Oυ Pα Πλ Pμ Pρ Pτ Qβ Qγ Qδ Qμ Sδ Tδ Vι Wι Xβ; c Cθ; G Βι Λζ Rα; s' Sβ Vε; 6 Oπ H] Βε Βθ Βι Cβ Cη Cθ Cι Eα Eβ Eη Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vι Vκ Vσ Vχ Wι Xβ; B Vε K] Βε Βι Cη Cθ Cι Eα Eη Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pγ Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Vχ Wι Xβ; illeg. Eβ M] Βι Cη Cθ Cι Eα Eβ Fβ Fζ Λγ Λε Λζ Λη Mδ Mθ Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Πλ Pμ Pρ Pτ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vε Vι Xβ N] Βε Βι Cη Cθ Cι Eα Eβ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Vχ Wι Xβ Q] Βι Cη Cθ Eβ Fβ Fζ Λγ Λε Λζ Λη Mδ Μυ Oζ Oτ Oυ Pα Πλ Pμ Pρ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vι Wι Xβ S] Βι Cη Cθ Cι Eα Eβ Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oκ Oξ Oπ Oτ Oυ Pα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vι Vκ Vσ Vχ Wι Xβ; F Vε V] Βι Cη Cθ Cι Eα Eτ Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Μλ Mν Mo Μυ Oζ Oξ Oπ Oτ Oυ Pα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vε Vι Vκ Vσ Vχ Wι Xβ; illeg. Eβ; B Oκ Z] Βι Cη Cθ Cι Eα Eβ Fβ Fζ Λγ Λε Λζ Λη Mδ Mθ Μυ Oζ Oξ Oπ Oτ Oυ Pα Πλ Pμ Pρ Pτ Qβ Qγ Qδ Qλ Qμ Rα Sβ

Sδ Tδ Vε Vι Xβ; v Oκ

[*Other information*]

meridies] *add.* Mδ Mλ Mo Po Pq Vβ Vχ; septentrio Xβ; *om.* Pv occidens] *add.* Mδ Mλ Mo Po Pq Pv Vβ Vχ; *om.* Xβ septentrio] *add.* Mδ Mo Po Pv Vβ Vχ; *om.* Mλ Pq Xβ oriens] *add.* Mδ Mλ Mo Po Pq Pv Vβ; *om.* Xβ; *cut off* Vχ

Cancrī circulus] *add.* Vσ; Cancer Pq equinoctialis] *add.* Vσ; Aries | equinocitalis | Libra Pq circulus Capricorn] *add.* Vσ; Capricornus Pq

zodiac] *om.* Eα; *add.* zodiacus Pq Vσ(*twice*); *add.* names of signs rotated 180° Bθ; Aries to Cancar divided into degrees 5 10 ... 25 30 Bθ

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[CAPITULUM 9.] DE DIVISIONE CIRCULI SIGNORUM SIVE ZODIACI¹

Cumque feceris circulum signorum, oportet te postea dividere eum per signa et gradus signorum. Cuius rei exemplar est ut facias circulum Arietis et Libre qui est circulus ABCD, et diametra abscondant se super punctum E et super circulum signorum AZCH.

5

- 1 De ... zodiaci] *om.* Aα Bα Bγ Bζ Bι Bκ Cβ Cδ Cε Cθ Cι Dγ Eδ Eζ Ev Eo Eτ Fβ Lζ Mγ Mλ Mν Mo Nα Oα Oη Oπ Oσ Pγ Pδ Pθ Po Pv Pφ Pψ Qα Qμ Rα Rβ Sβ Sθ Si Sκ Sλ Uα Vα Vβ Vε Vκ Vν Vυ Vχ Vψ Wα Wι Xα; Capitulum de divisione zodiaci 9^{um} Bε(*add. in marg.* 9^{um}); Cuius divide circulum zodiaci per lineas arcuatus contangentes se in puncto K. Super demidium tocius declinationis Eα(*marg.*); De divisione zodiaci Dη Eμ(*marg.*) Fα Mθ(*add. Rubrica*) Mκ Oκ(*add. Rubrica*) Pv Qδ Vσ Xβ; De divisione zodiaci et circuli signorum Ev Mη(*marg.*); De divisione zodiaci vel circuli signorum Bθ Vπ; De modo dividendi circulum signorum Pτ; Sequitur ulterius de divisione circuli signorum sive zodiaci. Explicit praedictio Pλ
- 1 *before* De] *add.* Rubrica Oξ Oτ Pα circuli] *om.* Mφ Mν Pα Vι signorum] *om.* Lβ sive zodiaci] *om.* Bη Wβ; per signa et gradus Qβ zodiaci] *add.* capitulum Cη; *add.* Rubrica Qλ
- 2 Cumque ... te] *om.* Bα oportet te] *om.* Fβ Eτ te] *om.* Cζ Eμ Mγ Mθ Mν Oα Oη Oκ Oσ Pψ Qα Qδ Si Sλ Vε Vυ postea] post Bα dividere] divide Bα Fβ; *add.* Eos Oκ eum] *om.* Vψ; *interlin.* Wι; circulus signorum Bα; cum Vα; cum dividere Eζ; eum dividere Po; ipsum Dη Vν; tps [= ipsum?] Mγ et] *add.* per Bα
- 3 signorum] *om.* Bα Bη Ev rei] *add.* gra Dη exemplar] ex[space] Mν; *ms* Uα ends ut] *add.* cum Bα facias] faciamus Oη; faciatis Vν circulum] *add.* capitis Aα Bγ Bθ Bι Bκ Cβ Cη Cθ Dγ Ev Eo Ev Lζ Mλ Nα Oπ Pτ Pv Qδ Rα Rβ Sβ Vκ Vπ Vχ Wβ; *add. interlin.* capitis Vβ Arietis] *twice* Sδ
- 3-4 qui ... et₁] *om.* Mν qui ... ABCD] *om.* Pψ Si
- 4 circulus] *om.* Bα Bγ Bε Bη Cη Cι Dγ Dη Eα Eβ Eδ Eζ Lε Lζ Mη Mλ Mo Mν Oζ Oη Oξ Oτ Ou Pα Pδ Pθ Pμ Pv Po Pτ Pv Qδ Qλ Rα Rβ Sβ Sδ Sκ Tδ Vι Vπ Wα Wβ Wι Xα Xβ ABCD] HTKL Oη diametra] *add.* AL Xβ; *add. interlin.* scilicet eiusdem circuli Vχ abscondant] abscondat Qδ Rβ; abscondent Tδ; absconderet Bα; que abscondat Nα se] *om.* Bε Eη; κ Vε punctum] *interlin.* Bγ; *om.* Bη Wβ punctum E et super] E et Bα E] *om.* Mγ et₂] *add. interlin.* scribe Vβ; *add.* scribi Nα super₂] *om.* Cδ; *del.* Sλ; *add.* punctum Eδ; *add.* signum Vσ signorum] *add.* in punctis Bα; *add.* super Cδ Sθ(*interlin.*) Sλ(*interlin.*)
- 5 AZCH] *corr. from* DZCH Cδ; ACH Bζ; ACTB Vυ; A et TH Mγ Nα; ATCH *with* Z *superscr.* Eδ; AZ et CH Eζ; AZTH Dγ Lβ Ou Pθ Si Vπ; ACCL Mν; *corr. from* AZTH Sλ

¹ Numerous manuscripts continue on from Capitulum 8 without a break and without a heading.

[CHAPTER 9.] ON THE DIVISION OF THE CIRCLE OF SIGNS, OR ZODIAC²

When you have made the circle of signs, you should next divide it into signs and degrees of the signs. An example of this is that you should draw the circle of [the beginning of] Aries and Libra, which is circle ABCD³ and its diameters should intersect at point E and with the circle of signs AZCH.

² The issue of dividing circles projected in the plane which are oblique to the equatorial circle – including the issue of dividing the ecliptic/zodiac into its twelve signs – is discussed in detail in my *Jordanus de Nemore and the Mathematics of Astrolabes: De plana sphaera*, Studies and Texts 39 (Toronto: Pontifical Institute of Mediaeval Studies, 1978), pp. 62-67; see also the various editions of Proposition 4, and the commentary on pp. 142-143.

The main method in Capitulum 9 is to draw great circles through the pole [κ] of a great circle with only half the declination of the ecliptic. These great circles through the pole will cut off equal arcs on both the ecliptic and the equatorial circle, and therefore if they pass through points 30° and 60° along the latter, they will also pass through points 30° and 60° along the former; and similarly for other divisions of both the equatorial circle and the ecliptic. (Thomson, *Jordanus de Nemore*, pp. 65-66; Proposition 4 and commentary, pp. 142-143.)

Samsó argues that this method clearly derives from Maslama's extra chapter to his notes on Ptolemy's *Planisphaerium*. See his lengthy discussion in *On Both Sides*, pp. 421-423.

³ The problem of variation in the lettering in the text and the diagrams is discussed in the Introduction, "F. The Text."

Deinde divides circulum ABCD per 360 gradus. Post hec pone arcum CT similem dimidio totius declinationis. Deinde iunge A cum T, et abscindet linea AT diametrum BD super punctum K. Deinde extrahe diametrum BD in directo, donec abscindat circulum

- 6 circulum] *om.* Bγ Bη Bθ Bκ Cη Dγ Eο Eτ Eυ Oπ Pυ Qδ Rβ Sβ Sδ Sκ Vβ Vε Vπ Vχ Wι Xα; *interlin.* Aα Cβ; *add. in marg.* circulum Arietis Pρ ABCD per] AZCH per Sκ; BCFL Mv 360] 60 Bζ gradus] *om.* Bε Cι Eη Fβ Fζ Lγ Lε Lη Mδ Mφ Nα Oζ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qλ Qμ Sδ Tδ Vι Vψ; *interlin.* Vχ; divisiones Xβ; divisiones vel gradus Mγ Mν Sθ Sι Vν; partes Sκ; partes vel divisiones Pφ; vel divide id est quartam per 90 (*add. in marg.* gradus per exempli[!]) Qα; *add.* divisiones Bζ; *add.* per limbum Aα Bθ Eυ Qδ Rβ Vπ; *add. interlin.* al' divisiones Vβ; *add.* Glossa: (*om.* Bκ; *marg.* Lζ) secundum divisiones circuli magni qui est in matre id est pones regulam super punctum graduum circuli magni et sibi oppositum et signabis (*add.* hanc Eο) hinc inde contactum regule et circuli Arietis et Libre et ita divides (*om.* Eο) ipsum circulum Arietis et Libram per 360 gradus (*add.* si deus voluerit Eο) Bκ Eο Lζ Post hec] *om.* Sι; et postea Bα pone] pones *many*; *om.* Mθ Oκ pone ... CT] *marg.* Eμ CT] *om.* Eδ Pο; C Vε; CD Aα Bθ Vπ; CO Cζ Eμ Mθ Oη Oκ; T Cε Oπ; TC Mκ; et Bη Eζ Pρ; et cetera(?) Sι; *add. interlin.* versus D Bγ simile] *om.* Sκ; simile in Mδ
- 7 dimidio] di[vi]des Sι; *crossed out* Bθ; medio Mδ; *add. interlin.* scilicet arcui Vβ; *add. in marg.* hoc est duodecim graduum secundum quod tota declinatio est 24 Mκ declinationis] *add.* hoc est 12 graduum secundum quad tota declinatio est 24 graduum Cζ Eμ(*interlin.*); *add. interlin.* id est 12 divisiones Vχ Deinde] *add. in marg.* dimidio totius declinationis h[*cut off*] fore 12 gradus ut tota declinatio sit fore 24 gradus ut patet super quid tia 61[*cut off*] dict circulus Capricorni [*cut off*] 360 divisiones et ponita regula super has divisiones et re[*cut off*] trium circularum fascsce dios circuli signorum ut(?) in precedenti t^occata(?) Qα iunge] iunges *many*; *add.* per lineam Cδ Oα(*interlin.*) Sθ(*marg.*) Sλ A] L Mv T] *corr.* ex O Mκ; C Bη Mγ Mν Pρ Vε; E Xα; O Cζ Eμ Oη Oκ; *add.* per lineam Cι Mη Mυ Mφ Pα Pδ Qλ Vι Vψ Wα Xβ; *add.* per lineam AT Bε Eα Eη Fα Fζ Lβ Lγ Lε Mδ(AC) Oζ Oξ Oυ Pθ Pλ Pμ Pν Qγ Qδ Qμ Rβ Sδ Tδ abscindet] abscindat Wι; *add.* A Oπ AT] *corr.* from AO Mκ; AC Bη Mγ Mδ Mν Pρ Vε; AD or ad Sι; AO Cζ Eμ Mθ Oη Oκ; LC Mv BD] DB Cθ Ev; ABD Nα Oξ Vψ; DBBD Pλ; *add.* in directo donec Sκ; *add. and canc.* in directo donec abscindat Pα
- 8 super] in Bγ Bη Pτ Wβ; supra Lγ super ... BD] *om.* Aα Cε Eδ Eζ Eτ Mθ Mo Nα Oκ Pγ Pο Pυ Wι Xα; *add. in marg.* in puncto K. Deinde extrahe diametrum BD in directo donec abscindat circulum Wι punctum] puncto Bγ Bη Cη Pτ Wβ κ] B *corr.* to K Sθ; E Eμ Wβ; *add. in marg.* med. Inter polum mundi et polum zodiaci et h' in spera non āūt in extensione Oα extrahe] extrahes *many*; protractes Bα; trahe Bζ; *add. interlin.* id est pertrahes vel extendes Vχ BD] *om.* Bζ; DB Cθ; BC Cι in directo] super directum Bα; *add.* dyametrum Vε abscindat] abscindet Bα; *add.* BD Pμ
- 8-9 super ... signorum] *om.* Mv

Then divide circle ABCD into 360 degrees. After this construct arc CT similar to half of the total declination [i.e., obliquity of the ecliptic]. Then join A to T and line AT will cut diameter BD at point K. Next extend diameter BD in a straight line, until it cuts the circle

10 signorum super H. Tunc punctus A erit punctus capitis Libre et punctus H erit punctus capitis Capricorni, et punctus C erit punctus capitis Arietis, et punctus Z erit punctus capitis Cancri. Post hec pone arcum DL et arcum BM unumquemque videlicet istorum

- 9 signorum] *om.* Sβ super] sub Wι super H] ZH Eδ H₁] A Nα Tunc] *add.* cuidat Pμ punctus₁] scilicet St A] *om.* Vε; H Sκ; L Mv; *add.* et punctus A Vκ A ... punctus₃] *om.* Bα punctus₂] *add.* Libre Vπ H₂] A Bζ Cε Mv Vε erit₂] *om.* Cβ erit₂ punctus] *om.* Bζ Ev punctus₄] *om.* Mφ Vι Wα
- 9-10 Libre ... capitis] *marg.* Lε; *om.* Nα Sι et ... Capricorni] *om.* Dη erit₂ punctus capitis] *om.* Bγ Bη Pτ
- 10 capitis] *om.* Bα Cε Cη Eη Mv Oη Pφ Qα Vε Wβ; *marg.* Sθ C] T Mv Nα erit₁] *om.* Bα Ev Pτ erit₁ punctus capitis] *om.* Bγ Bη Cη punctus₂] *om.* Ev Pτ capitis₂] *om.* Bα Bζ Cζ Mθ Oη Oξ Oτ Pφ Vv Wβ; *marg.* Mκ Z] *om.* Mv; *lac.* Nα erit₂ punctus] *om.* Bγ Cη punctus₃] *om.* Ev Pτ
- 10-11 Capricorni ... capitis] *om.* Aα erit₂ ... capitis] *om.* Bα Bη
- 11 capitis] *om.* Oζ Oη Pφ Cancri] *add.* et punctus A Libre Bα; *add.* 1-line gloss Cζ Post hec] Postea *many*; Post *some*; *add.* in *marg.* De divisione circuli signorum Cβ pone] pones *many* arcum₁] *om.* Wι; circulum Eδ Eζ Eτ Mo Pγ Po Pv arcum DL] *add.* *interlin.* al' circulum Vβ arcum₁ ... BM] circulum DLBM Sκ; pones FLZ et arcus BG Mv et arcum₂] *om.* Aα Bθ Bι Bκ Cθ Dγ Eδ Eζ Ev Eo(*corr.* from L.BM) Eτ Ev Lζ Mλ Mo Oπ Pα Pγ Po Pv Rα Sβ Vε Vκ Vπ Vχ; in Bη arcum₂] *om.* Cβ Cη Nα Pτ Vβ(*corr.* *interlin.* to ... et arcum scilicet) Wβ Wι BM] B in Nα; B^M Wι; BM LG MF GA FC Bε Cε Cι Dη Eα Eβ Eη Fα Fζ Lβ Lγ Lε Lη Mv Mφ Oξ Oτ Ou Pδ Pθ Pλ Pμ Pν Pρ(*add.* *interlin.* TD) Qβ(G in *marg.*) Qγ Qδ Qλ Rβ Sδ Tδ Vι Vψ Wα Xα Xβ(*om.* FC); BM SG MF XA FC Wβ(*add.* in *marg.* DL in BM; SG in MF; XA in FC); BM scilicet G in MF XA in FC Bη; LG MF GA FC Mδ Pα; *add.* circulum Wι unumquemque] unumquodque *some*; *add.* volueris Aα Bθ Vπ unumquemque videlicet] unumquemlibet Pτ videlicet] *om.* Bα Bζ Cβ Eη Oη Pφ Qα Tδ Vε;.N. Mη; scilicet Bε Bζ Cδ Cζ Cθ Eμ Ev Mγ Mθ Mκ Mv Oα Oκ Oπ Oσ Pφ Pψ Sθ Sι Sλ Vα Vv Vσ Vυ Vχ; *add.* dividet Rβ; *add.* volueris dividet(*corr.* to divides) Qδ istorum] *om.* Oξ

of signs at H. Then point A will be the point of the beginning of Libra, and point H will be the point of the beginning of Capricorn, and point C will be the point of the beginning of Aries, and point Z will be the point of the beginning of Cancer. After this take arc DL and arc BM, namely each one of them,

ex 30 gradibus. Deinde queres arcum qui eat super punctum M, K, L, et abscindet circulum signorum super N, S; eritque signum Sagittarii HS et arcus ZN signum Geminorum. Post hec ponēs unumquemque ex arcubus LG et MF 30 gradus. Deinde

- 12 ex] *om.* Bζ Bθ gradibus] gradus Pφ Deinde] Post Bα queres] queras Eν Pφ Qα Vπ; quartas Xα; *add.* hoc(hic Cζ) scitur per illum propositionem⁴ datis tribus punctis in linea non recta (non recta] ipse Cζ), centrum (*add. illeg.* Cζ) invenire Cζ Mκ(*marg.*) qui eat] *om.* Cε eat] erat Aα Bθ Oκ Pφ Vε Vπ; erat *with eat interlin.* Mθ; erat *corr. to eat* Vχ; erat *corr. to vadit* Mκ Sλ; est Bε Bη Cι Dγ Eα Eβ Eδ Eζ Eη Eτ Eυ Fα Lβ Lγ Lε Lζ Lη Mδ Mη Mλ Mν Mυ Mο Mφ Nα Oζ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Rβ Sδ Tδ Vι Vκ Vψ Wα Wβ Xα Xβ; vadit Cδ Mγ Vβ(*add. interlin.* a' est) Vν Vσ Vτ super] per Eν punctum] puncta Qδ Rβ M, K, L] M et K et L *some*; G et K et H Mν; KLM Eη; HKL Eυ; MCK et B Vε; MLK Sβ; N per K et B Eο abscindet] abscindas Vα; abscindat Bζ Cβ Cδ Cζ Cθ Eμ Eν Eο Mθ Mκ Mν Oα Oη Oκ Oσ Pγ Pφ Pψ Qα Vσ Vυ Vχ; abscinde Bε Eβ Eη Eυ Fα Lβ Lγ Lε Lη Mδ Mη Mυ Mφ Oζ Oξ Oτ Oυ Pα Pμ Pν Qβ Qγ Qλ Sδ Tδ Vε Vι; abscindes Aα Bθ Qδ Rβ Vπ; abscindit Dγ Lζ Oπ Vν
- 13 super] punctos Vχ N, S] *illeg.* Nα; KS Sβ; *marg.* Bε; HS Pρ; VS Bη Cι Pθ Sκ Vε; *add.* scilicet Oη; *add. interlin.* punctos Cβ eritque] erit quod Sκ signum₁ ... HS] arcus HS signum Sagittarii Bα Cβ Cδ Mγ Mκ Pτ Pφ Qα Sθ Sι Sλ Vν Vσ; H signum scilicet⁵ Sagittarii Eυ; HS arcus signum Sagittarii Bγ Cη; HS signum Sagittarii Dη Vβ; Sagittarii Vε Vψ; signum HS Sagittarii Aα Bη Bθ Bι Bκ Cε Cι Dγ Eδ Eζ Eτ Lζ Mη Mλ Mο Pγ Pδ Pθ Pο Qδ Rα Rβ Sβ Vκ Vπ Wβ Wι Xα; signum HS signum Sagittarii Bζ Cζ Cθ Eμ Eν Eο Mθ Nα Oα Oη Oκ Oπ Oσ Pυ Pψ Vα Vυ(AS) Vχ; *add. interlin.* scilicet iste arcus Vβ arcus] *om.* Pρ; Arietis *corr. to arcus* Qδ ZN] M or in Vπ; M signorum vel Xα; SN Mν; TN Vυ; XN Pα Qλ; ZB Pρ; ZM Oη Vε; ZV Bη signum₂] *om.* Bα Pτ; signorum Dγ
- 13-16 circulum ... Scorpionis] *illeg.* Eη
- 14 ponēs] *add.* ex Bη ex arcubus] *om.* Pτ LG et MF] LG, MF or LGMF *many*; BGLN facie Pρ; EG FM Dγ; GMKP Mν; id est MF Sθ; J et MF Pψ; LCMF Oσ; LGMMF Nα; LG ut supradictum est MF Xβ; LMF Oα LTMF Bζ Mθ Oκ Vε Vυ; LT.MF Cζ Eμ; LZMF Qα; MLG Vν; SXMF Wβ; *corr. from* LZ MK Sλ 30 gradus] xxx.xxx Cθ Oπ; 20.30 *corr. to* 30 Lζ; 30 et 30 Cβ; 30.30 Eν Eο Vε; 30 gradibus Vα Vχ(*add. interlin.* ex); 30 graduum Aα Cε Mν Vν Vπ; 60 gradus Bα Deinde] Post Bα
- 14-15 Deinde ... puncta] *om.* Cε

⁴ Euclid, *Elements*, Bk. 4, Prop. 5: "About a given triangle to circumscribe a circle," which is equivalent to this problem.

⁵ HS read as H s[*cilicet*], with *scilicet* moved to its normal position after *signum*.

as 30 degrees. Next you will require an arc which is to run through points M, K and L, and will cut the circle of signs at N and S; and HS will be the sign of Sagittarius, and arc ZN the sign of Gemini. After this take each one of the arcs LG and MF [as] 30 degrees.
Next

- 15 queres arcum qui vadit per puncta F, K, G et abscondet circulum signorum super punctos Q, X, eritque arcus SX signum Scorpionis et arcus NQ signum Tauri, et remanebit arcus XA signum Libre et arcus QC signum Arietis. Post hec pone arcum HO sicut arcum HS et
- 15 queres] queras Mv Pτ Pφ qui vadit] *om.* Eζ vadit] eat Bα puncta] *om.* Mv Qλ; punctum Bα Cθ Cι Qα F, K, G] FA et Qδ; FFG Vε; FGK Eδ Po Pτ; FGK *corr.* to FKX Pq; FKH Bζ; FKLg Wι; FKT Cζ Eμ Mθ Oα Oη Ok Vα Vυ; *corr.* from FKT Sλ; FKZ Qα; FLAG Bη; FLAT *corr.* in marg. to FLCAG Wβ; PHM Mv; secundus HG Mη abscondet] abscondat Cβ Ev Mv Oα Oσ Pψ Vυ Vχ; abscondit Eo; *add. and canc.* diametrum Bι circulum] circulos Bζ circulum signorum] circulorum Dγ punctos] *om.* Pτ; puncta Bα Mv; punctos Oη; *add. interlin.* al' punta Vβ
- 16 Q, X] NG Qα; QG Cζ Eμ Oα Oη Ok Oσ Vα Vυ; QG *corr.* to QT Sθ Sλ; QG *corr.* to QX Mκ; QR Mv Vκ; QT Bα Bζ Cβ Cδ Cθ Ev Mγ Oπ Pψ Si Vv; QT in alio AX Eo; QZ Pφ; SX Sκ; XG Mθ; *add.* eritque QX Pα arcus SX ... et.] *om.* Bη Wβ SX] FT Pφ; HG Mη; SG Cζ Eμ Oη Oα Oσ Qα Vα; SG *corr.* to ST Sθ Sλ; SR Mv; ST Bα Bζ Cβ Cδ Cθ Ev Mγ Mθ Mκ Pψ Si Vv; ST *corr.* ad SX Mκ; XA *corr.* to SX Pγ; scilicet ST sive vel(!) SX Eo; scilicet eit ST Oπ; *add.* Scorpīi et arcus NQ Aα signum.] *om.* Bα Scorpionis] Bα Bγ Bζ Cβ Cδ Cη Cθ Eμ Ev Eo Fβ Mθ Mκ Mv Oα Oη Oπ Oσ Pτ Pφ Pψ Qα Qλ Vα Vβ Vε Vv Vσ Vυ Vχ Xβ; Scorpīi Aα Bε Bθ Bι Cε Cι Dγ Dη Eβ Eδ Eζ Eη Eτ Ev Fα Fζ Lβ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mu Mφ Oζ Oξ Oτ Ou Pα Pγ Pδ Pμ Pν Po Pq Pv Qβ Qγ Qδ Rα Rβ Sβ Sδ Sκ Tδ Vι Vκ Vπ Vψ Wα Wι Xα; *abbreviated* Eα Ok Pθ Pλ; *om.* Nα; *add. interlin.* al' scorpīi Vβ NQ] FM Oη; VQ Bη; si qui Lβ signum.] *om.* Bα Bγ Eδ Eζ Eτ Dγ Nα Pγ Po Pτ Pv Qδ Rα Rβ Sβ Sκ Vβ Vκ Wι Xα Tauri] Cancrī Cε Mγ; Thauri Ev Mo Mφ Qδ Vπ remanebit] *om.* Pα
- 17 XA] CA Sι; ex A *corr.* to XA Sκ; GA Cζ Eμ Oα Oη Ok Oσ Pψ Qα Vα Vυ; GA *corr.* to XA Mκ; SA Vκ; SA *corr.* to TA Sθ Sλ; TA Bα Bζ Cβ Cδ Cθ Ev Mγ Oπ Pφ Vε Vv; TA vel XA Eo; XI Pα Vπ et.] *add.* est Cε; *add.* remanebit Vv; *add.* remanebit quoque Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mγ Mθ Mκ Mv Oα Oη Ok Oπ Pλ Pφ Pψ Qα Sθ Sλ Vα Vβ(*interlin.*) Vε Vσ Vχ; *add.* remanebitque Oα Oσ Vυ arcus] *om.* Bα Bζ Cβ Cδ Cθ Eμ Mθ Mκ Mv Oα Oη Oπ Pφ Pψ Qα Vα Vσ Vυ; *canc.* Eζ; remanebit quoque Si QC] AC Lγ; CQ Qδ Rβ; FC Oη; Q Sι; QO Pα; QS Vυ; QT Bι Mθ Ok Vε Vκ Xβ; QX Aα Ev Vπ QC ... Arietis] Arietis scilicet QC Eo pone] pones *many*; compones Cζ Oη; *add.* ex alia parte Qα arcum.] *interlin.* Cβ; *om.* Bι arcum HO sicut] *om.* Qα Vυ HO] BO Vπ; FS *corr.* to HS Mκ; HC Nα; HE Cη Eμ Mθ Oη; HG Mv Pψ Qα Vε; HS Ev Oσ Sθ Vα; HS *corr.* to HO Oα; *corr.* to HO Sλ; *add. and canc.* et arcum OR Pγ HO ... SX] GH et arcum VT.ST Vε sicut arcum HS] *om.* Oπ arcum.] *om.* Xα HS] HC Nα; HG Sι; HO Pγ; *corr.* from HST Sθ
- 17-18 HS ... arcum.] *om.* Pψ
- 17-19 Post ... Capricorni] *marg.* Pα; *om.* Fβ Mφ Pν Vι

seek the arc which runs through points F, K, and G and it will cut the circle of signs at points Q and X, and arc SX will be the sign of Scorpio, and arc NQ the sign of Taurus, and arc XA will remain as the sign of Libra, and arc QC as the sign of Aries. After this construct arc HO equal to arc HS and

arcum OR sicut arcum SX, eritque arcus RC signum Piscis et arcus OR signum Aquarii,
 et arcus HO signum Capricorni. Post hec etiam pones arcum ZV sicut arcum ZN et arcum
 20 VP sicut arcum NQ, eritque arcus AP signum Virginis et arcus PV signum Leonis, et arcus

- 18 OR₁] eG Cζ Eμ; EN Oη; OI Bε Cι Eη Eα Eβ Fα Fζ Lβ Lγ Lε Lη Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ
 Qβ Qγ Qδ Rβ Sδ Tδ Xα Xβ; OK Sι; OT Vχ; OZ Bα Bγ Vψ; RG Mv; SG Oα Oσ Qα Vα Vυ; SG
corr. to OG Sθ; SG *corr.* to OR Mκ Sλ; ST Cβ Ev sicut ... OR₂] *om.* Ev SX] SG Cζ Eμ
 Mθ Mv Oα Oη Ok Oσ Pψ Qα Vα Vυ; SG *corr.* to ST Sθ Sλ; SG *corr.* to SX Mκ; ST Bα Bζ Cβ
 Cδ Cθ Ev Mγ Oπ Sι Vε Vυ; STLX Eo arcus₁] *om.* Cη Pt arcus₁ ... et] *om.* Bη Wβ
 RC] BT Cθ; C Sι; CG Cζ Mθ Oα Oη Ok Oσ Pψ Qα Sθ Vα; CG *corr.* to RC Mκ Sλ; CT Ev
 Sκ; eG Eμ; IC Bε Cι Dγ Dη Eα Eβ Eη Fα Fζ Lβ Lε Lγ Lη Mδ Oξ Oτ Pα Pδ Pλ Pμ Qβ Qγ
 Qδ Rβ Sδ Tδ Xβ; IC *corr.* to IT Oυ; RG Mv; RT Oζ Vε; RX Pφ; ST *corr.* to RC Bζ; TC Mo; TG Vυ;
 VT Eo; ZC Bγ signum₁] *om.* Bα; *add.* in Lβ; et ... Aquarii] *om.* Pλ; *marg.* Pρ Piscis]
 Piscium Vψ arcus₂] *om.* Bα Vε OR₂] AT Vε; CS *corr.* to OR Mκ; GS Mθ Mv Oα Ok
 Oσ Pψ Qα Sθ Vα Vυ; GS *corr.* to OR Sλ; TK Ev; OI Bε Fα Fζ Lβ Lγ Lε Lη Mδ Oξ Oτ Oυ Pα
 Pδ Pμ Qβ Qγ Qδ Rβ Sδ Tδ Xα Xβ; OI *corr.* to OR Oζ; OZ Bα Bγ Pυ; OX Mo; SE Cζ; VE Eμ Oη
 signum₂] *om.* Bα
- 19 et arcus] hoc Taurus Eδ arcus] *om.* Bα HO] BO Vπ; EH Cζ Eμ Oη; HD Qδ; HS Oα
 Oσ Vυ; SH Ev Mθ Mv Ok Pψ Qα Sθ Vα; SH *corr.* to HO Sλ signum] *om.* Bα et₁ ...
 Capricorn] *om.* Eη; *marg.* Bε; *add.* 1-line gloss Cζ Post hec] Postea multi; Post some;
om. Nα; Et hec Qδ Post ... arcum₁] Pones etiam post arcum Dη etiam] *om.* Bα
 Bε Bζ Cδ Cζ Cι Eβ Eη Fζ Lβ Lγ Lε Lζ Lη Mγ Mδ Oζ Oξ Oτ Oυ Pδ Pθ Pυ Pρ Pτ Pφ Pψ Qα
 Qβ Qδ Rβ Sι Sλ Tδ Vv Vπ Vσ Vψ Xβ ZV] CG Mv; HS *corr.* to ZG Pψ; RX Nα; TG Vυ; ZB
 Cε Vκ; ZG Bα Cβ Cδ Cζ Cθ Eμ Ev Mγ Oα Oζ Oη Ok Oξ Oπ Oσ Oτ Pα Pγ Pδ Pθ Pφ Qα
 Sθ Sι Sλ Vα Vε Vυ; ZG.LF Eo; ZH Mη; ZN Aα Bη Mθ Sκ Wβ; ZNV Bθ Vπ; ZP Vχ ZV
 sicut arcum] *om.* Eζ arcum₂] *om.* Bζ; *add.* and *canc.* NQ eritque arcus Pγ ZN] CN
 Mv; GN Oπ; HS *corr.* to ZN Pψ; TN Vυ; XA Pρ; ZM Bα; ZT Vε; ZV Pα Wβ; ZVN Bθ Vπ; et v³ Aα
 ZN ... arcum₃] *om.* Nα Rβ Xα
- 19-20 Capricorni ... arcum₄] *marg.* Vσ arcum VP] *om.* Sθ; GC Mγ arcum VP sicut] *om.*
 Vπ
- 20 VP] GT Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Mθ Oα Ok Oπ Oσ Pψ Qα Sλ Vα Vε Vv Vυ; GT.PX Eo;
 GV Sι; NVP Qδ Rβ; PN Bη Pρ Wβ; PV Vχ; RX Nα; ST Mv Oη; ZV Pυ arcum] *om.* Bα Fβ
 NQ] MF Oη; NA Eη; NF *corr.* to NQ Ev; NO Fβ Pα; VQ Bη Cζ Pρ Wβ; ZN *corr.* to NQ Qγ
 arcus₁] *om.* Cζ Eμ Ev Mv Oα Oσ Pψ Vα Vυ; *marg.* Mκ eritque] *ms* Mγ (*end of f.*
15^{vb}); *f.* 16 *missing*; *begins again at Cap. 13 line 4 (f. 17^{ra})* AP] AT Bα Bζ Cβ Cδ Cζ Cθ Eμ
 Ev Mθ Mv Oα Oη Oπ Oσ Pψ Qα Sθ Sλ Vα Vε Vυ; AV Vχ; AX.VX Eo; A per Nα; V Sι
 signum₁ ... arcus₃] *om.* Pδ et₁ ... Leonis] *rep.* Wβ arcus₂] *om.* Bα PV]
 CG *corr.* to RG Sλ; GT Oα Oσ Sθ Vυ; NPN Wβ; PB Oζ Vκ; PN Bη Fζ Lγ Lη Mδ Pμ Pυ Pρ Qγ
 Qδ Tδ; PN *corr.* to PV Oξ; PVN Bθ; PX Mo; QT Ev; TG Bα Bζ Cβ Cδ Cζ Cθ Eμ Eo Mθ Mv Oη
 Ok Oπ Pψ Qα Vα Vε; VG Sι; VN Vπ; VP Vχ signum₂] *om.* Bα arcus₃] *om.* Bα
- 20-21 Virginis ... VZ] Leonis VS signum Virginis et arcus PN Rβ et arcus₃ ... [Cancr] *marg.*
 Qα

arc OR equal to arc SX, and arc RC will be the sign of Pisces and arc RO the sign of Aquarius, and arc HO the sign of Capricorn. After this also take arc ZV equal to arc ZN and arc VP equal to arc NQ, and arc AP will be the sign of Virgo, and arc PV the sign of Leo, and arc

VZ signum Cancrici.

Similiter si poneret arcum DL 3 gradus, et arcum BM similiter, esset arcus [HS]

21 VZ] [*illeg.*]Z Cζ; GT Vα; GX Vε; GZ Bα Cβ Cθ Ev Eo Mθ Mv Oα Oκ Oπ Oσ Pψ Qα Sθ St Vv;
NZ Pρ; PX Vχ; ^T_G Bζ; VC Sκ; VO Bη; XV Nα; ZG Cδ Sλ signum] *om.* Bα Rα Cancrici]
Capricorni Qα

21-23 signum ... ZN] *om* Bζ

22 Similiter₁] Et similiter *many*; etiam Dγ; sic Vε Similiter ... gradus] *om.* Qα si]
om. Fβ Qδ Rβ poneret] poneris Mv; pones Bε Eα Eβ Eδ Eη Fα Fβ Lβ Lγ Lε Mδ Mθ
Oζ Oη Oκ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Sθ Tδ Vv Vυ Xα; poteris Vε
arcum₁] *om.* Cε Nα; gradus Vv; *add.* uniuscumque Cθ DL] AX.DL Pλ 3₁]
3^{es} Sθ; tres *some*; trium Bα Eη Ev Pφ Qδ; 30 Bη Dη Eα Eδ Vβ Wβ Xα; 33 *corr.* to 3 Vψ
gradus] graduum Aα Bv Vπ; gradibus Bι; *add.* quorum quilibet Bη Pρ Wβ; *add.*
quorum quilibet valet 10 [*or x*] Cβ(*interlin.*) Bε Cε Cι Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη
Mυ Mφ Oξ Oζ Oτ Oυ Pα Pδ(*valeret*) Pθ(*valeret*) Pλ Pμ Pν Qβ Qγ Qδ(*add.* g^a) Qλ Qμ
Rβ(*quodlibet*; *add.* g^a) Sδ Tδ Vι(*quolibet*) Vψ Wα Xβ; *add.* vel unius gradus sicut 30 eodem
modo distingueretur St arcum₂] aarcus Mv BM] BL Oπ; BLM Qδ; HM Xβ; LG
Bε; LM Fβ Lβ Lγ Lε Lη Mδ Oζ Oυ Pα Pλ Pν Qβ Qγ Sδ Tδ; VM Vκ; VN Eo similiter₂]
add. BN Eo; *add.* *interlin.* scilicet 3 gradus Cβ; esset arcus HS] *om.* Pμ HS] Cζ Eμ
Oα Oη Oσ Pψ Qα St Vυ; HG Vα; HO Aα Bγ Bε Bη Bθ Bι Bκ Cβ Cδ Cε Cη Cθ Cι Dγ Dη Eα
Eβ Eδ Eζ Eη Ev Eo Eτ Ev Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mφ Mκ Mo Mυ Nα Oζ Oξ Oπ Oτ
Oυ Pα Pγ Pδ Pθ Pλ Pν Po Pρ Pτ Pυ Pφ Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sθ Sκ Tδ Vβ Wβ
Vε Vι Vκ Vν Vπ Vσ Vχ Vψ Wα Wι Xα Xβ; *corr.* ex HO Mη; HX Bα; HZ Mθ Oκ; H scilicet Z
Mv; MS *corr.* to HO Sλ

22-23 et arcum BM ... gradus₁] *repeat* Bθ HS ... arcus] *om.* Mλ

VZ the sign of Cancer.

Similarly, if you constructed arc DL as 3 degrees and arc BM in the same way, arc HS would be

3 gradus ex [Sagittario] et arcus [ZN] 3 gradus ex [Geminis]. Hoc modo divides

23 3₁] tres *some*; trium Βα Βε Ευ Qδ Vπ; *om.* Dη; 30 Βη Εα Εδ Να Qα Vβ Wβ Χα gradus₁] *om.* Pτ; graduum Αα Vν Vπ; *add.* et arcus Vν ex₁ ... gradus₂] *om.* Βκ Sagittario] Cζ Εμ Οη; Capricorno Αα Βα Βγ Βε Βη Βθ Βι Cβ Cδ Cε Cη Cθ Dγ Dη Εα Εο Ευ Εδ Εζ Εη Εν Ετ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mν Mo Mv Mφ Nα Oα Oζ Ok Oξ Oπ Oσ Oτ Ou Pα Pγ Pδ Pθ Πλ Πμ Πν Po Pρ Pτ Pυ Pφ Pψ Qα Qβ Qγ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sθ Sλ Sι Sκ Tδ Vα Vβ Vε Vι Vκ Vν Vπ Vσ Vυ Vχ Vψ Wα Wβ Wι Χα Xβ [Sagittario] ... ex₂] *om.* Cε Lβ ZN] Βη Cζ Cη Εμ Ετ Οη Pδ Pθ Pρ Pτ Si Wβ; CG Mv; RV Fζ; RX Nα; TG Vυ ; xv Qδ; [*illeg.*]z Eo; ZB Qγ Vκ; ZG Βα Cβ Cδ Cθ Ev Mθ Oα Ok Oπ Oσ Pψ Qα Qμ Rα Sθ Sλ Vα Vε Vν; ZP Vσ Vχ; ZV Αα Βγ Βε Βθ Βι Cι Dγ Dη Εα Εβ Εδ Εζ Εη Ευ Fα Fβ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mo Mv Mφ Oζ Oξ Oτ Ou Pα Pγ Πλ Πμ Πν Po Pυ Pφ Qβ Qλ Rβ Sβ Sδ Sκ Tδ Vβ Vι Vπ Vψ Wα Wι Χα Xβ; *add.* qui est arcus Geminorum Si 3₂] trium Βα Qδ Rβ Vπ; tres *many*; 30 Βη Εδ Να Χα gradus₂] graduum Vν Geminis] Cζ Εμ Οη; Cancro Αα Βα Βγ Βε Βζ Βη Βθ Βι Βκ Cβ Cδ Cε Cη Cθ Cι Dγ Dη Εα Εδ Εζ Εη Εν Εο Ετ Ευ Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mθ Mη Mκ Mλ Mo Mv Mv Mφ Nα Oα Oζ Ok Oξ Oπ Oσ Oτ Ou Pα Pγ Pδ Pθ Πλ Πμ Πν Po Pρ Pτ Pυ Pφ Pψ Qα Qβ Qδ Qλ Qμ Rα Rβ Sβ Sδ Sθ Si Sκ Sλ Tδ Vα Vβ Vε Vι Vκ Vν Vπ Vσ Vυ Vχ Vψ Wα Wβ Wι Χα Xβ; Capricorno *corr.* to Cancro Qγ Hoc] *add.* igitur Cδ modo] *add.* utimur ut iam dictum est Cδ

23-24 Hoc ... figura] *om.* Βα

3 degrees of Sagittarius,⁶ and arc ZN 3 degrees of Gemini. In this way you will divide the

⁶ If one follows the diagram and the lettering used for dividing the zodiac into its signs, almost all the manuscripts insert the wrong signs – Capricorn for Sagittarius, and Cancer for Gemini – in this sentence. This may stem from an error in an early ms (C₁, dated AD 1276 – see introduction) where the names in the diagram have been shifted clockwise by one sign. In line 21, designating the arc as HO would be correct for Capricorn and ZV (corrupted to ZG) would be correct for Cancer. (Where the mss do read HS and ZN, often this corresponds to the lettering in the diagram for Capricorn and Cancer. And as has been mentioned, V and N were often interchanged by scribes.)

Note: in the correct version the parts divided off in this example would be the final 3 degrees of the sign.

universum circulum signorum per singulos gradus, ut patet in hac figura.

24 universum] *interlin.* Cθ; *om.* Bζ Cζ Eμ Eo Mv Mo Oα Oη Ok Oσ Pφ Pψ Qα Sθ Sλ Sι Vα Vσ Vυ Vχ; zodiacum sive Cδ; *add.* scilicet Cθ circulum] *om.* Bθ Vπ signorum] *om.* Mv Mφ Vι per ... gradus] certissime Pψ singulos] *add. and canc.* dies Lγ singulos ... figura] signa et partes signorum et per gradus si placet, sicut vides hic Cδ gradus] *om.* Ok ut ... figura] *om.* Ev Mv Oη Pψ; eodem modo Sι; et est figura Vυ; et hec est figura Bζ Cβ Cζ Cθ Eμ Eo(hoc) Mθ Mκ Oα Ok Oπ Oσ Pψ Qα Sθ Vα Vε Vσ Vχ; ut in figura Bε; ut in figura precedenti patet Dη; *add. interlin.* que prenotata Eμ ut] *om.* Eζ patet] *om.* Cε; patebit Nα hac] *om.* Aα Bγ Bθ Cη Dγ Lη Ev Mη Mλ Nα Pτ Qγ Vι Vπ Wβ; sua Xα; subsequenti scripta Fβ; *add.* sequenti Pφ figura] *add.* intuiti(?) Vυ; *add.* postposita Bη; *add.* precedenti Mη; *add.* subsequenti que talis est Pφ; *add.* sequenti Rα Tδ Vβ; *add.* subscripta Lε; *add.* transacta Pυ; *add.* Requir~ infram libro magistri Johannis de Simdis istam et omnes alias figurarum Xα⁷; *add.* (*later hand*) Figura est post textum astrolabii ad iste signum * Qμ(*links to fol. 153'*); *add.* 4-line gloss Cζ

figura] *add.* Oη:⁸

DE CONSTITUTIONE ZODIACI ET EIUS DIVISIONE.

Statue circulum super lineam AO ita quod transeat per LT, et sit circulus zodiaci. Deinde divide circulum ABCD per 360 gradus. Post hec pones arcum E ut similem dimidio declinationis Ptholomei. Deinde iunges A cum T et abscindat diametrum super K, qui est punctus medius inter polum zodiaci et polum mundi. Posita regula super 280 gradus limbi ex una parte et super 45 ex altera, et concordat cum cenith capitis in linea medii celi.

figura] *add. in marg.* Vβ:

Nota quod secundum quosdam potest dividi zodiacus per lineas rectas super totam declinationem, sicut per arcus super mediam declinationem. Tamen non videtur esse sufficiens, quia aliqualis esset ibi error, si aliquis subtiliter investiget. Unde levius et melius est per ascensiones.

Nota quod meliori modo et certiori dividitur zodiacus per ascensiones signorum, que sibi debentur in circulo directo, et unumquodque signum in gradus similiter secundum ascensiones, que gradibus debentur. Et accipiuntur iste ascensiones in tabula, ascensiones signorum in circulo directo. Et hoc modo dividunt facientes astrolabium.

figura] *add.* *Addendum 9-1: many*

⁷ At the beginning of the text, ms Xα attributes this treatise to John of Sacro Bosco; see Prologus, line 1. "Iohannis de Simdis" is unknown; perhaps *Simdis* is really *Sundis*, i.e., Stralsund, the Hanseatic city on the Baltic Sea in northeastern Germany.

⁸ This additional material was included by Gunther as part of his text (p. 205), but in fact it appears in only this one manuscript. Moreover, whoever prepared the Latin for Gunther dropped a whole line ("zodiaci [5th line] ... limbi") from the transcription and misread "AO" [line 6] for "45", "centro" for "cenith", and "capreis" for "capitis", thus destroying the sense of the sentence.

entire circle of signs into individual degrees, as shown in this figure.

[ADDENDUM 9-1]

Aα Bγ Bε Bη Bθ Cε Cη Cι Dη Eα Eβ Eδ Eζ Eη Eο Eτ Eυ Fα Fβ Fζ Lγ Lε Lη Mδ Mo Mυ Mφ Oζ Oξ
Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Po Pρ Pτ Pφ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Sκ Tδ Vβ Vι Vπ Vχ(marg.)⁹ Vψ
Wα Wβ Wι Xβ

- 25 Potest etiam aliis 3 modis dividi zodiacus. Primo per lineas rectas super totam declinationem, ut in precedenti per arcus super dimidium declinationis. Secundo per tabulas ascensionum signorum in circulo signorum, et hoc utimur modo scilicet trahendo lineam rectam a puncto E per zodiacum et per ascensionem signi sive gradus.

- 25 Potest] Post hoc *many* Potest .. dividi] *twice* Rβ; *illeg.* Cε etiam] *om.* Eη; autem Aα Bθ Eυ Vπ 3] *tribus some*; 2 Wα zodiacus] *add. in marg.* 2° [*illeg.*] alios 3 modos dividendi zodociacum. Et primo, primum. 2°, 2^m quem servamus. 3°, 3^m modum. Hii autem modi sunt additi, nec habent figuram preter primus Vβ Primo] *om.* Cε; *add. in marg.* Primo per lineas rectas Eα rectas] *add.* de quorum in sequenti figura. Et Vβ totam] *om.* Mυ Vι Wα
- 26 ut] *ut corr. to* videlicet Pρ; non poc Eο; *add. interlin.* id est scilicet Pρ precedenti] *add. interlin.* scilicet figura Vβ per] super Fβ; *om.* Bα super] secundum Eο Eτ dimidium] . . . Vψ; *add. interlin.* scilicet arcui Vβ Secundo per] super Qδ; *add.* 2° Eα(marg.)
- 27 ascensionum] *om.* Vψ in] ut patet in Qβ signorum₂] directo Bη Bθ Cη Cι Eη Eο Eυ Fα Pδ Pθ Pλ Pρ Pτ Vβ Vπ Wβ; recto Cε Dη Eδ Eζ Eτ Mo Mυ Po Qμ Sκ Vψ Xβ; *add.* directo Qδ; *add. in marg.* signorum Fα utimur] ut. . . Vψ modo] melior modo Bε scilicet] *om.* Pρ
- 27-28 modo ... gradus] *om.* Aα Bγ Bη Bθ Cη Eδ Eζ Eμ Eο Eτ Mo Pτ Qμ Sκ Vπ Vχ Wι Wβ; *marg., late hand, garbled* Po scilicet trahendo] subtrahendo Cε
- 28 trahendo] atrahendo Qδ per] *twice* Cε ascensionem] declinationem Pδ Pθ Vψ; declinationem *corr. to* ascensionem Oτ; *add.* vel declinationem Oξ Pφ

⁹ Due to the tight binding of ms Vχ, the first part of each of the 10 lines of this marginal addition is not readable.

[ADDENDUM 9-1]

25 The zodiac can also be divided in three other ways. First through straight lines using the entire [obliquity],¹⁰ as in the preceding through arcs using half the [obliquity]. Second, by tables of [right] ascensions of the signs in the circle of signs, and we use this method, that is, by drawing a straight line from point E through the zodiac and through the [right] ascension of the sign or degree.¹¹

¹⁰ Straight lines from the projection of the pole of the ecliptic to points on the equatorial circle (i.e., to 30°, 60°, 90° etc. along the equatorial circle) also cut off equal arcs on both the equatorial circle and the ecliptic. See Thomson, *Jordanus de Nemore*, pp. 66-67; Proposition 4, and commentary, pp. 142-143.

Samsó notes that this method is found in Ptolemy, *Planaesphaerium*, chapter 15 (*On Both Sides*, p. 421).

¹¹ Knowing the right ascension (along the equator) of the beginning of each sign in the zodiac (e.g., as found in the table in Addendum 9-2), then straight lines from these points on the equator through the pole (i.e., great circles through the pole and the points on the equator) will cut off appropriate arcs of the ecliptic. See Thomson, *Jordanus de Nemore*, pp. 62-64; Proposition 4 and commentary, pp. 142-143 and Samsó, *On Both Sides*, pp. 423-424.

A similar but inaccurate method (often known as “false right ascensions”) involves drawing straight lines from 30° arcs along the equator to the pole, cutting off arcs on the ecliptic. For the problem with this “method” see Thomson, *Jordanus de Nemore*, p. 64.

30 Tertio modo per circulos transeuntes per declinationes cuiuslibet gradus signorum. Et si declinatio sit australis, accipe eam extra equinoctialem ex A versus D; si sit septentrionalis, accipe intra ex A versus B ponendo regulam super punctum D et super declinationem versus quamcumque partem fuerit declinatio accepta, scilicet ex A versus D vel ex A versus B.

29 Tertio] iii Aα Vπ; In Bθ Ev; *add.* 3° Eα(*marg.*); *add.* autem] Bγ Cη Pτ Vβ Wβ modo] *om.* Bε Pϑ circulos] *om.* Eo; singulas Pτ; singulos gradus Vβ per] *om.* Pτ cuiuslibet] *om.* Vχ; uniuscuiusque Bγ Bη Cη Pτ Wβ signorum] *om.* Cε; *add.* vel per declinationem unius signi vel duarum signorum Qμ Et] que Pα si] sit *or* sic Vψ

29-33 Et ... B] Eβ(*very faint*) Lβ(*very faint*) Pο(*later hand in marg., partly cut off*) Qμ(*later hand*); *om.* Aα Bγ Bη Bθ Cε Cη Eδ Eζ Ev Eo Eτ Mo Pτ Rβ Sκ Vβ Vπ Vχ Wβ

30 eam] *add. and canc.* versus Eα

30-31 si ... versus] *om.* Vψ

31 accipe intra ex A] *marg.* Oξ intra] eam Mδ A] ea Qγ ponendo] *add.* semper Cι Pδ D] CB Pφ

32 fuerit] fuerint Pφ declinatio accepta] *om* Pφ

33 D] B Cβ Mφ Mv Pφ Vι Wα versus B] *om.* Oξ B] D Mφ Mv Vι Wα; *add.* Possunt leviori modo extrahi signa zodiaci ex gradibus limbi sive in marginalibus. Nam Capricornus constituit 32 primos gradus, Aquarius constituit 30 sequentes, Pisces 28 sequentes usque ad caput Arietis. Deinde Arietis continet 28 sequentes, Taurus 30, Gemini 32 usque ad caput Cancri. Cancri continet 32, Leo 30, Virgo 28 usque ad caput Libre. Libra occupat 28, Scorpio 30, Sagittarius 32 usque ad caput Capricorni. Quos gradus singulis signe annotatos divide eos in 30 gradus equales secundum divisionem orizontium sive in singulos aut binarios aut quintarios secundum quod astrolabium tuum fuerit magnum. Ev

The third way is through circles passing through the declinations of any degree of the signs. And if the declination is southern, draw it outside the equatorial [circle, i.e., the celestial equator]¹² from A towards D; if it is northern, draw it inside from A towards B, placing the rule on point D and on the declination towards whichever side the drawn declination is, that is, from A towards D or from A towards B.¹³

¹² The circle through the equinox/equinoxes (*equinoctius diei*) is the circle through the beginnings of Aries and Libra, that is, the celestial equator. Henceforth this phrase will be translated as “celestial equator”.

¹³ By drawing circles parallel to the equatorial circle at appropriate declinations, these circles will cut the ecliptic at the desired points. However, this method depends on having a table of declinations for the beginning points of the signs along the ecliptic. It is also not very accurate – or at least very difficult to be accurate – because the angle of intersection is always less than the obliquity of the ecliptic making the precise point of intersection very difficult to determine. See Thomson, *Jordanus de Nemore*, p. 66; Proposition 4, and commentary pp. 142-143.

[ADDENDUM 9-2]

in margins, or indented into the text at the margin: Mu Mφ Oξ Ov Pα Po¹⁴ Wα

NOTA: Ascensiones signorum per quos dividitur zodiacum

35	Sagittarius Capricornus Gemini Cancer	} 	32 g ^a	13 m ^a
40	Aries Libra Pisces Virgo	} 	27 g ^a	53 m ^a
45	Taurus Scorpio Leo Aquarius	} 	29 g ^a	54 m ^a

34 per ... zodiacum] *om.* Oξ Ov Pα Po

36 32] 23 Pα Po

¹⁴ Most of names of the signs are cut off.

[ADDENDUM 9-2]

NOTE: [Right] ascensions of the signs by which the zodiac is divided¹⁵

Sagittarius	}	32 degrees	13 minutes
Capricornus			
Gemini			
Cancer			
Aries	}	27 degrees	53 minutes
Libra			
Pisces			
Virgo			
Taurus	}	29 degrees	54 minutes
Scorpio			
Leo			
Aquarius			

¹⁵ These are (fairly accurate) right ascensions used in the second method noted above in Addendum 9-1. These right ascensions for the beginnings of the signs are: Aries, 0°; Taurus, 27° 53'; Gemini, 57° 47'; Cancer, 90°; etc. In modern notation these would be: Aries 0^h; Taurus, 1^h 51^m 32^s; Gemini, 3^h 51^m 8^s; Cancer, 6^h; etc.

The “correctness” of these right ascensions depends of course on the value used for the angle of the ecliptic; and the “usefulness” of the degree of accuracy exhibited here depends on the craftsmanship of the engraver.

[FIGURA 9]

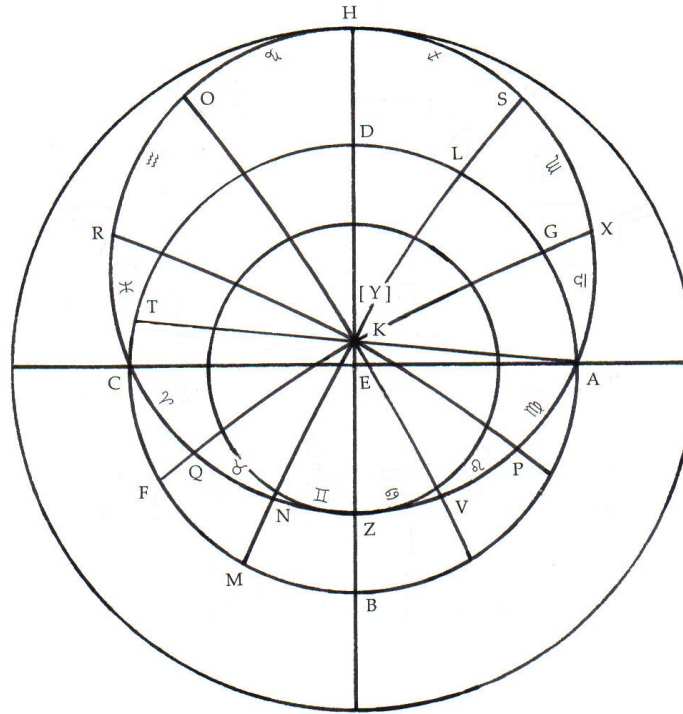


Figura divisionis zodiaci per arcus super medie declinationis polum

[Complete diagram] Bα Bγ Bε Bι Bκ Cβ₁(fol. 52^v) Cβ₂(fol. 52^v) Cδ Cη Cθ Cι Eα Eβ(faint) Eη¹⁶
 Eμ₁(fol. 53^r) Eμ₂(fol. 53^v) Eν¹⁷ Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν Mo Mυ(fol. 406^v)
 Oζ Oκ¹⁸ Oξ Oπ₁(fol. 50^o bottom left) Oπ₂(fol. 50^o bottom right) Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ
 Pυ Pψ¹⁹ Qβ Qγ Qδ Qλ(fol. 185^v) Qμ(fol. 153^r) Sβ Sδ Tδ Vα Vβ Vι(fol. 332^r) Vκ Vσ Vχ Wι Xβ
 [Partial diagram] Bθ Eο Rα Vε Wα
 [Outline, or space only] Aα Bζ Cε Dη Eζ Lβ Mφ Nα Oα Pν Pφ Qα Rβ Sθ Vν Vπ Vυ Vψ
 [No space] Dγ Eδ Oη Si Sλ Xα

¹⁶ In Eη the figure is partly symmetrical around diameter BH. Thus L and G are also found in arc DC of the equatorial circle.

¹⁷ The figure in Eν is oriented 90° counterclockwise. Some letters are oriented horizontally, and some vertically, making them at times difficult to decipher. As well it is partially symmetrical around diameter BH; thus L and G are also found in arc DC of the equatorial circle, and F and M in arc AB.

¹⁸ In Oκ the figure is symmetrical around diameter BH, with the left side repeating the right side. Thus L and R (not G) are also found in arc DC of the equatorial circle, and F and M in arc AB.

¹⁹ Ms Pψ is partly symmetrical around diameter BH.

PΘ “J”

[Combined with Fig. 7 and 8] Bη Eο Wβ²⁰

[Includes Fig. 8] Cβ₁ Sκ

[Combined with Fig. 10] Mδ

[Note: Lines MKL and FKG should be arcs, but in some mss these are drawn as straight lines: Bα Bε Cθ Ev Eυ Fβ Pλ Pο Pτ Pψ Qδ Qλ Tδ Vε Vκ Vσ Xβ. Mss Bη, Mv, Mu, Sβ, and Vι have straight lines drawn from K. Mss Cθ, Oπ₁ and Wα have no arcs drawn.]

[Caption]

Figura ... polum] Cι Fζ Lγ Lε Lη Mκ Oζ Oξ Oτ Oυ Pα Pδ Pτ Qβ Qγ Qδ Qλ Sδ Tδ Xβ; Fβ(repeated in marg.); Pq(twice); illeg. Eβ; om. Bα Bι Bκ Cβ₁ Cβ₂ Cθ Eμ₁ Eμ₂ Ev Mθ Oκ Oπ₁ Oπ₂ Pλ Pψ Sβ Vα Vε Vσ Wα Vυ; Cumque feceritis circulum signorum etcetera Oσ(later hand); Divisio zodiaci per arcus super demidium tocius declinationis Eα; Figura divisionis circuli signorum per signa et gradus super medium declinationis Bγ; Figura divisionis zodiaci Qμ; Figura inscriptionis et divisionis zodiaci per arcus super mediem declinationis per lineas curves et per totum declinationem per lineas rectas Sκ; Hec est figura benefacta secundum artem Lζ; In hec figura punctus K est punctus medius inter polum mundi et polum zodiaci in que se intersecant sex circuli dividentes tam equinoctialem quam zodiacum in xii partes equales quod facere non possent ubi essent eorum thercerto(?) Cδ

Figura] add. inscriptionis Bε divisionis] Fα(twice); inscriptionis Eη zodiaci] circuli signorum Eτ Eυ Mη Mv Mo Mu Po Pv Vι Vκ Vχ Wι; add. id est circuli signorum Vβ(and add. interlin. uno scilicet modo) per arcus] om. Eυ Mδ Mη Vι Wι per arcus super medie declinationis polum] om. Pγ; super totam declinationem Pμ super] om. Bθ super ... polum] om. Cη medie declinationis polum] mediam declinationem Eτ Eυ Fα Mη Mλ Mv Mo Po Pv Vκ Vχ; mediam declinationem signorum Mu Vι polum] om. Bθ; add. cum figura inscriptionis stellarum fixarum Mδ

[Lettering on the diagram]

A] Bα Bγ Bε Bη Bθ Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mo Mu Oζ Oκ Oξ Oπ₁ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wβ Xβ; om. Bθ Mκ Wι; cut off Oπ² Wα; x Mv B] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mv Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wα Wβ Xβ; om. Bθ Mκ Vε Wι C] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mθ Mη Mλ Mv Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wβ Xβ; om. Bθ Mκ Wα Wι D] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mv Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pv Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Vσ Vχ Wα Wβ

²⁰ Mss Bη (fol. 120^r), Eο (fol. 186^r), and Wβ (fol. 1^{va}) have Figures 7, 8 and 9 all superimposed as one diagram. In Eο the lettering for Figure 9 is not included and in Wβ an attempt has been made to distinguish the figures in part by the use of different coloured inks. For the captions, see Figure 7.

Xβ; *om.* Bθ Mκ Pψ Vε Wι E] Bα Bγ Bε Bη Bι Bκ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Ev Et Eu Fα Fβ
 Fζ Lγ Lε Lζ Lη Mδ Mθ Mλ Mν Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ
 Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vε Vκ Vσ Vχ Wβ Xβ; *om.* Bθ Cβ₁ Eμ₂ Mη Mκ Mo Mv Vι Wα
 Wι; κ Eμ₁ F] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ Lγ
 Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Mv Oζ Oκ Oξ Oπ₁₂₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ
 Pψ Qβ Qγ Qλ Qμ Sβ Sδ Sκ Tδ Vβ Vι Vκ Vσ Vχ Wβ Xβ; *illeg.* Eβ; *om.* Bθ Mκ Qδ Vα Vε Wα Wι
 G] Bα Bγ Bι Bκ Cβ₂ Cδ Cθ Cι Eα Eβ Eη Ev Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mu Oξ Oπ₁ Oτ Oυ
 Pα Pγ Pδ Pλ Pμ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vβ Vι Vκ Vσ Vχ Wβ Xβ; *illeg.* Mθ; *om.* Bε Bη
 Cβ₁ Cη Bθ Et Mδ Mκ Mλ Mν Mo Oζ Pο Pρ Pψ Vα Vε Wα Wι; R Oκ; T Eμ₁ Oσ; X Eμ₂ Oπ₂ H] Bα
 Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη
 Mθ Mλ Mν Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ
 Qμ Sβ Sδ Sκ Tδ Vα Vβ Vε Vι Vκ Vσ Vχ Wα Wβ Xβ; *om.* Bη Bθ Et Mκ Wι K] Bα Bγ Bε Bι Bκ
 Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mθ Mλ Mv²² Mu Oζ
 Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ
 Vε Vι Vκ Vσ Vχ Wβ Xβ; *om.* Bη Bθ Mη Mκ Mo Wα Wι; *add.* polum zodiaci Cδ; *add.* above κ
 centrum zodiaci Cδ L] Bα Bγ Bι Bκ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ
 Lγ Lε Lζ Lη Mη Mθ Mv Mo Mu Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ
 Qλ Qμ Sβ Sδ Sκ Tδ Vβ Vι Vκ Vσ Vχ Wβ Xβ; *om.* Bε Bη Bθ Cβ₁ Mδ Mκ Mλ Oζ Pψ Qδ Vα Vε Wα
 Wι M] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ Lγ Lε Lζ
 Lη Mδ Mη Mθ Mλ Mν Mo Mu Oζ Oκ Oξ Oπ₁₂₃ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ
 Qβ Qγ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Vσ Vχ Wβ Xβ; *illeg.* Eβ; *om.* Bθ Mκ Vε Wα Wι; F Qδ
 N] Bα Bγ Bε Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ
 Mη Mθ Mλ Mν Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qδ Qλ
 Qμ Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Vσ Vχ Xβ; *illeg.* Eβ; *om.* Bθ Mκ Wα Wι; v Bη Pρ Wβ; z Vε O] Bα
 Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₂ Et Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ
 Mv Mo Mu Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vβ Vι Vκ
 Vσ Vχ Wβ Xβ; *om.* Bθ Mκ Vε Wα Wι; e Eμ₁ Oπ₁; m Oπ₂; s Ev Oκ Oσ Pψ Vα; •t• Mθ P] Bγ Bε
 Bη Bι Bκ Eα Eβ Eη Et Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mν Mo Mu Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ
 Pμ Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vβ Vκ Wβ Xβ; *om.* Bθ Mκ Wα Wι; q Oκ; t Bα Cβ₁ Cβ₂
 Cδ Cθ Eμ₁ Eμ₂ Ev Mθ Oπ₁ Oπ₂ Oσ Pμ Pο Pψ Vα Vε Vι; v Vσ Vχ; *on equatorial circle* Cη Cι Q] Bα
 Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eη Eμ₁ Eμ₂ Ev Et Eu Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη
 Mθ Mλ Mν Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ
 Qμ Sβ Sδ Sκ Tδ Vβ Vι Vκ Vσ Vχ Wβ Xβ; *illeg.* Eβ; *om.* Bθ Mκ Wα Wι; f Vα; n Vε R] Bα Bη Bι
 Bκ Cβ₁ Cβ₂ Cδ Cθ Cι Et Eu Fζ Lζ Mη Mλ Mν Mo Oπ₂ Pρ Pτ Qμ Sβ Vβ Vκ Vσ Vχ Wβ; *illeg.* Mθ;
om. Bθ Mκ Vε Wα Wι; g Pψ; h Ev; i Bε Cη Eα Eβ Eη Fα Fβ Lγ Lε Lη Mδ Mu Oζ Oξ Oτ Oυ Pα Pδ
 Pλ Pμ Pυ Qβ Qγ Qδ Qλ Sδ Sκ Tδ Vι; r *corr.* to I Xβ; t Oπ₁; v Oσ; z Bγ Pγ; α Pο; ζ Vα; 6 Eμ₁ Eμ₂ Oκ
 s] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Ev Eu Fα Fβ Fζ Lγ Lε Lζ Lη
 Mδ Mη Mθ Mλ Mν Mo Mu Oζ Oκ Oξ Oπ₁ Oπ₂ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ
 Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Vσ Vχ Wβ Xβ; *illeg.* Et; *om.* Bθ Mκ Wι; v Vε T] Bα Bγ
 Bε Bι Bκ Cβ₁ Cβ₂ Cδ Cθ Cι Eα Eβ Eη Ev Et Eu Fα Fζ Lγ Lζ Lη Mδ Mη Mλ Mo Mu Oζ Oξ Oπ₁ Oπ₂

²¹ In Oπ₁, F is also on arc AB.

²² In Mv, κ is on top of E.

²³ In Oπ₁, M is also on arc AB.

Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ Vβ Vε Vκ Vχ Wβ Wι Xβ; *om.* Bθ Ev Mo Mu Ok Oπ₁ Pμ Vα Vι Vσ Wα; Sagittarius Cη Sagittarius] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eτ Ev Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν Oζ Oξ Oπ₂ Oσ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ Vβ Vε Vκ Vχ Wβ Wι Xβ; *om.* Bθ Ev Mo Mu Ok Oπ₁ Vα Vι Vσ Wα; Capricornus Cη Capricornus] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eτ Ev Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν Oζ Oξ Oπ₂ Oσ Oτ Ou Pα Pγ Pδ Pλ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ Vβ Vε Vκ Vχ Wβ Wι Xβ; *om.* Bθ Ev Mo Mu Ok Oπ₁ Pμ Vα Vι Vσ Wα; Aquarius Cη Aquarius] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eτ Ev Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν Oζ Oξ Oπ₂ Oσ Oτ Ou Pα Pγ Pδ Pλ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ Vβ Vε Vκ Vχ Wβ Wι Xβ; *illeg.* Eβ; *om.* Bθ Ev Mo Mu Ok Oπ₁ Pμ Vα Vι Vσ Wα; Pisces Cη Pisces] Bα Bγ Bε Bη Bι Bκ Cβ₁ Cβ₂ Cδ Cη Cθ Cι Eα Eβ Eη Eμ₁ Eμ₂ Eτ Ev Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν Oζ Oξ Oπ₂ Oσ Oτ Ou Pα Pγ Pδ Pλ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ Vβ Vε Vκ Vχ Wβ Wι Xβ; *illeg.* Eβ; *om.* Bθ Ev Mo Mu Ok Oπ₁ Pμ Vα Vι Vσ Wα; Aries Cη

[Division of the zodiac]

10, 20, 20 × 12 Sk

[Other information]

Tropic of Cancer] *om.* Bι Cβ₂ Cθ Eμ₁ Eμ₂ Ev Lζ Oπ₁ Oπ₂ Pτ Vε equatorial circle] *add.* circulus Arietis et Libre Pρ (*om.* circulus) Pτ zodiac] *add.* zodiacus Bγ; *add.* 30 in each sign Cδ; *add.* 10 20 30 in each sign Bγ Mλ Mν Po Pv Vβ Wι; *add.* 5 10 ... 25 30 or 10 20 30 in each sign Bε Eα Tropic of Capricorn] *om.* Bι Cβ₂ Cθ Ev Lζ Oπ₁ Oπ₂ Vε

add. A, B, C, D, H, L, T as in Fig. 7 Cβ₁; *add.* A, B, C, D as in Fig. 7 Eτ Mν line AKT] *om.* Mν Pρ Pψ Wα; *add.* declinatio media Bγ Pv Vβ; *add.* dimidium declinationis Cι Fζ Lγ Lε Lη Mκ Oξ Ou Pα Pλ Pτ Qβ Qγ Qμ Sδ Tδ Wβ; line AK only Po; *add.* line KC Po *add.* line AY extended to equatorial circle Bγ Bε Cη Cι Eβ Eη Fβ Lγ Lε Lη Mδ Mκ Oζ Oξ Oτ Ou Pα Pδ Pλ Pμ Po (*om.* γ) Pτ Pv Qβ Qγ Qδ Qλ Qμ Sδ Sk (AL') Tδ Vβ Wβ; *add.* at intersection C Bε; *add.* at intersection R' Eβ Eη Lγ Lη Mδ Oζ Oτ Pλ Qμ; *add.* declinatio Wβ; *add.* declinatio tota Bγ Cι Mκ Oξ Qμ Vβ *add.* line γS Pv; *add.* tota Pv arc RKP] *om.* Cβ₂ Oπ₂; extended to equatorial circle Ev (lettered HGKTF) Pρ (lettered RKPT) Pτ (lettered RTKP) arc OKV] *om.* Cβ₂ Oπ₂; extended to equatorial circle Bε (lettered OLKV) Ev (lettered SLKGM) Pρ (lettered OKVδ) arc MKLS] *om.* Oξ *add.* arc AKC Bι Eη Lζ Mλ Pκ Pρ Pv Vβ Vχ arc KO and equatorial circle] M Lε

add. meridies | occidens | septentrio | oriens Bγ Mδ Pρ (*om.* septentrio)

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[CAPITULUM 10.] DE INSCRIPTIONE STELLARUM FIXARUM

Cumque diviserimus circulum signorum certissime, oportet nos postea describere stellas fixas in circulo signorum. Cuius rei exemplar est ut ponamus stellam

- 1 De ... fixarum] *om.* Aα Bα Bγ Bκ Cβ Cδ Cε Cθ Dγ Eα Ev Lη Mv Mλ Nα Oα Oπ Oσ Pγ Pφ Rα Sβ Sθ Sι Vε Vκ Vυ Vχ Xα Wα; Capitulum de impositione stellarum fixarum in rethe Bζ Bι Pτ(*om.* Capitulum) Vv; De compositione stellarum in circulo signorum Mθ Oκ; De descriptione stellarum fixarum in rethi Bη Wβ; De impositione stellarum Pυ; De impositione stellarum fixarum Xβ; De impositione stellarum fixarum in rethi Vβ; De impositione stellarum fixarum in rethi secundum distanciam earum ab equinoctiali Dη; De ordinatione stellarum fixarum in circulo signorum Qα(*marg.*); De positione stellarum in circulo signorum Eμ Mκ Pψ Sλ Vσ; De positione stellarum in circulo signorum et rethe Cζ; De positione stellarum in rethe in circulo signorum, cum longitudine sua ab equinoctiali cum gradu cum quo venit ad medium celi, id est declinatione sua Oη; De descriptione stellarum Rubrica Bθ(*add. in marg.* De inscriptione stellarum); Hic de situatione stellarum et primo septentrionalium, secundo meridionalium, tertio rethis expositioni Bι(*in marg., later hand*); Sequitur de inscriptione stellarum fixarum in rethe in eius zodiaco Cη; Tria pars in qua docet situationem stellarum Lζ(*marg.*); 10^m Bε(*marg.*)
- 1 before De] *add.* Capitulum Fβ De] *add.* impositione vel Ev fixarum] *om.* Bε Cι Eδ Eζ Mη Pδ Po Qμ Vψ; z̄ ei Bθ; *add.* in rethi Wι; *add.* in zodiaco Qβ; *add.* Capitulum Qλ
- 2 Cumque] Cum *some* Bα Bγ Bη Cε Cη Dη Mθ Mv Oκ Pτ Pφ Qα Vβ Vv Wβ; *add.* a' [autem?] Vv Cumque diviserimus] Postquam diviseris Cδ signorum] *add. interlin.* [*illeg.*] signa et gradus Oα certissime] *om.* Mδ Qδ Rβ; *add. interlin.* secundum priorem capitulum Eδ oportet] o Sκ nos] *om.* Cδ Sλ; *add.* certissime Rβ nos ... describere] *om.* Bα postea] *om.* Ev Ev Pq; certissime Qδ
- 3 describere] scribere Fβ Vv; ^{de}scribere Cβ fixas] *om.* Bα in circulo] *marg.* Mκ cuius] *om.* Ev; cuiuscumque Nα rei] *add.* figura Xα; *add.* signorum Eδ est] *om.* Bη Cη Wβ Xα ponamus] ponam Fβ; ponas Cδ; *add.* quamlibet Bα; *add.* unamquamque Bζ Pτ Pφ Vv; *add.* nec unamquamue Sθ stellam] *marg.* Oσ Sλ; *interlin.* Cθ Oα; *om.* Mv Pψ Vα Vυ; stellas vel stellam Fβ Pα; eam Qα
- 3-5 stellam ... sic] *om.* Nα

[CHAPTER 10.] ON INSCRIBING THE FIXED STARS¹

When we have divided the circle of signs with very great precision, we should next mark the fixed stars along the circle of signs. To illustrate this, let us suppose a star

¹ This is a fairly standard method for placing the stars in the rete. It is also found in the Maslama's extra chapter (Samsó, *On Both Sides*, p. 424).

- cum longitudine sua ab equinoctio diei cum gradu qui venit ad medium celi cum ea.
 5 Et hoc fit sic: Ponemus circulum equinoctii diei, scilicet circulum Arietis et Libre ABCD, et diametra abscondant se super E; et sint super circulum signorum AZCH. Et
- 4 cum₁] cumque Eζ; in Vψ longitudine] latitudine *late mss* Bε Eα Eβ Eμ Fα Fζ Lβ Lγ Lε Mδ Oζ Oξ Oτ Pλ Pμ Pν Pρ Qβ Qγ Qδ Rβ Sδ Tδ; longitudinem(*expunged*) vel(*expunged*) latitudinem Oυ; *add.* id est declinatione sua Eμ(*interlin.*) Mκ(*interlin.*); *add.* *interlin.* latitudine Qλ; *add.* *in marg.* quod sciemus ex tabula Eα; *add.* *interlin.* id est distantia Vβ sua] *om.* Bε Cζ Eβ Eη Fζ Lβ Lγ Lε Pα Oζ Oξ Oτ Pλ Pμ Pν Pρ Qλ Sδ Tδ Wα(*interlin.*) Xβ ab] *om.* Cζ; sub Mυ equinoctio] equinoctiali Bα Pφ; *add.* id est equinoctiali circulo Cζ Eμ(*interlin.*) Mκ(*interlin.*) equinoctio diei] equinoxiali circulo Oη diei] *om.* Si cum₂] *interlin.* Mκ; *om.* Vυ gradu] *add.* zodiaci Si qui] *add.* hinc in sequentibus in multis locis longitudo ponitur per latitudinem ut patet hic in isto xisicto(?) Similiter ponas et est ubi d[icitu]r(?) longitudo id est declinatio et Xβ celi] celum Ev Oπ Vχ celi] *add.* secundum Alfragani capitulorum 33 Si² ea] *add.* stella Bα Cι Eα Eβ Eη Fα Fζ Lβ Mδ Mη Mo Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pρ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Tδ Vψ Wα Xβ; est stella Pν; ipsa stella Cδ Sλ; stella Fβ; *add.* *interlin.* stella Oα
- 4-5 diei ... sic] et cum gradu cum quo fit in medium celi sic Bα
- 5 fit] facies Cδ Sλ; est Mυ; sit Pα Qγ Sδ Vσ Vυ sic] *om.* Xβ; secundum quod dicimus Bζ Cζ Eμ Ev Eo Mθ Mκ Mν Oα Oη(*secundum interlin.*) Oκ Oπ Oσ Pφ Pψ Qα Sθ Si Vα Vε Vν Vχ; secundum quod dictum est Cβ Cθ ponemus] pone Cδ Sλ; ponendum Xβ; *add.* eum Vυ; *add.* sic Lε Tδ equinoctii (*and elsewhere*)] equinoxii Oη diei] *om.* Bα Bε scilicet] *om.* Dη; id est Mυ; qui est Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mκ Mν Oα Oπ Oσ Pψ Qα Sθ Si Sλ Vε Vν Vπ Vσ Vυ Vχ circulum₂] *om.* Bα Vκ Libre] *add.* scilicet Bη Ev Oσ Pα Vα Vυ
- 6 abscondant] scindant Bα et₂] *ms* Oπ *ends* super₁] *add.* punctum Dη super E sint] *marg.* Mκ sint] *om.* Cζ Fβ Eμ Oη sint super] sicut sit Xα AZCH] AZ\$CH Bα; ZACH Bη Wβ et₃] *many om.*

² Aḥmad ibn Muḥammad ibn Kathīr al-Farghānī, ca. 820–after 861. The reference here is not easily traced. He wrote a 30-chapter summary of Ptolemaic astronomy (*Jawāmi‘ ʿilm al-nujūm wa-uṣmūl al-ḥarakāt al-samāwīya* / *Compendium of the science of the stars and the foundations of the celestial motions*) but this text is not likely to be referenced here. He also wrote a treatise on the astrolabe (*Kitāb fī ṣanʿa al-aṣṭurlāb* / *Treatise on the Construction of the Astrolabe*) which contains only seven chapters. The closest texts are either Chapter 3, section [4] or Chapter 6, section [1]. See al-Farghānī, *On the Astrolabe*, ed. Richard Lorch (Stuttgart: Franz Steiner Verlag, 2005), pp. 77 ff. and 345 ff. However, this text was never translated into Latin which makes this reference to it problematic.

with its distance³ from the celestial equator [and] with the degree which reaches the middle of the sky with it.⁴ And this is done as follows: We will place the circle of the celestial equator, that is, the circle of Aries and Libra, ABCD and its diameters should intersect at E; and let AZCH be on the circle of signs. And

³ I read *longitudo* as “distance”. Gunther (along with some of the medieval scribes, particularly later ones) attempted to co-ordinate the use of *longitudo* and *latitudo* (which Gunther sometimes substituted, one for the other, in both the Latin and the English without comment) with either right ascension and declination, or celestial/ecliptic longitude and latitude.

The text, however, actually uses a conflation of these two systems, that is, (modern) declination (from the equatorial circle) for the north/south position, while measuring the east/west position along the ecliptic. For the latter the text then uses the hour circle through the equatorial poles and through the given point along the ecliptic to position the star east/west. This is a “right ascension” positioning, but where the east/west degree given in the text will differ from the true right ascension figure (along the equatorial circle) as a result of the obliquity of the ecliptic. (In the Middle Ages, this measure was known as “mediation”.)

⁴ That is, with the point on the ecliptic (using the coordinate system of this text) which crosses the meridian at the same time as the star – mediation.

ponemus exemplum nostrum in una stella ex stellis quarum longitudo est ab equinoctio diei versus septentrionem sitque illa stella *Vultur volans*. Et abscindemus ex puncto D versus C quantum longitudo eius est ab equinoctio diei, et est 7 gradus et 25 minuta;

- 7 ponemus] ponamus Vχ nostrum in una] in Sλ; in una Aα Bθ Bι Bκ Cε Dγ Dη Eα Eδ Eζ Eτ Ev Lζ Mλ Mo Nα Pγ Pv Po Pτ Qδ Rα Rβ Sβ Si Sκ Vβ Vπ Wβ Wι Xα; ut una Bγ Bη Cη Pv Vκ Vχ; in Bα Cδ Vε; nostrum in Bζ Cβ Cθ Eμ Ev Eo Lβ Mv Oα Oσ Pψ Qα Sθ Vv Vv; nostrum Vα; unum in una Mv Mφ Wα in una *in marg.* Mκ stella] *om.* Nα Vβ(*add. interlin.* scilicet stella) ex stellis] *om.* Bα quarum] cuius Bα; quorum Mφ longitudo] *om.* Xα; latitudo *later mss* Bε Eα Eβ Eη Lβ Lε Lη Oζ Oξ Oτ Ov Pλ Pμ Pv Pρ Qβ Qγ Qδ Sδ Tδ
- 8 diei] *om.* Bα septentrionem] *add.* Non curetur de illa stella nec de gradibus eius quia hoc quod dicit gracia exempli est ut sciamus collocare stellas in rethi. Ponentur autem in suis gradibus per tabulam que in fine compositionis posita est. Cζ On illa] ipsa Ev; ista Nα stella] stella stella Vκ; *om.* Ok Pρ Vultur] extra Qβ volans] *marg.* Oξ; *add. in marg.* Non curetur de de(!) stella nec de gradu eius quia hoc quod dicit gracia exempli est ut sciamus collocare stellas in rethi. Ponentur autem in suis gradibus per tabulam que in fine compositionis posita est Eμ et] hoc Wβ abscindemus] abscindens Ok; abscindes Cδ; abscindet Cβ Cθ Mv Oα Oσ Pτ Pφ Qα Vα Vv; abscindit Pψ; scindemus Eζ ex] a C; ut Bα ex puncto] *om.* Qγ puncto] *add.* arcus Bε Eη D] *add. interlin.* scilicet [...?] circulo Arietis et Libre in primo gradu Captricorni Cβ
- 8-9 versus ... diei] *om.* Vι
- 9 C] D C Sι; T Dη; *add. interlin.* Id est usus circulus signorum cum circulo Arietis et Libre scilicet versus punctum gradum Arietis Cβ quantum] quanto Si; quem On longitudo] latitudo *later mss* Bε Eα Eβ Eη Fζ Lβ Lγ Lε Oζ Oξ Oτ Ov Pλ Pμ Pv Pρ Qβ Qγ Qδ Sδ Tδ; *corr. to* latitudo Pα; *add.* est ab equinoctio diei et longitudo Sβ; *add. interlin.* id est declinatio Eμ eius] cuius Mκ est₁] *om.* Bε Ev Oζ Rα diei] *om.* Bα Bε Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Oτ Ov Pα Pλ Pρ Qγ Qλ Xβ; stellam Oζ; *add.* versus septentrione Qα; *add. and canc.* versus meridiano sitque illa Cε et₁] *add.* longitudo eius(cuius Vε) ab equinoctio diei Aα Bθ(sed long~) Bκ Cβ Cθ Dγ Ev Lζ Mλ Rα Vε Vκ Vπ(sed long~) Vχ et est₂] *om.* Bζ Eζ Oζ Pλ Xα; est *corr. interlin.* to scilicet Qμ; hoc Ok; hec/hoc est Cδ Eμ Mκ Mv On Oσ Pφ Pψ Vα Vβ Vσ Vv Vv; id est Pρ; scilicet Bα Bε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lγ Lβ Lε Lη Mη Mv Mφ Oξ Oτ Ov Pα Pδ Pθ Pλ Pμ Pv Qβ Qγ Sδ Si Tδ Vι Vψ Wα Xβ est₂] *om.* Vε; *add. in marg.* ab Si 7] 7 *corr. to* 28 Bη; 4 Oα Oσ Qλ Vα Vv Wα; 8 Mθ Mv Pψ Qα Sθ Si Vσ; 10 Nα; 14 Vχ; 18 Bα Bκ Cβ Cθ Dγ Ev Lζ Mλ Pτ Pv Pφ Sβ Sλ Vβ Vε Vκ Vv; 18 *corr. to* 4 Cδ; 18 *corr. to* 4, *all canc. and add. in marg.* 7 Mκ; 28 Bζ Cζ Eμ On Ok; 28 *corr. to* 7 Eo(*marg.*) et 25 minuta] *om.* Cη; *add. in marg.* Bγ 25] *corr. from* 5 Lγ minuta] menses Bζ

for our example we will take one star from among the stars whose distance from the celestial equator is towards the north and let this star be *Vultur volans*.⁵ And from point D toward C we will cut off the degree to which its distance lies from the celestial equator, and it is $7^{\circ} 25'$;⁶

⁵ *Vultur volans* (also known as *Altair*) is α *Aql*. See Lists of Stars – Appendix I.

⁶ This measure, sometimes (especially in star tables) denoted as “latitude,” is actually equivalent to our declination. The modern (2000 CE) declination of α *Aquila* is $+08^{\circ} 52'$. Because of the precession of the equinoxes the declination of the star in the Middle Ages would be less than the modern figure. In Kunitzsch’s edition of medieval star tables, declinations of 6° (1 table), $6^{\circ}25'$ (2), $6^{\circ}30'$ (1), and 7° (4) and latitudes of $29^{\circ}4'$ (1), $29^{\circ}10'$ (7) and $29^{\circ}30'$ (1) are found; the difference arises because some of the “latitudes” are measured from the ecliptic (Paul Kunitzsch, *Typen von Sternverzeichnissen in astronomischen Handschriften des zehnten bis vierzehnten Jahrhunderts* [Wiesbaden: Otto Harrassowitz, 1966], *passim*).

In my Lists of Stars (below, Part III) Tables 1, 1A, and 3B give declinations of $7^{\circ} 0'$.

- 10 et est arcus DT. Iungemusque T cum A et abscindet diametrum super punctum K. Et ponemus punctum E cuspidem, et faciemus circulum secundum quantitatem longitudinis E ex K et est circulus KM, vaditque per stellam. Post hoc aspiciemus punctum qui cum ea est in medio celi ex circulo signorum; hoc est 16 gradus ex
- 10 arcus] circulus Nα et est arcums] *om.* Pτ DT] DC Aα Eζ Ev Pγ Po Pφ; DN Pq; DV Nα Iungemusque] Iungemus *some* Iungemusque ... A] *marg., corr. from* M N D E Z T cum A Bη; in .N.D.E.Z. T cum A Wβ T] C Pφ; D Vε; N Pq A] *om.* Eδ; *add. interlin.* que est in opposita sectioni scilicet in primo gradu Libre Cβ abscindet] abscindent Bθ Dγ Mo Pγ Sk Vβ Xα; abscindat Qα; abscindes Cζ; abscindimus Ou Vψ; abscindit Pφ; *add. interlin.* scilicet TA Vβ diametrum] *add.* DB Dη; diametra Pφ K] B Si; *add.* intra equinoctialem Bε Bη Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mo Mφ Oζ Oξ Oτ Ou Pα Pδ Pθ Pλ Pμ Pν Pq Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Vψ Wα Wβ Xβ; *add.* extra equinoctialem Cε
- 11 ponemus] pones Cδ Sλ punctum] *om.* Sι E] *om.* Cζ Cε; C Vε; S Nα; *add.* eiusdem Bγ Cη punctum] *interlin.* Oα; *om.* Cι faciemus] facies Cδ Fβ Sλ circulum] *om.* Cε secundum] *om.* Ev
- 11-12 Et₁ ... κ] *om.* Oη
- 12 longitudinis] latitudinis Bε Eα Eβ Eη Fζ Lβ Lγ Lε Lη Mδ Oζ Oξ Oτ Ou Pλ Pμ Pν Pq Qγ Qδ Rβ Sδ Tδ; *corr. to* latitudinis Pα; *add. interlin.* id est distancie Mκ E ex κ] *om.* Lβ; EK Bα Bε Fβ Pq Xβ κ ... circulus] *om.* Pθ est] *om.* Wβ; erit Xα KM] K Pq; KN Vε vaditque] invaditque Pq vaditque per stellam] et illum describitur *Vultur* Bα per] *om.* Bζ Xβ stellam] *add.* equidistantem equinoctiali Dη Eτ; *add.* illum Qδ Rβ post hoc] Post Oη; Postea Aα Bθ Ev Qβ Sδ Vα Vι Vπ aspiciemus] aspiciamus Cζ; aspice Pφ; aspice Bα Cδ Vν; aspicias Vε; accipe Bζ Si; accipiemus Ev Oξ Ou Pλ Pμ Pν Pq Qβ Qγ Tδ Vι Wα; *corr. from* accipiemus Mκ; excipiemus Mν; *add.* E Si
- 13 punctum] gradum Mν qui] quod Vψ qui ... est₁] cum quo sit Mθ cum] *om.* Bζ Xβ; *suprascr.* Mη ea] ea stella Bε Eα Eβ Eη Fα Fβ Lβ Lγ Lε Lη Mδ Mo Mφ Mν Oζ Oξ Oτ Ou Pλ Pμ Pν Pq Qβ Qδ Qλ Rβ Sδ Tδ Vι Wα Xβ; eo Aα Bγ Bζ Bη Bθ Bι Cε Cζ Cη Cι Dγ Eδ Eζ Ev Eτ Ev Lζ Mη Mλ Mν Nα Oα Oη Oσ Ok Pγ Pδ Pθ Po Pν Pφ Pψ Rα Sβ Vα Vβ Vε Vκ Vπ Vν Vχ Vψ Wβ Wι Xα; *add. interlin.* ea stella Eμ; *add. interlin.* id est stella Oα; *add in marg.* stella Pα; *Vulture* Bα ea est] eo gradu sunt Si est₁] *om.* Wι; sit Bα Cδ Cθ Eo Mκ Mν Oα Ok Oσ Sθ Sλ Pψ in] *om.* Mη ex] in Pφ ex circulo signorum] *om.* Vν hoc] *hec many* hoc/hec est] et est Bγ Cε Cη Dη Pα Pτ Wβ; hoc Mθ Ok; hoc est in Aα; id est Ev; scilicet Bα; *add.* in Ev; *illeg.* Eη 16] 13/13^{us} Aα Bα Bγ Bζ Bη Bι Bκ Cβ Cδ Cε Cζ Cθ Dγ Dη Eζ Eμ Ev Eo Eτ Ev Lβ Lζ Mη Mθ Mκ Mλ Mν Mo Nα Oα Oη Ok Oσ Pγ Pδ Po Pτ Pν Pφ Pψ Qα Qγ Qδ Sβ Sθ Si Sk Sλ Tδ Vα Vβ Vε Vκ Vν Vσ Vν Vχ Wι; 13 *corr. to* 33 Rα; 18 Mδ; 26 *corr. to* 13 Eδ; in 3 13 Bθ Vπ gradus] *add.* distancia Pα ex₂] *om.* Bα; a Xα
- 13-14 ex Capricorno] a linea(?) Cε; signi Capricorni Bκ
- 13-16 puctum ... quarum] *very faint* Lβ

and this is arc DT. And we will join T with A and cut the diameter [BD] at point K. And we will take point E as the centre, and we will construct a circle with radius EK, and this is circle KM, and it passes through the star. After this we will observe the point on the circle of signs which is in the middle of the sky with it [i.e., the star];⁷ this is 16 degrees

⁷ This is “mediatio coeli” or “mediation” which is neither right ascension nor longitude. Instead it is the position of the point on the ecliptic which passes the meridian at the same time as the observed star (in other words, it uses the same hour line as right ascension, but gives the position of that hour-line in reference to the ecliptic). It is often denoted in astrolabe star tables as “longitudo”.

- Capricorno, qui est punctus L. Deinde iungemus L cum E abscindetque linea LE
 15 circulum KM super M. Punctus ergo M est cuspis *Vulturis volantis*. Similiter pones
 universas stellas quarum longitudo est ab equinoctio diei ad septentrionem.
- 14 Deinde] Post hoc Bγ Bη Cη Pα Pτ; Post Bα Wβ qui] ubi Vε qui ... L₁] *om.* Cε
 L₁] *om.* Mλ; B Bζ; I Sκ; S Bε; V Eo iungemus] *marg.* Sβ; iunge Cδ Oη Vv; iungas
 Vε L₂] ut Cε; I Sκ; S Bε; V Eo E] DE *corr.* to E Eδ abscindetque] et absconde
 Ev; et abscindet Bα linea] *om.* Eo; repeated Oζ LE] ZE Bζ; SE Bε; LEZ Qδ; LD(?) Wt;
 LO Vε
- 15 circulum] *add. and canc.* circulum Cθ KM] LM Eδ super] *add.* punctum Bθ Ev
 Mδ Pτ Qβ Vβ(*interlin.*) Vv Vπ super M] *om.* Sθ M₁] O Cε Punctus] *om.* Bθ
 Ev Vπ Punctus ergo] cuspis vero Vv ergo] igitur *some* M₂] O Cε; *corr. in*
marg. from T Eδ; *corr. from* TH Pτ cuspis] cuspidem *and add. and canc.* L cum E Cη;
corr. from cuspidem Bζ; cuspidis Sκ; punctus Mδ; *corr. from* punctus Vχ; *add.* id est
 centrum Cζ; volantis] *interlin.* Vχ; *om.* Bα; *add.* qui vocatur Altair Cζ(Altayr)
 Eμ(*interlin.*) Mκ(*interlin.*); *add.* ut patet in figura Nα; *add.* ut hic in sequenti pagina Pv
 similiter] scilicet Vε pones] ponas Bα Eβ Eμ Fβ Lγ Lε Lη Mv Mv Mφ Nα Oζ
 Oη Oκ Oσ Oτ Pλ Pμ Qα Qβ Qγ Qλ Sδ Sι Vα Vε Vι Vσ Xβ; pone Bε
- 16 universas] alias Bα; omnes Cδ Sλ longitudo] latitudo *later mss* Bε Eα Eβ Eη Fζ Lβ
 Lγ Lε Mδ Oζ Oξ Oτ Oυ Pλ Pλ Pμ Qα Qδ Sδ Tδ; *corr.* to latitudo Pα; *add. interlin.* id est
 distancia Mκ; *add. in marg.* id est distancia Pα est] *om.* Bη equinoctio] initio
 Mv equinoctio diei] equinoctiali Bα; *add.* et declinatio Eα; *add.* id est declinatio *later*
mss Bε Cι Eβ Eη Fα Fβ Fζ Lγ Lβ Lε Lη Mδ Mη Mv Mφ Oζ Oξ Oτ Pδ Pθ Pv Pq Pλ Pμ Qβ
 Qγ Sδ Tδ Vι Vψ Wα Xβ ad] *om.* Eζ Eo Pα; versus Bα Bζ Cβ Cδ Cζ Cθ Dη Eμ Ev Mθ
 Mκ Mv Oα Oκ Oσ Pφ Qα Sι Sλ Vβ(*add. interlin.* al' ad) Vε Vv Vσ Vυ Vχ
 septentrionem] meridiem Cε Dη; *add.* Ita quod cadant omnes intra circulum ABCD
and in marg. Quamplura exempla non habent istam litteram "Ita quod cadant omnes intra
 circulum ABCD" sed caret Vβ; *add. in marg.* Ita quod cadant omnes intra circulum ABCD
 Vσ; *add.* Lζ 18 lines marked "va .. cat" Cum autem vis ponere aliqua stella in zodiaco
 secundum hanc doctrinam computabis in circulo Arietis et Libre diviso tot gradus quanta
 est eius longitudo a puncto D versus C si stella illa fuerit septentrionalis; et si fuerit
 meridialis computabis a puncto D versus A et fac notam in dyametro HB ubi dyameter a
 regula tangitur. Deinde pones unum pedem sexte [= circini?] super E et alium super illa
 notam et fac circulum occultum et postea considera in quo signo sit ista stella et pone
 regulam super tot gradum illius signi in zodiaco quanta est est(!) eius latitudo et super E et
 fac lineam occultam ab illo gradu usque in E et ubi illa linea secat illum circulum ibi
 debet esse punctus seu summitas illius stelle.

of Capricorn,⁸ which is point L. Then we will join L with E,⁹ and line LE will intersect circle KM at M. Thus point M is the position of *Vultur volans*. Similarly you will place all stars whose distance is to the north of the celestial equator.

⁸ The right ascension of α *Aquila* (2000 CE) is 19^h 51^m or 27° 45' along the celestial equator from D. This figure would have to be modified to allow for the precession of the equinoxes from the thirteenth century (about 10° less) as well as being translated to the ecliptic (i.e., converted to “mediation”). In Kunitzsch’s edition of medieval star tables, mediations/longitudes/right ascensions of 10° (1 table), 10°28' (1), 14° (1), 14°26' (1), 16° (2), 16°30' (1), 17° (2), 17°15' (1), 17°48' (2), 18°30' (1), 20°30' (1), 21° (1), 21°59' (1), and 22°49' (1) are found (Kunitzsch, *Typen von Sternverzeichnissen*, passim).

In my Lists of Stars (below, Part III) Tables 1 and 1A give mediations of 16° 0' and Tables 3A and 3B give mediations of 14°.

⁹ In stereographic projection this is equivalent to drawing a great circle through the equatorial poles, that is, drawing an equal-hour line.

Postea ponemus aliud exemplum in stella cuius longitudo ab equinoctio sit versus septentrionem, et sit ipsa stella *Cor Tauri*. Abscindemusque ex puncto D versus C longitudinem eius ab equinoctio diei, quia longitudo eius versus septentrionem est

- 17 Postea] Post hoc *many* Postea ponemus] Item Bα Bζ Cδ Eο Pφ Sι Sλ Vv
ponemus] *om.* Cδ Vψ; pones Eα aliud] *om.* Eη Oζ Pλ Pρ Qβ Xβ; alium Oη; ad
Fζ Lβ Pθ Pμ Qβ Qλ Sδ Vψ; aliquid Nα; illud Bζ aliud exemplum] *om.* Bε
exemplum] *add.* est Cδ in] *add.* alia Bα Bε Bζ Cδ Eβ Eο Fβ Lε Pδ Pτ Pφ Sδ Sι
Sλ; *add.* altera Vv in stella] *om.* Bη Wι stella] *add.* alia Cι Eα Eη Fζ Lβ Lγ Mδ
Mκ Mv Mφ Oζ Oξ Oτ Oυ Pα(*interlin.*) Pθ Pλ Pμ Pρ Qβ Qγ Qδ Qλ Qμ Rβ Sδ Wα Xβ
cuius] alicuius(?) Pv longitudo] latitudo Eα; *add.* *interlin.* id est declinatio Mκ
ab] *add.* ipso Sι Vv equinoctio] equinoctiale Bα; *corr.* ex equinoctiale Pθ; *add.*
diei Eν Eο Qα Pφ Sι Vv Vv; *add.* *interlin.* sit etiam Pα sit] *om.* Rβ Sι; est Bα Bγ Bζ Bη
Cδ Cη Dη Eν Eο Nα Pτ Pφ Sλ Vv Wβ; fit Mθ Oκ; *add.* etiam Eβ Eη Fα Fβ Lβ Lγ Lη Mφ
Oζ Oυ Pα(*interlin.*) Pδ Pλ Pν Pρ Sδ
- 17-18 Postea ... septentrionem] *om.* Mv
- 18 septentrionem] *add.* meridiem Qδ et sit ipsa stella] et si sic ipsa stella Eν; et sit etiam
stella ipsa Xβ; et sit illa stella Dη Mv Pλ Pρ Sβ; et sit ipsa Qα; et sit ista stella Eα; etiam et
sit ipsa stella Cθ; sitque illa Bα; sitque illa stella Pφ Vv; sitque ipsa stella Cδ Sλ Cor
Tauri] *add.* *interlin.* sive oculus Cβ Cδ Sλ; *add.* id est Aldebaran Cζ Eμ Mκ(*margin.*)
Oη(Aldeboran); *add.* Tunc Bα Tauri] Thauri Mo Mv Mφ Vι Abscindemusque]
Et absconde Sλ D] A Cζ
- 18-19 Cor ... diei] ab equinoctio diei que est in puncto D longitudinem eius ab equinoctio diei
versus septentrionem. Sitque T Pφ versus C] *in marg.* Pα; versus septentrionem
scilicet C Vv
- 19 C] *om.* Pρ; CT Eδ Pο; E(*corr.* to C) Pα longitudem] latitudinem *later mss* Bα Bε Eα Eη
Fα Fζ Lε Oζ Oη Oξ Oτ Oυ Pλ Pμ Pν Pρ Qβ Qγ Qδ Sδ Tδ; *add.* *interlin.* latitudinem Rβ
eius] cuius Pο; *add.* quia Bζ equinoctio] equinoctiali Bα diei] *om.* Bα;
versus septentrionem Bζ Wα; *add.* versus septentrionem Fβ Mv Mφ Qλ Vι; *add.* (*i.e.*
repeated) versus C Bε Fζ Mδ Oζ Oξ Oτ Oυ Pλ Pμ Pν Pρ Qβ Qγ Sδ Tδ quia] et Bζ Cε
Dη Mo Vχ; et quia *many*; sitque T quia Pφ quia ... septentrionem] que latitudo Bα
longitudo] latitudo Oζ; *add.* *interlin.* latitudo Rβ diei] *add.* (*i.e. repeated*) versus
C Lβ eius] *om.* Sκ; est Mκ est] *om.* Xα
- 19-20 et 14 gradus] *margin.* Oτ

After this we will take another example of a star whose distance from the [celestial] equator is toward the north, and let it be the star *Cor Tauri*¹⁰ itself. And we will cut off from point D towards C its distance from the celestial equator, since its distance towards the north is

¹⁰ *Cor Tauri* (also known as *Aldebaran*) is α *Tau*. It is more properly known in Latin as *Oculus Tauri*, because this star actually is the eye and not the heart. See Lists of Stars – Appendix I.

- 20 14 gradus, et est arcus DN. Iungemusque A cum N et extrahemus eum donec abscindat HB super s. Deinde ponemus punctum E cuspidem, et faciemus circulum secundum quantitatem longitudinis ES, et est circulus SF. Deinde aspiciemus punctum cum quo est
- 19-20 est ... est] *marg.* Lε
- 20 14] 7 Aα Bθ Bκ Eζ Eτ Ev Lζ Mo Nα Pγ Po Pτ Pv Rα Sβ Vβ Vε Vκ Vπ Vχ Wι; 8 Qα; 18 Pφ; 24 Bη Wβ; *add. in marg.* aliter 7 Mθ gradus] *om.* Mη; graduum Aα Bθ Pα; *add.* et 30 minuta Bγ Bη Cε Cη Dη(minutorum) Pα(minutarum) Wβ; *add.* scilicet Ev; *add.* et 40 minuta Oη; *add. interlin.* al' graduum Vβ et₁] *add. interlin. [illeg.]* Cβ arcis] gradus Nα DN] BN Qα; DAN Pφ; DV Wι; N Lβ; diei *corr. in marg.* to DN Pμ iungemusque] et iungemus Bα; iungemus Bκ Cβ Cι Eβ Ev Fβ Ov Pμ Pq Qδ Qλ Sδ Tδ Vα; iunge ergo Cδ Sλ; iungemus ergo Dη; iungendusque Pφ; *corr. from* igitur similis Eδ; *add.* igitur Vσ; *add. in marg.* igitur Mκ A cum N] dcn Vε N] DN Mv; *add.* per lineam Cδ Sλ Vσ et extrahemus eum] et abstrahemus Eα Pφ; et extrahe eam Sλ; producendo Bα extrahemus eum donec] *om.* Vχ eum] *interlin.* Pα; *om.* Aα Oξ Vε; cum Qα; eam Mκ abscindat] abscindet Cβ Cζ Cη Cθ Dγ Eδ Lβ Lζ Mλ Mo Oζ Pγ Pμ Pq Pτ Pv Qγ Vα VβvVχ; abscindant Eβ; abscindent Mv Mφ Oξ Ov Pv Qβ Qλ Sδ Xβ; *add.* diametrum Sβ Vσ; *add. interlin.* diametrum sive lineam Sλ; *add.* lineam Bγ Cη Eτ Pτ Sκ Vβ(*interlin.*) Wβ; *add. and canc.* lineam Pα; *add.* et extrahent Mη
- 20-21 extrahemus ... lineam] abscindet diametrum Cδ
- 21 HB] DB Cδ Eo; HDB Cβ; QB Wβ; THB Vπ; *add.* dyametrum Qδ Rβ; *add.* diametrum sive lineam Bε Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mv Mφ Oζ Oξ Ot Ou(*partly in marg.*) Pδ Pθ Pλ Pμ Pv Pq Pv Qβ Qγ Qλ Qμ Sδ Tδ Vι Vψ Wα Xβ; *add. interlin.* scilicet diametrum Cβ; *corr. in marg.* to dyametrum DB Mκ HB ... S] *corr. from* lineam HB super punctum G to HB dyametrum sive lineam super s Pα super] *add.* punctum₁ Bγ Bη Cη Pτ Wβ super s] *om.* Xα s] C Mv Mφ Vι; G Pγ Vσ Deinde] Et Vχ ponemus] pone Sλ punctum] *om.* Bα Rβ Vχ E] BE Bζ faciemus] facies Cδ
- 22 longitudinis] latitudinis *later mss* Bε Eβ Fα Fζ Lβ Lγ Lε Lη Oζ Ot Ou Pλ Pμ Pv Qβ Qγ Rβ Sδ; s [= scilicet] Sι; *corr. to* latitudinis Pα; *illeg.* Eη ES] *om.* Lβ; EC Nα; EF Mv Mφ Pφ Vι; EG Oκ Pγ; ESB Bζ; EG Mθ *and add. suprascr.* aliter s ES ... SF] eius in circulo Vε circulus] *add.* scilicet Wβ SF] *marg.* Pτ; CF Mv Mφ Nα; EP Bζ Pψ; EF Sθ; GF Oη; SC Sκ; SFS Bη Deinde] Post Bα aspiciemus] aspicie Cδ; accipiemus Bη Bθ Pλ Pq Vπ Vσ Xβ; *corr. from* accipiemus Eμ punctum] *om.* Mθ Oκ cum] *suprascr.* Bε; *om.* Eη cum ... est₂] qui cum eo sit Sι quo] *om.* Aα est₂] *om.* Sκ; fit Oκ; sit Bζ Cδ Cζ Cθ Eμ Ev Eo Mθ Mv Oα OηOσ Pψ Sθ Sλ Vα Vε Vv Vχ; sit *corr. to* est Mκ

14° ,¹¹ and it is arc DN. And we will join A to N and extend it until it divides [line] HB at point S. Then we will take point E as centre and make a circle with the quantity of the length [i.e., radius] ES, and this is circle SF. Then we will consider the point

¹¹ The present declination of α *Tauris* (2000 CE) is $+16^\circ 30'$. Because of the precession of the equinoxes the declination of the star in the Middle Ages would be less than the modern figure. In Kunitzsch's edition of medieval star tables, declinations of $14^\circ 12'$ (1 table), $14^\circ 20'$ (2), $14^\circ 30'$ (3), and 15° (2) and latitudes of -5° (1), $-5^\circ 10'$ (8) and $-5^\circ 12'$ (1) are found; the difference arises because some of the latter are measured from the ecliptic (Kunitzsch, *Typen von Sternverzeichnissen*, passim).

In my Lists of Stars (below, Part III) Tables 1, 1A, and 3B give declinations of $14^\circ 30'$.

- in medio celi ex circulo signorum, hoc est 26 gradus ex Tauro, qui est punctus G,
et iungemus E cum G, et extrahes eum donec abscindat circulum FS super punctum F.
25 Punctus ergo F est punctus *Cordis Tauri*. Et similiter pones omnes stellas quarum
- 23 ex₁] *om.* Wα hoc est] scilicet Bα; hoc Eν Mθ; ipse est Vι 26] *illeg.* Qλ; 2 Mν Mφ Vι; 18 Cη; 20 Bζ Lβ Pρ Vε; xx6 Mκ Pψ; xx6 *corr.* to 26 Vσ; 28 Cε Pτ; 29 (*later mss*) Bε Bη Cι Dη Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mδ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Qβ Qγ Qδ Rβ Sδ Tδ Wα Wβ Xα Xβ; 426 Sθ gradus] graduum Wι; *add.* tempore compositionis huius tractatus 28 Aα Bθ Eν Vπ; *add. in marg.* 26 gradus ex Tauro tempore compositionis huius tractatus Vσ; *add. in marg. (later hand)* 26 tempore compositionis tractatus Bι ex₂] cum Vν Tauro] Tauri Bα; Thaurο Mο Mν Mφ Vι; Cancro Pο; tanto Wι; *corr. from* Cancro Eδ; *add. interlin.* aliter Cancro Mθ est₂] *om.* Bα G] S Bη; *corr. interlin.* to F Qμ
- 23-24 G ... eum] *om.* Sκ
- 24 iungemus] iunge Cδ Sλ; *add.* -que Cζ Eμ Vσ iungemus ... extrahes] extrahemus Oη E cum G] EG Mκ; cum G Mν; C cum G Vε G] *corr.* to F Qμ; F Mη; H Fα; S Bη; *add.* per lineam Mκ(*marg.*) Vσ; *add.* ut prior Bζ Pρ Vβ(*interlin.*) Vν et₂ ... eum] ut prui(?) precedendo Bα et₂ ... donec] *om.* Cδ extrahes] extrahemus Bε Mφ Cβ Cε Cι Dη Eβ Eδ Eν Eυ Fα Fβ Fζ Lβ Eμ Lε Lζ Lη Mδ Mθ Mο Oζ Oξ Oτ Oυ Pγ Pδ Pο Pρ Pφ Pψ Rβ Qα Qδ Sι Vβ Vε Vν Vπ Xα Xβ; abstrahemus Bζ; abscindemus Nα extrahas eum donec] *om.* Vχ eum] *om.* Bζ; *add. suprasci.* lineam Mθ donec] *om.* Pδ Vψ; *add. (i.e. rep.)* iungemus ... donec Bη Wβ abscindat] abscindet Cδ Eζ Pο; *corr.* to abscindet Vκ; *add.* cum Nα circulum] *om.* Oκ FS] *om.* Eε; CF Mν Mφ Nα Vι Wβ; FG Mθ Oκ Mν Sι Vσ; S Eζ; SC Sκ; SF *many*; ST Pρ; sunt Dγ Eο; secundum Pλ punctum] *om.* Dη F] *om.* Bη; *add. et canc.* punctus Cθ
- 25 punctus₁] *marg.* Pα punctus ergo F] *om.* Pφ ergo] igitur some F] *om.* Eη Tauri] *om.* Bα Eτ; Thauri Mο Mν Mφ Vι Vπ; *add. interlin.* sui oculi Cδ; *add.* et c[etera?] Bα; *add. in marg.* Eμ(*end of l.* 26) Mκ Oη; Hoc leviter facies si memoriter retinueris que dicta sunt in(*om.* Mκ) fine illius capituli(*om.* Oη) cuius titulus(circulus Oη) est in inicium operis tabularum. Ibi enim docetur qualiter ex circulo Arietis fiat(*om.* Oη) circulus Capricorni sicut(cadet Mκ; dadem Eμ) igitur arte constitues circulum declinationis stelle ab equinoxiali circulo versus meridiem. Ista autem falso et nulla arte(*om.* Oη) hec inanis(*reading* Eμ Mκ) docet (*add.* et nulla arte Oη) et propter hoc diligentius notentur que hic dicta sunt. similiter] super Lβ Vψ similiter pones] supponemus Pν pones] ponemus Aα Bθ Bι Cβ Cζ Cθ Eδ Eζ Eμ Eν Eυ Mδ Mη Mθ Mκ Mλ Mν Nα Oα Oη Oσ Pγ Pδ Pθ Pο Pφ Qα Qδ Qμ Rβ Sβ Sκ Vα Vκ Vν Vσ Vυ Vψ Wι Xβ quarum] quas Bθ
- 25-26 Et ... septentrionem] *om.* Bα Cδ; Sic et de aliis stellis septentrionalibus Sλ

on the circle of signs with which it is in mid-sky, and this is $26^{\circ 12}$ of Taurus,¹³ which is point G, and we will join E with G and you will extend it until it cuts circle FS at point F. Therefore point F is the position of *Cor Tauri*. And similarly you will place all the stars whose

¹² Probably all the texts originally had 26° , with the 6 morphing into 0 (20), 8 (28), or 9 (29). Gunther's 18 (Cη) seems unique. In general, early manuscripts tend to have 26° , and later ones 29° .

¹³ The right ascension of α *Tauri* (2000 CE) is $04^{\text{h}} 36^{\text{m}}$ or 9° of Taurus along the celestial equator. This figure would have to be modified to allow for the precession of the equinoxes from the thirteenth century (about 10° less) as well as being translated to the ecliptic (i.e., converted to "mediation"). In Kunitzsch's edition of medieval star tables, mediations/longitudes/right ascensions of Taurus $19^{\circ}18'$ (1 table), $25^{\circ}20'$ (1), $26^{\circ}47'$ (1), $27^{\circ}35'$ (1), $27^{\circ}39'$ (1), $28^{\circ}47'$ (1), 28° (3), $28^{\circ}2'$ (1), 29° (2), $29^{\circ}30'$ (1), 30° (1), and Gemini $1^{\circ}26'$ (1), $1^{\circ}29'$ (1), and 2° (1) are found (Kunitzsch, *Typen von Sternverzeichnissen*, passim).

In my Lists of Stars (below, Part III) Tables 1 and 1A give mediations of $29^{\circ} 0'$ and Tables 3A and 3B give mediations of 28° .

longitudo est ab equinoctio versus septentrionem.

Si vero fuerit longitudo earum ab equinoctio diei versus meridiem, accipies longitudinem earum ex D versus A, et iunges A cum illa longitudine accepta, et extrahes lineam donec abscindat lineam BH, cadetque extra circulum equinoctii versus meridiem

- 26 longitudo] latitudo Bε Eα Eη Fζ Oη ab] *om.* Eυ equinoctio] *add.* diei Bζ Cβ Cθ
Eο Mκ Mν Oα Oη Oκ Oσ Qα Sθ Si Vα Vε Vσ Vυ septentrionem] *add.* 7-line gloss Cζ;
add. marg. note – l. 25 Eμ
- 26-27 est ... longitudo] *marg.* Bη septentrionem ... versus] *om.* Cε Wβ Xα
- 26-30 septentrionem ... versus] *om.* Bζ
- 27 Si] *add. in marg. (later hand)* De situatione stellarum meridialium Bι fuerit] *interlin.*
Bγ; *marg.* Wα; *om.* Cη Lγ Mυ Pα Qλ; fuerint *corr. to* fuerit Mκ; *add.* erit Cζ; *add.* stelle Cδ
longitudo] latitudo (*later mss*) Bε Eα Eβ Eη Fα Fζ Lβ Lε Lη Oζ Oξ Oτ Oυ Pλ Pμ Pν
Pρ Qγ Qδ Rβ Sδ Tδ; *corr. to* latitudo Pα; *add.* vel latitudo Xβ earum] *om.* Bη Cδ Sλ;
stellarum Bα ab] *om.* Sθ; ex Mυ Mφ equinoctio] equinoctiali Lε Lη Oζ
diei] *interlin.* Vβ; *om.* Bα Bη Bθ Bκ Cι Dγ Eα Eτ Eυ Fα Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mο
Mφ Oζ Oξ Oτ Oυ Pγ Pθ Pμ Pν Pο Pτ Pυ Qα Qδ Qμ Rα Rβ Sβ Sδ Vι Vκ Vν Vψ Wι Xβ
accipies] accipie Cβ; accipiemus Aα Xβ; accipiet Eυ
- 28 longitudinem] latitudinem Eα earum] eius Bγ Bη Cδ Cε Cη Dη Pα Qδ; *add.* ab
equinoctio Bγ Cε Cη Pα Pρ ex D] *om.* Vε ex D versus A] *corr. in marg. from*
versus ex D Eδ ex D ... iunges] *om.* Pγ et iunges A] *om.* Eδ Eζ Eτ Mο Pο Qδ Sκ
Vβ Vσ Wι iunges] iunge Bε Cι; iungemus Bγ Cε Cη Pα Xβ A₂] *interlin.* Cδ; *om.*
Eυ Vψ A cum illa] a Mν; A cum r(!) ille Bε illa] *om.* Bα Bη Cβ Cζ Eδ Eμ Eν Mθ
Oη Oσ Pφ Pψ Qα Sθ Si Sλ Vκ Vε Vι Vν Vυ; *in marg.* Mκ; *interlin.* Eα; ista Nα
longitudine] latitudine Eα accepta] *om.* Bα Bη Cβ Cδ Cζ Cθ Eν Mθ Mν Oα Oη
Oκ Oσ Pφ Pψ Sθ Si Sλ Vα Vε Vι Vυ Vχ; *in marg.* Mκ; *excepta* Rβ; *add. in marg.* sicut fecisti
in alia parte Cδ extrahes] extrahas Oυ; protrahas Bα
- 29 donec] *interlin.* Cβ donec ... lineam] *om.* Rα Wα Xα abscindat] abscindet Dγ
Fα Mν Mυ Oκ Si Vα; scindat Bα lineam₂] *om.* Bα Fζ Pν BH] *illeg.* Bη; AB Eζ; BD
Eδ; DH Bγ Cε Cη Cι Dη Eτ Mη Mο Nα Pγ Pο Pυ Qμ Sκ Vκ Wι; *add. interlin.* scilicet
diametrum Cβ cadetque] cadet Cβ Sθ Mη; *add.* illa sectio Bε Cθ Cι Eα Eβ Eη Fα Fβ
Fζ Lβ Lγ Lε Lη Mδ Mη Mυ Mφ Oζ Oξ Oτ Oυ Pδ Pθ Pλ Pμ Pν Pρ Qβ Qδ Qλ Qμ Rβ Sδ Vι
Vψ Wα Xβ; *add. interlin.* illa [*illeg.* = sectio?] Oα circulum equinoctii] equinoctialem
Bα equinoctii] *add.* diei Bι Bκ Cβ Cζ Dγ Eμ Eν Eο Lζ Mθ Mκ Mλ Mν Oα Oη Oκ Oσ
Pψ Pφ Sθ Si Vα Vε Vι Vκ Vν Vυ Vχ

distance from the celestial equator is towards the south.

If, however, their distance [i.e., of the stars] were to the south of the celestial equator you will take their distance from D towards A, and you will join A with this given distance, and extend the line until it divides line BH, and it will fall outside the circle of the [celestial] equator towards the south,

30 et erit longitudo eius meridiana. Mensurabisque longitudinem et facies circulum qui erit super ipsam longitudinem, sicut fecisti in stellis septentrionibus, si deus voluerit.

30 erit] *om.* Mv Mφ Vv; erunt Bθ; est Bα Bζ Cδ Sι longitudo] latitudo Ea eius] eius eius Pv; *add.* circa Pq meridiana] *add.* id est declinationem Oη; *add.* circulus Q P Bε Eη(*interlin.*) Mensurabisque] mensurabilem seu mensurabisque Xα; mensuraquebis *corr.* to mensura^{bis} que Pα; *corr.* from mensurabilisque Po; *add.* (*i.e.*, repeats) ll. 28 (longitudinem) – 30 (mensurabisque) Bε Eη longitudinem] *add.* eius Eμ Oη; *add.* id est declinationem Cζ Eμ(*interlin.*) facies] *add.* in marg. Ego Iohannes de Calomonte:¹⁴ Communiter in exemplaribus reperitur sic “Et facies circulum qui erit super ipsam longitudinem sicut fecisti in stellis septentrionibus, si deus voluerit.” Et tunc immediate sequitur hoc capitulum “Cum posueris stellas fixas” et c. Vβ circulum] *om.* Fβ

30-31 et₂ ... longitudinem] *marg.* Bε; *om.* Eη Mv Mφ Vt; in Eζ et₂ ... voluerit] *om.* Bα

31 erit] eat Oσ Pφ; erit *corr.* to eat Sλ super] supra Mθ Qα Sι; *add.* *interlin.* al' supra Vβ ipsam] *om.* Sκ longitudinem] *add.* postea aspice punctum cum quo mediat celum ex circulum signorum Dγ; *add.* Post hoc aspice (accipe Eo; accipies Sι; aspicias Cβ) punctum cum quo (qua Bζ Cβ Eo) sit in medio celi(*interlin* Pτ) (*add.* circuli Pφ) ex circulo signorum Bζ Cβ(*marg.*) Eo Pτ Pφ Sι Vβ Vv sicut] *om.* Xβ fecisti] *om.* Dη Xα in stellis] *om.* Vv in ... septentrionibus] *marg.* Cδ septentrionibus] *add.* a quo ad E (a DE Bζ; A ad E Eo; A DE Vβ) linea pertracta (contracta Eo; protracta Vβ) continuabitur cum circulo longitudinis ab equinoctio diei(*om.* Bζ) et punctus contactus (contractus Eo) est punctus stelle Bζ Eo Pτ Vv Vβ si deus voluerit] *om.* Bγ Bη Cε Cη Dη Pq Tδ Vε Vv Wβ; *illeg.* Bκ; *add.* sequitur figura Vκ; *add.* ut patet in presenti figura Sβ

¹⁴ See note to Cap. 7 line 9.

and it will be its southern distance.¹⁵ And you will measure out the distance and make a circle which will be through this distance, just as you did for northern stars (God willing).

¹⁵ The example in the diagram is sometimes labeled as *Alchimech*, i.e. *Azimech*, better known as *Spica*, i.e., α *Virginis*. See Lists of Stars – Appendix I.

[ADDENDUM 10]

Aα Bγ Bε Bη Bθ Cε Cη Cι Dη Eα Eβ Eδ(*very faint*) Eζ Eη Eτ Eυ Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη
 Mθ(*marg. later hand*) Mo Mv Mφ Oζ Oξ Oτ Ou Pα Pδ Pθ Pλ Pμ Pν Po Pρ Pτ Qβ Qγ Qδ Qλ Qμ Rβ
 Sδ Sκ Tδ Vβ Vι Vπ Vψ Wα Wβ Wι Xα Xβ

35 Possunt etiam aliter stelle fixe inscribi per secundam tabulam que verificata est
 ad Parisius per armillas continens stellas cum distancia earum ab orbe signorum,
 et cum longitudinibus earum secundum veritatem que habentur ex circulo magno eunte
 per polos zodiaci et per stellas ad eclipticam; cuius modus inscribendi habetur in
 quodam capitulo in fine compositionis apposito.

- 32 *before* Possunt] *add.* De eodem Eδ Possunt] Post Qμ etiam] autem Vβ(*add.*
interlin. al' etiam) aliter] *marg.* Wα; *om.* Bε Eβ Eη Fβ Lβ Lε Lη Oτ Ou Pλ Pρ Qβ Qγ
 Qλ Tδ Xβ fixe] *om.* Bε Eζ inscribi] *marg.* Wβ; scribi Bη Cε; inl'tipler Mv
 per] *om.* Wβ secundam] st/n Bη; *add.* scilicet Dη Pτ Vβ Wβ que
 verificata est] verificatam Bγ Bη Cε Cη Dη Pτ Vβ Wβ; *add.* ad situm Fβ
- 33 ad] *interlin.* Mη; *om.* Cε Dη Eα Eβ Eδ Eη Fα Fζ Lβ Lε Lγ Lη Mθ Oζ Oξ Oτ Ou Pλ Pμ Pν
 Pρ Pτ Qβ Qγ Qδ Rβ Sδ Tδ Xα ad Parisius] *om.* Bε continens]¹⁶ continentes
 {armillas} Bγ Bη Cε Cη Dη Eυ Pδ Pτ Sκ Vψ Wβ distancia] *add. and canc.* quod est
 ipse latitudo Pα earum] quarum Eζ ab] in Pτ orbe] *marg.* Oξ
 signorum] *marg.* Ou
- 33-34 stellas ... earum] *om.* Aα
- 34 cum] ad Eυ longitudinibus] longitudo] Cη earum] *om.* Qγ ex] in Sκ
 circulo] circl'.o. Pθ magno] *om.* Dη; *add. interlin. (later hand)* id est per
 circulum meridionale Eδ eunte] eunde Pμ; exeunte Qδ Rβ; existente Bθ Vπ
- 34-36 et ... apposito] *illeg.* Eη
- 35 ad] *om.* Eυ Lβ; et Bε Eα Eβ Fα Fβ Fζ Lγ Lε Lη Mδ Oζ Oξ Oτ Ou Pλ Pμ Pν Pρ Qβ Qγ Qλ
 Sδ Tδ Xβ; et *corr. to* ad Wα eclipticam] edipticam Bθ cuius modus] cuius modi
 Aα; qui modus Bγ Bη Cη Dη Pα Pτ Vβ Wβ inscribendi] describendi Bη; inscribendo
 Xβ; scribendi Aα habetur] *add.* sic Eδ in] per Dη
- 36 quodam] quo ca° Aα quodam ... apposito] capitulum immediate sequens Dη
 capitulo] tabulo Pλ in fine] *om.* Mv; *add.* sive Mo compositionis] compoti
 Cη apposito] *om.* Aα; apposita Eζ; composito Lη; opposito Eυ Pμ; posito Eα; *add.*
later hand Figura est ad iste signum^Δ Qμ(*links to fol. 153°*)

¹⁶ *Continens* would modify *tabulam que*; *continentes* would modify *armillas*.

[ADDENDUM 10]

The fixed stars can also be alternatively inscribed by the second table¹⁷ which has been proved near Paris by means of armillas [i.e., armillary spheres], [a table] containing the stars with their distances from the zodiac, and with their distances according to the truth which they have from the great circle running through the poles of the zodiac and through the stars to the ecliptic; this method of inscribing is contained in a certain chapter appended to the end of the composition.¹⁸

¹⁷ Samsó (*On Both Sides*, pp. 424-426) discusses the possibility of identifying the table mentioned here.

¹⁸ See Cap. 22.

[FIGURA 10]

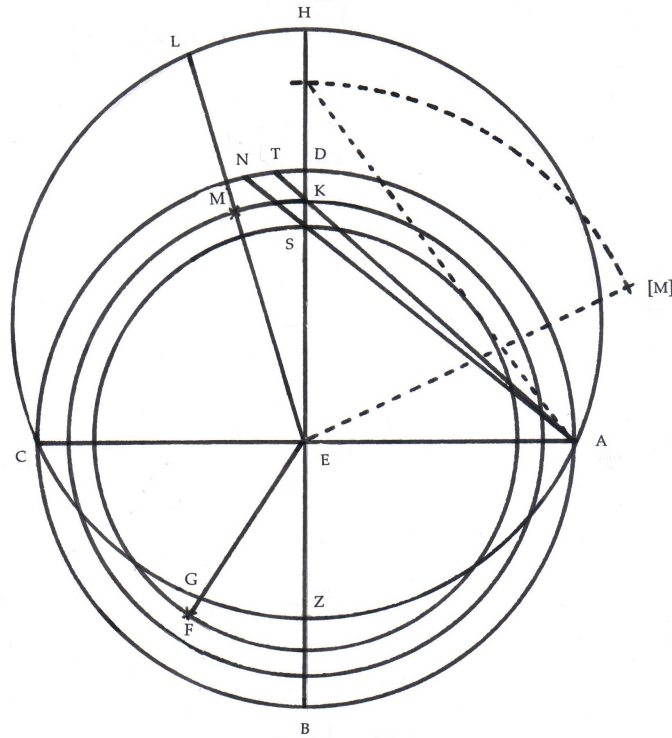


Figura inscriptionis stellarum fixarum secundum latitudines suas ab equinoctiali

[Complete diagram] B α B γ B ϵ B η B ι B κ ¹⁹ C β C δ C η C θ C ι E β (faint) E η E μ E ν ²⁰ E τ E υ F α F β
 F ζ L γ L ζ L η M η ²¹ M θ M λ M ν M \omicron O α O ζ O κ O ξ O π O σ O τ O υ P α P γ P δ P λ P μ P \omicron P ρ P τ P υ P ψ ²²
 Q β Q γ Q δ Q λ Q μ (fol. 153^v) R α S δ S θ V α V β V ϵ V ι (fol. 332^r) V κ X β
 [Partial diagram] B θ E α M κ M υ S β S κ ²³ T δ V σ V χ W β W ι

¹⁹ In ms B κ the diagram is rotated 90° clockwise.

²⁰ In ms E ν the diagram is rotated 90° counter-clockwise.

²¹ M η also contains (fol. 39^v) a second confused figure labelled “Figura inscriptionis stellarum fixarum secundum latitudinem earum ab orbe signorum” with “almuri | ostensor | calculator | divisor” and “wolvellum | rethe | aranea | alkanthabuth | valzagora” in the margin.

²² In ms P ψ the diagram is rotated 90° counter-clockwise.

²³ In ms S κ the diagram is very confused and without many of the letters. Perhaps this reflects the erroneous or missing letters in the text.

[*Outline or space only*] Αα Cε Dγ Dη Eδ²⁴ Eζ Eο Lβ Mφ Pν Pφ Qα Rβ Vν Vπ Vυ Vψ Wα
 [No space] Bζ Cζ Nα Oη St Sλ Xα
 Pθ “K”
 [Combined with Figure 9] Lε Mδ

[Caption]

Figura ... equinoctiali] Bε Eη Lε Mo Pτ Pυ Oζ Oτ Qβ Vκ; om. Bα Bι Bκ Cβ Cδ Cθ Eμ Eν Lζ Mθ Oα Oκ Oπ Oσ Pδ Pμ Pψ Qδ Rα Sθ Vα Vε De inscriptione stellarum fixarum Qμ Figura] om. Fα Pλ inscriptionis] impositionis Bη secundum] cum Bγ secundum ... equinoctiali] om. Bη Cη Eβ Eτ Eυ Mδ Mη Mλ Mν Vι Lη Pγ latitudines] longitudes Vβ suas] om. Bθ Pρ; earum Bγ equinoctiali] add. circulo Pο; add. et cum gradu medii celi Vβ; add. et gradibus quibus celum mediant Bγ; add. et longitudinem in ecliptica Pρ; add. et secundum(om. Qγ) longitudes earum Pλ Qγ Qλ Sδ; add. et secundum longitudes earum et(om. Cι) hoc est profunditates graduum earum(corr. from suas Cι) in signis in quibus sunt gradus illi Cι Lγ Pα Oξ(om. gradus illi) Oυ Xβ; add. et secundum longitudes earum id(hoc Fζ) est profunditates ipsarum(om. Fζ) in signis in quibus sunt gradus illi Fβ Fζ

[Lettering on the diagram]

A] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ B] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ C] Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; om. Bκ Mo D] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ E] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; om. Mν F] Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mo²⁵ Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vι Vκ Xβ; om. Eυ Mν Vε; G Bκ G] Bγ Bε Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pλ Pμ Po Pρ Pτ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι Xβ; om. Bα Bη Eν Eτ Eυ Mη Mθ Mλ Mν Mo Pγ Pδ Pυ Rα Vκ; F Bκ H] Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sθ Vα Vβ Vε Vι Vκ Xβ; om. Bκ Eβ Pα Sδ K] Bα Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; om. Bη Rα Pυ L] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ(faint) Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι

²⁴ In ms Eδ the diagrams found on these folios do not belong to this text.

²⁵ In ms Mo, F is in the middle of Gemini.

Vκ Xβ; *om.* Rα; *also* S Mη M] ²⁶ Bα Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι Vκ; *om.* Bη Eυ Rα Xβ; N Mo; O Qμ N] Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; T Bκ S] Bα Bγ Bε Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Vα Vβ Vε Vι Vκ Xβ; *om.* Bη Mη Sθ; G Rα; H Bκ T] ²⁷ Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mν Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; *om.* Rα; N Bκ Z] Bα Bγ Bε Bη Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eν Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mλ Mo Oα Oζ Oκ Oξ Oπ Oσ Oτ Oυ Pγ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Sδ Sθ Vα Vβ Vε Vι Vκ Xβ; *om.* Eτ Mν Pα Pδ Rα

[Signs of the zodiac]

add all signs (no degrees): Bη Cβ Cη Cι Eβ Eμ Eυ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Oζ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pρ Pτ Qβ Qλ Qγ Qμ Rα Sδ Vκ Xβ

add all signs plus degrees: 5 / 10 / 15 / 20 / 25 / 30 Bε

add all signs plus degrees: 5 / 15 / 25 Eη

add all signs plus degrees: 10 / 20 / 30 Bγ Eτ Mλ Mν Pο Pυ Vβ

add. Aries, Taurus Lζ

add. Aries, Taurus, Gemini, Cancer, Leo, Virgo, Libra, Aquarius, Pisces Cβ

add. Aries, Gemini, Cancer, Leo, Virgo, Libra, Sagittarius Mo

add. Aries, Cancer, Libra, Sagittarius, Capricornus Oσ

add. Sagittarius, Capricornus, Aquarius Oα

[Major variants]

T to the left of N, i.e., DT > DN; consequently S is above K and circle KM is inside circle SF: Cβ Eμ Eτ Lζ Mθ Oα Oκ Pγ Pο Vβ

an extra line drawn from A, passing to the right of D, intersecting with line DH (i.e., for a southern star position): Bα Bγ Bη Cη Fα Fβ Lγ Lη Oζ Oτ Oυ Pα Pγ Pτ Qβ Qγ Rα Sδ Vβ Xβ

an extra line, intersection with DH marked as K': Eτ Mη Mν Pο Pυ Rα Vκ

an extra line, intersection with DH marked as Q: Bε Eη

an extra circle (or part thereof) through this point of intersection on DH: Bα Bγ Bε Bη Cη Eη Eτ Fα Fβ Lγ Lη Mη Mν Mo Oζ Oτ Oυ Pα Pγ Pο Pτ Pυ Qβ Qγ Sδ Vβ Vκ Xβ

the extra line from A (to DH) intersects with arc DA at T': Mν Mo Pο Pυ Rα

the extra line from A (to DH) intersects with arc DA at R: Eη Eτ

an extra line drawn from E, through Libra, (intersecting with circle if there): Pμ

an extra line drawn from E through Libra and marked at the circle as M': Eτ Eυ Mη Mν Mo Pο Pυ Rα Vκ

²⁶ In mss Bι, Mλ, and Rα, point M is on a line from E through the middle of Libra, and is drawn as a southern star.

²⁷ In mss Bι, Mλ, and Rα, point T is in arc AD, which results in K being on line DH, and M being a southern star.

an extra line drawn from E through Libra and marked at the circle as O: Bγ Bη Cη Eβ Fα Fβ Fζ Lγ Lε Lη
Mδ Oζ Oτ Oυ Pα Pρ Pτ Qβ Qγ Qλ Sδ Xβ

[Minor variants]

line ASN is missing (F and M are on the same circle through K): Mη

D' added where the line from A to line DH intersects with the equatorial circle Qμ

G is placed somewhere in Scorpio which means that F is also in Scorpio: Cθ Ev(om. G) Oπ Vε(om. F)

G is properly placed but the line GE is extended so that it cuts circle SF at F in Scorpio: Oξ

an extra line from E through Gemini, intersecting with the circle through Q at point P, labelled
“meridianalis stella”: Bε Eη

[Other information]

add. meridies Mδ Pλ Pρ Qγ add. occidens Lη Mδ Pλ Pρ Qγ add. septentrio Mδ Pλ Pρ
Qγ add. oriens Lη Mδ Pλ Pρ Qγ

add. meridianus Pλ Qγ add. equator Pλ Qγ add. circulus Arietis et Libre Vβ add.
circulus Cancri Vβ add. [circulus] Capricornus Pρ add. zodiacus Oξ

F] add. Aldebaran Rα; add. Cor Tauri Bγ Eη Pγ; add. Cor Thauri Bε; add. cuspis Cordis Tauri Lζ;
add. cuspis Aldebaran in 29 Tauri Mλ; add. cuspis Aldabaran septentrionalis Eτ Mo; add. cuspis
Aldabaran sive Cordis Tauri Vβ(marg.); add. Punctus Cordis Tauri Vβ

M] add. Altayr Bγ; add. centrum Vulturis Volentis Vβ; add. cuspis Altair sive Vulturis Volentis
Vβ(marg.); add. cuspis Vulturis Volentis Lζ; add. cuspis Vulturis Volentis septentrionalis Eτ Mo;
add. Vultur Volens Bε Eη Pγ

add. M' Auamē Rα; add. M' cuspis Alchimech meridionalis Eτ Mo; add. M' cuspis Althimech in 9
Libre Mλ; add. O Alchimach Bγ

add. M' Alchimech / Libre 9 gradus factus / F Cor Tauri / Tauri factus est Bι(marg., later hand)

add. in marg., misplaced from Figure 11:

almuri | ostensor | calculator | divisor Po

volvellum | rethe | aranea | [illeg.] utal | [illeg.] Po

[CAPITULUM 11.]¹ APTATIO RETHIS SIVE TELE ARANEE

Cumque posueris stellas fixas et diviseris circulum signorum, oportet ut extrahas tabulam et abscindas eam et non dimittas nisi circulum signorum et signa

- 1 Aptatio ... aranee] *om.* Aα Bα Bζ Bι Bκ Cβ Cδ Cε Cθ Dγ Eα Eμ Ev Eo Lζ Mθ Mκ Mλ Mν Nα Oα Oη Ok Oσ Pα Pγ Pλ Pφ Pψ Qα Rα Sβ Sθ St Sl Tδ Vα Vε Vκ Vν Vv Vχ Wα Xα; Aptatio aranee Bγ Eζ Pδ Po Qμ Sκ Vψ; Aptatio arenee. Rubrica Ci Eδ; Aptatio aranee sive ethe Wι; Capitulum ii^m Bε(*marg.*); Compositio arenee Eτ; De aptatione atque explanatione rethis Wβ; De aptatione et aplanatione volveli² Vσ; De aptatione rethis Bη Bθ Dη Ev Mη Vβ Vπ; De inscriptione rethis Fβ; Docet perforare volvellum Cζ
- 1 rethis] retis Mδ sive ... aranee *om.* Pτ Pυ tele] thele Fζ Lβ Mφ Oτ Qλ Pμ aranee] *om.* Xβ; *add.* seu valzagore³. Rubrica Cη; *add.* seu waz Qλ; *add.* vel de divisione equinocialis circuli per [*illeg.*] describendis Mυ Vι
- 1-4 Aptatio ... lineabus] *very faint* Eδ
- 1-14 Aptatio ... patet] *illeg.* Eη
- 2 Cumque] Cum Qα Vψ Wι fixas] *om.* Bκ Eo; *marg.* Ok et] ad Pθ; *add.* de Aα oportet] *interlin.* Bε ut] *om.* Nα; licet Pγ; ut ut Pθ
- 2-3 oportet ... signorum] *om.* Vv
- 2-14 Cumque ... patet]⁴ Post vide punctum cum quo ab medio celi ex circulo signorum sicut prius post extrahas tabulam scindens eum nec dimittas nisi circulum signorum et stellarum et tabulam [*illeg.*] artam que transeat per capite Arietis et Libre et per axem que sit hinc inde abscisa linea tamen meridionali manende illesa et scribes quamlibet .lineam. stellam nomen suum et sit caput Capricorni almuri graduum vel muri id est ostensor graduum. Sitque axis huius tabule cuspis equinoctiali diei. Et hic regula dicitur alancabut id est aranea id est rete (*corr. from recte*). Bα
- 3 extrahas] *corr. from* extrahemus Xα; abstrahas Bζ et₁] ut Mη abscindas] abscindat Dγ; abscindes Oη Vκ non] nec Mν dimittas] divides eam Vκ nisi] *om.* Qμ Wι; *interlin.* Cδ; ut Pν signa] *om.* Aα Bζ Bθ Bι Bκ Cβ Cδ Cζ Cθ Dγ Eδ Eζ Eμ Ev Eo Eτ Ev Lζ Mη Mθ Mκ Mλ Mν Nα Oα Oη Ok Oσ Pγ Po Pυ Pφ Pψ Qα Qμ Rα Sβ Sθ St Sl Vα Vβ Vε Vκ Vν Vπ Vσ Vυ Vχ Wι Xα

¹ In a number of manuscripts, this capitulum continues on from the previous one without a break.

² *Volvellum*: another name for the rete. See Kunitzsch, *Glossar*, pp. 515-517.

³ *Walzgora / valzagora*: the surface of a sphere. Here, presumably, the sphere of the stars as projected onto the rete. See Kunitzsch, *Glossar*, pp. 517-518.

⁴ Ms Bα (an early ms) replaces the entire capitulum with these few lines.

[CHAPTER 11.] THE FITTING OF THE RETE OR SPIDER WEB

And when you have positioned the fixed stars and divided the circle of signs, you should you take the plate and cut away [its central area] and do not stop except for the circle of signs and the indicators⁵

⁵ While many mss omit “signa/indicators” – perhaps confusing it with a “sign [of the zodiac]” – it is necessary to include “signa” in order to make sense of the genitive plural “stellarum fixarum.” A few mss try to rectify the omission by adding “loca” after “fixarum” (l. 4).

- 5 stellarum fixarum. Postquam iunxeris eas circulo signorum, postea lineabis eam et planabis eam optime donec sit planatio eius, et distinctio eius cum circulo ita ut non augeat nec minuat. Similiter facies cum stellis fixis et planabis eam optime. Et scribes
- 4 stellarum fixarum] stellas fixas Si fixarum] *add.* loca Bζ Eo Pτ Vβ Vv
 Postquam ... signorum] *om.* Mv iunxeris] *om.* Mv; iunxis Lβ; *add.* *interlin.*
 stellam Oα eas] *om.* Pλ; *corr.* in *marg.* from eam Mκ; ea Sδ; eam Bζ Bθ Bι Cβ Cζ Cθ
 Dγ Eδ Eζ Eμ Ev Eτ Ev Lζ Mη Mθ Mλ(*twice*) Mv Mo Na Oα Oη Ok Pγ Po Pτ Pv Pφ Pψ
 Qα Qδ Qμ Rα Sβ Si Sk Sl Va Vκ Vπ Vχ Wι Xα; eam cum Aα Eo; eas in Ea; eam in Vβ
 Vv; omnia Vε; *add.* *interlin.* stellam Eμ; *add.* *interlin.* scilicet tabulam Vβ circulo]
 circulum Oη signorum] *add.* et(per Dγ) regulam aliquamtulum(*sic all*) artam(artem
 Pφ) que transeat per capud Arietis et Libre(umbra Dγ) et(*om.* Vβ) per axem que(et Dγ) sit
 hinc(hic Vβ) inde(in Vβ) abscisa(excisa Bζ; excisa Eo) linea(hu° Dγ) cum(tamen Pφ Si;
 tum Vv) meridionali(media Dγ) manende(manente Pφ Si; permanente Bζ Eo; in Ariete
 Vβ) illesa Bζ Dγ Eo Pφ Si Vβ Vv postea] Post hoc Ev lineabis] liniabis Lε;
 lunabis Mδ eam] ipsam Dη
- 4-5 eam ... eam] *om.* Mv Mφ Vι eam ... optime] *om.* Mη et planabis] *om.* Eo;
 inplanabis Cε et planabis eam] *om.* Cζ Fζ Wα
- 5 planabis] explanabis Bζ Cβ Ev Mθ Oα Oη Oσ Pφ Pψ Qα Si Sl Vv Mv Va Vε Vσ Vv Vχ;
corr. from *explanabis* Cδ; plana|nabis Xβ planabis eum] plano Bη eam] *om.* Bγ
 Bι Bκ Cβ Cε Dγ Dη Eδ Eζ Eμ Ev Eo Eτ Fa Fβ Lζ Mδ Mθ Mλ Mv Mo Oα Oσ Pa Pφ Pψ Qμ
 Rβ Sβ Si Sk Va Vι Vκ Vv Wβ; *interlin.* Vβ eam ... sit] *om.* Qα sit] *om.* Lγ Oη
 planatio] explanacio Bζ Eo Vv eius₁] *om.* Fβ Mo et distinctio eius] *om.* Vσ
 eius₂] *om.* Bγ Bε Bζ Bη Bι Bκ Cβ Cδ Cε Cη Cθ Dγ Ev Eo Ev Lζ Mλ Mv Pτ Pφ Qα Qμ
 Sβ Vε Vι Vκ Vv Vχ Wβ cum] in Bε Ea Fζ Lε Oζ Qβ Qγ; qui Bθ cum circulo]
om. Bζ Vv circulo] tertio Cη; *add.* signorum Si ita ut] *om.* Oη Qα; et Pφ; ita Vπ
 Wβ; ita quod] Bγ Bη Cε Cη Dη Eζ Eη Pa Pτ; in ut Fβ; ut Bζ Cδ Cζ Eμ Eo Mθ Mκ Mv Oα
 Ok Oσ Pψ Si Va Vε Vι Vv Vσ Vv non] *interlin.* Wα; nos Sθ
- 5-6 donec ... optime] *om.* Na
- 6 augeat] *om.* Xβ nec] donec Xβ; et Wι; neque *some*; vel Bγ Bζ Bη Cη Pa Pτ Wβ
 cum] in Cδ Sa Vσ; eam Ea stellis] *om.* Mη Pδ Pθ Vψ fixis et] ipsis Qδ
 et₁ ... optime] *om.* Qα et planabis] explanabis Oη Vε; inplanabis Eζ
 planabis] planes Fβ eam] *om.* Cε et₂] *add.* similiter Dη scribes]
 scribas Wι

of the fixed stars. When you have united them [i.e., the stars] to the circle of signs, you next incise it and flatten it very thoroughly until it is level with it, and the separation of it from the circle [of Capricorn] [is] such that it neither increases nor decreases. You will do the same with the fixed stars, and flatten it completely. And you will inscribe

super omne signum nomen suum et super omnem stellam nomen suum, secundum quod patet in figura.

10 Et sit super caput Capricorni almuri graduum, id est ostensor graduum, quem quidam Latinorum, ut in quodam libro diximus, “calculatorem” dicunt. Et iam

- 7 omne] eum Cζ omne ... super₂] omne signum *and canc.* Po signum] *om.* Bζ; punctum Bε; *add. interlin. illeg.* Eδ nomen] *interlin.* Wι nomen₁ ... suum₂] *om.* Eδ Eζ Eτ Nα Pυ Sκ Xα suum₁] eius Cε suum₁ ... suum₂] *om.* Bγ Cη Pγ Wι; *marg.* Pα; eius Dη et ... suum₂] *om.* Aα Bθ Cε Eυ Mο Pτ Pφ Rα Sβ Vκ Vπ super₂] *om.* Vσ; *corr. from per* Vυ omnem ... suum₂] *marg. (later hand)* Po stellam] *om.* Cθ suum₂] earum Bι; *suidem(!)* Qδ
- 7-8 secundum ... figura] *om.* Bη Wβ; que est in hac figura. Oκ; quod patet in figura Xβ; secundum quod est in hac figura Bζ(*add. parens*) Cβ Cζ Cθ Eμ Eν Eο(*add. patet*) Mθ Mκ Mν Oα Oσ Pφ Pψ Sθ Vα Vε Vν(*add. patet*) Vσ Vυ Vχ; secundum quod est in supradicta figura Oη; secundum quod patet in hac figura Eα; secundum quod vides in figura Cδ; ut est in figura Nα; ut est in figura precedenti Pτ; ut est in hac figura Aα Bγ Bθ Bκ Cε Cη Eδ Eζ Eυ Mο Pα Pγ Pο Pυ Vπ Wι Xα; ut est in hac figura sequenti Bι Dγ Lζ Mλ Qδ Rα Rβ Sβ Vκ; ut est in precedenti Vβ(*add. interlin. scilicet invaeditur(!)*); ut in presente figura Sκ; ut est in subscripta patet figura Dη; ut in figura Qα; ut patet in figura Qβ; ut patet in sequenti figura Eτ
- 8 quod patet] patet patet Sδ figura] *add. praedicta* Fβ; *add. sequenti* Mδ; *add. in marg.* Hoc(In Mκ) figura non ponitur hinc quare in volvellis astrolaborum satis potest exemplar habere Cζ Eμ Mκ; *add. in marg.* Retis in quo non est [*illeg.*] et oportet quo ad letteram Cδ
- 9 Et] ut Cβ sit] *om.* Mυ Qλ Vε Vι Wα; sint Dκ Mθ sit super] *om.* Eδ; si sit Pφ; sicut Bθ Vπ; sic Nα super] *om.* Aα Bγ Bζ Bη Bι Bκ Cδ Cε Cη Eζ Eν Eο Eτ Eυ Lζ Mλ Mο Pο Pψ Rα Rβ Sι Sκ Vκ Vν Vυ Vχ Wβ almuri⁶ graduum] alimir et g~ vel muri g~ Sι; alium gradum almuri graduum Vπ; almeri vel muri graduum Cβ Cδ Cθ Eμ Oκ Pψ Sλ Vα Vσ; almuri gradus vel muri Vν; almuri gradus vel muri gradus Eο; almuri graduum almuri graduum Pφ; almuri vel muri graduum Cζ Mθ Mκ Mν Oα Oη Oσ Vυ; almuri(*corr. from almeri*) vel muri Vχ {*om. graduum*}; gradus vel mu[ri] gradus Bζ; muri graduum Eν; *add. in marg.* muri Bη id est] vel Qλ id ... graduum₂] *om.* Bθ Lγ Pγ Pφ Ve graduum₂] gradubus Bζ; gradus Vν quam] *quam some*; quoniam Pφ
- 10 Latinorum] *om.* Cδ Sλ Vα; Latinos Oκ ut] *om.* Pυ ut ... diximus] *om.* Nα quodam] alio Bζ Cδ Cζ Eμ Eν Eο Mκ Mν Oα Oη Oσ Pδ Pθ Pλ Pμ Pν Pφ Pψ Qα Qβ Qγ Qδ Sθ Sι Sλ Vα Vβ Vν Vσ Vυ Vχ; aliquo Mθ Oκ diximus] *om.* Rβ; dicunt Qδ calculatorem] *add. interlin. vocant* Cβ dicunt] nominant Pφ; vocunt Eα Xβ iam] *add. diximus* Mη

⁶ In a number of mss, this is written as “alm^uri” which can be read as either *almuri* or *almeri*. For *almuri*, see above, Cap. 1, note to line 5.

on each sign its own name, and on every star its name, as is shown in the figure.

And at the beginning of Capricorn let there be the indicator-muri,⁷ that is the indicator of degrees, for which some of the Latins, as we have mentioned in a certain book, use the term “calculator”. And we have already

⁷ For *al-muri / ostensor / calculator*, see Cap. 1, line 5, and note.

scripsimus super eum in figura “almuri graduum”. Sitque axis huius tabule cuspidi circuli equinoctii diei, et iam scripsimus super eum in hac figura “axem”. Cum autem perfecta fuerit eius explanatio atque descriptio, tunc perficietur et hec tabula vocatur

- 11 scripsimus] *add. and canc.* figuram Cβ super] *om.* Nα super eum] *om.* Wι
in figura] *margin.* Po; scilicet ostensor et Pλ(*interlin.*) figura] figuram Qδ; hac Bζ
Sθ; *add.* hac Bι Cβ Cε Cζ Cθ Eα Eβ Eδ Eζ Eμ Eο Mθ Mκ Oα Oη Oσ Pψ Qα Vα
Vβ(*interlin.*) Vε Vν Vσ Vυ Vχ almuri] ac muri Sι; alium Vπ; muri Bζ Cβ Cδ Cζ Cθ
Eο Eμ Eν Mθ Mκ Mν Oα Oη Oκ Oσ Qα Sθ Sλ Vα Vε Vν Vσ Vυ Vχ graduum]
gradus Eο Vν Sitque] *corr. from* Estque Eδ; Sintque Sι axis] assis Vπ; *add.*
scripsimus Bθ huius] *om.* Oκ; istius Sκ; quibus Bη; unius Pμ Vπ Wα huius
tabule] h[*cut off*] Vχ; *om.* Mθ tabule] *add.* axis Pθ cuspidi] *repeated* Qδ
- 11-12 almuri ... figura] *rep.* Bγ almuri ... hac] *om.* Pψ; *margin.* Vχ
- 12 circuli] *om.* Bζ Mδ diei] die Wι; *add. rep. of ll. 10* Et iam ... 12 diei Cηc iam
scripsimus] *cut off* Vχ super] *om.* Sλ eum] *corr. to* eam Eμ; eam Mθ in hac
figura] hac Tδ hac] *om.* Cε Dη Nα Pυ; *interlin.* Vβ; precedenti Pτ; sequente Bε
hac figura] figura ac Qδ axem] *assem* Vπ autem] *om.* Vε; iam Eο
- 12-13 et ... perficietur] *om.* Qα Cum ... perficietur] *om.* Cδ Sλ
- 13 perfecta] *om.* Eο; perfc-m Eμ; per| facta Po; perfectum Sι fuerit] *om.* Bθ
explanatio] *complanatio* Vν; planatio Oκ atque] sit que Fζ tunc] nunc Wι
perficietur] perfecta facietur Eδ; perfc- ficietur Eζ; *add.* id est perfecta erit Fβ et
hec] *om.* Vε hec] *om.* Cζ; *add.* est Sθ Sλ Vβ(*interlin.*); *add.* precedens Rα tabula]
om. Dη Pδ Qδ Vπ; est tabula que] Bζ Cβ Cδ Cζ Cθ Eμ Eν Eο Mθ Mκ Mν Oα Oη Oκ Oσ
Pφ Pψ Qα Sι Vα Vν Vσ Vυ Vχ; *add.* que Bε Sθ Sλ Vβ(*interlin.*) Vε vocatur] *om.* Pλ Pq
Vκ

written above it in the figure “the [indicator-]muri of the degrees”. And let the axis of this plate be the centre of the circle of the celestial equator and we have already written on it in this figure “axis”.⁸ When, moreover, its exposition has been completed, and its description, then it will be complete, and this plate is called

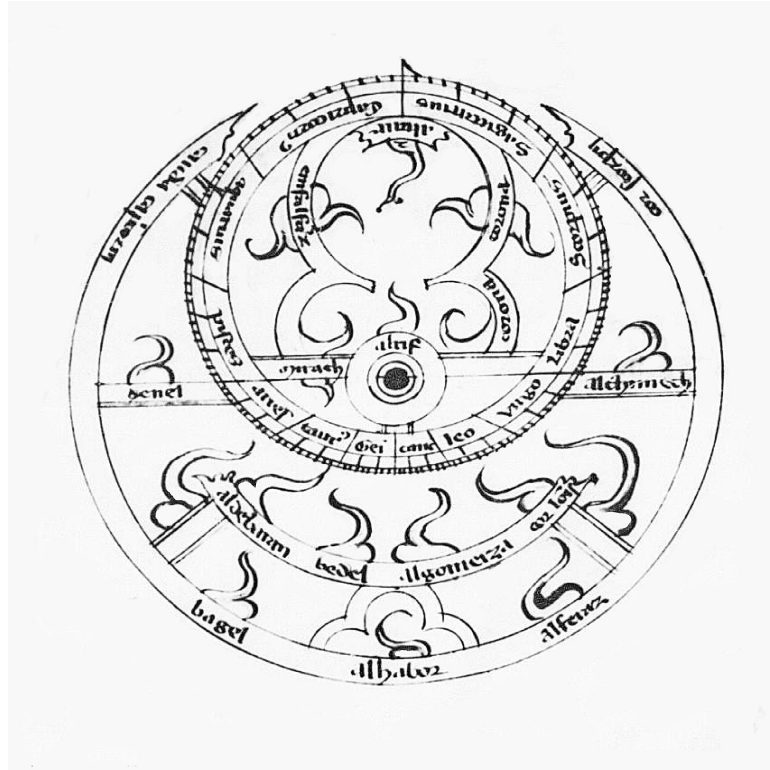
⁸ While some diagrams for this capitulum have “almuri” written on them, very few have “axis.”

“alhanabuz”, cuius interpretatio est “aranea”, et dicitur “rethe” ut hic.

- 14 alhanabuz] alacantabuz *corr. to* alantabuz Sλ; alancabut Vα; abancabuth Bζ; alahanbuch Aα; alahantabuth Bθ Ev Vπ; alahantabuz Qδ Rβ; alamcabath Vε; alamcabuz/alantabuz Cβ Cδ Cθ; alancabath Vβ; alancabut Oκ; alancabuz Oα Oσ Pψ Qα Vχ; alangabuz Ev; alantabuch Pφ; alantabur Si; alantaburz Sθ; alantabut Cζ Eμ Mθ Oη Vυ; alatanbut Eα; alcamcabuz Cε; alcanthabuth Dη; alhancabuth Bι Vν; alhanchabuth Pτ Bη; alhanabaz Qγ; alhanabum Vψ; alhanabur Mδ Tδ Xβ; alhanabut Qμ; alhanabuth Vκ; alhanabuthc Eo; alhanabutz Bε; alhanabuz Cι Eβ Fβ Fζ Lβ Lγ Lε Lη Mκ Mυ Mφ Oζ Oξ Oτ Oυ Pδ Pθ Pλ Pμ Pν Qβ Qλ Sδ Vι Vσ Wα; alhanthabu[*illeg.*] Mη] alhanthabuth Bγ Cη Wβ; alhanthabuz Mν; alhathabuth Pα; alhintabuth Fα; alimcantabuz Mλ; allantabuz Pq; alman^{nach} Po; almicantharat Eδ; alminath Xα; almucantabuz Lζ Sβ; almucanthanth Pγ; almucantharath Eτ Pυ Sκ Wι; almucantherath Nα; almuncantabuz Rα; almurath Eζ; almu^{rath} Mo; almutantabuz Bκ; almutanthabith *corr. to* almutanthabitz Dγ cuius interpretatio est] cuius interpretatio vocatur Mη; *om.* Mo; et Eδ; id est Aα Bγ Bη Bθ Bι Bκ Cε Cη Dγ Dη Eζ Eτ Ev Lζ Mλ Nα Pα Pγ Po Pτ Pυ Rα Sβ Sκ Vκ Vπ Wβ Wι Xα; que interpretatur Qδ aranea] arania Eζ; aranea Qλ; arenea Pτ dicitur] *om.* Pλ; dedz Qλ; que vocatur Bζ; vocatur Cβ Cδ Cθ Ev Eo Mκ Mν Oα Oσ Pφ Qα Sθ Si Sλ Vβ(*add. interlin. dicitur*) Vε Vν Vσ Vυ Vχ; vocatur et dicitur Vκ; vocatus erit Vα; vocabitur Cζ Eμ Mθ Oη Oκ Pψ; *add.* etiam Bθ Cβ Cζ Eμ Mθ Mκ Mν Oη Oκ Pτ Pφ Pψ Sθ Si Sλ Vβ Vσ Vυ Vχ rethe: recte: Si Vα Vσ: rete Bθ Cβ Cδ Cζ Cθ Eμ Mθ Mκ Oκ Pτ Pφ Pψ Sλ Vκ Vυ Vχ; rethi Xα; *add.* sive novellum Bι; *add.* vel novellum Vν; *add.* vel volvellum Bζ Eo Vβ(*interlin.*) ut hic] *om.* Bζ Cβ Cδ Cζ Cθ Eζ Eμ Ev Eo Mθ Mκ Mν Nα Oα Oη Oκ Oσ Pγ Pυ Pφ Pψ Qα Sθ Si Sλ Vα Vβ Vε Vν Vσ Vυ Vχ Xβ; et hoc patet hic Pα; hic Mυ Mφ Vι Wα; ffi^a(?) patet in lateri sequenti Bε; ut Pμ: ut apparet in presenti figura Cε; ut apparet in presenti figura Dη; ut hic patet Bγ Cη Pτ; ut hic patet autem est figura Wβ; ut hic sequitur tabula Eτ; ut patet in figura Bη; ut patet in prescripta figura Fβ; *add. in marg.* alamcabuz | aranea | rethe Cδ; *add. later hand* Figura est ad iste signum o-o Qμ(*links to fol. 154'*)

“al-hantabuz”,⁹ whose meaning is “spider-web”, and it is [also] called “rete”, as here.

⁹ The Arabic word for rete is *al-ʿankabūt* (العنكبوت), meaning “spider”; the Latin transliterations are multiple. In Latin itself, “aranea” is used both for “spider” and for “spider-web”. See Kunitzsch, *Glossar*, no. 1, pp. 515-517.

[FIGURA 11]¹⁰

Rethe - Volvellum - Valzagora - Aranea - Alhantabuz

[Complete diagram] Bγ Bε Bη Bι Bκ Cβ Cη Cθ Ci Ea Eβ Eη Eo Et Ev Fa Fβ Fζ Lγ Lε Lζ Lη
Mη Mκ Mλ Mν Mo Oζ Oτ Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qδ Qλ Qμ (fol. 154^r) Rα Sβ Sδ
Sk (fol. 97^r) Tδ Vβ Vκ Vσ (fol. 13^r) Wβ Wi Xβ

[Partial diagram] Bα Ev Mθ Vε Vχ Wa

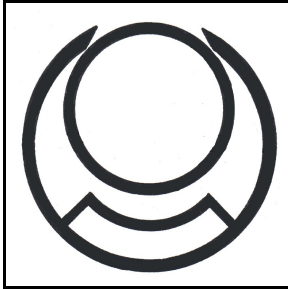
[Outline or space only] Aα Bθ Cε Dγ Dη Eδ¹¹ Eζ Lβ Mδ Mφ Oα Oξ Pν Pφ Rβ Si Va Vv Vπ
Vσ Vυ Vψ

[No space] Bζ Cδ Cζ Eμ Mν Nα Oη Oκ Oσ Pθ Pψ Qα Sθ Sλ Vi Xα

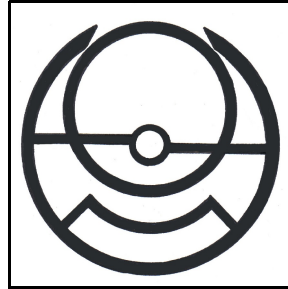
¹⁰ The image here is just a sample, taken from ms Bι.

¹¹ Ms Eδ: space filled with irrelevant diagrams.

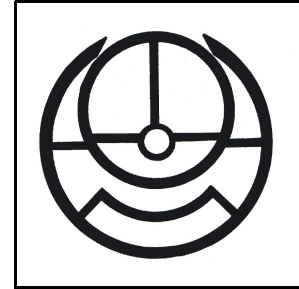
[Rete Strapping Patterns]



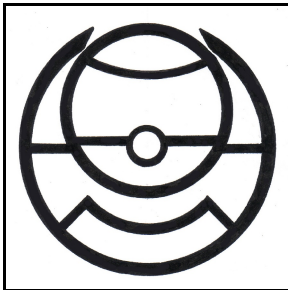
A1: Vε



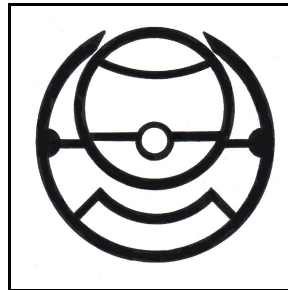
A2: Cβ Cθ



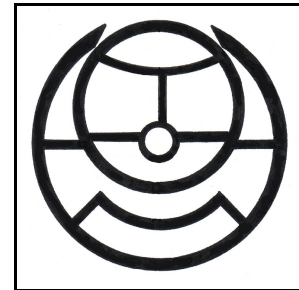
A3: Sκ



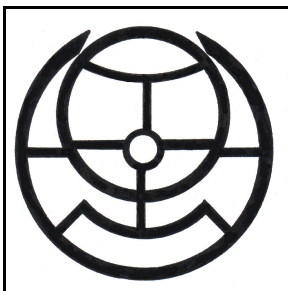
B1: Bη Fβ Pλ Pρ Xβ



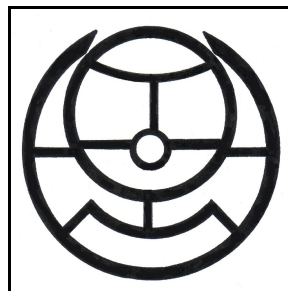
B2: Eη



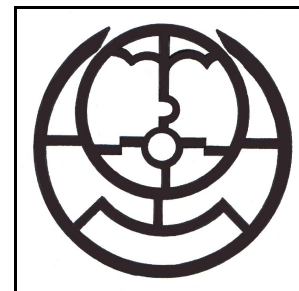
B3: Eα Eο Qδ Tδ



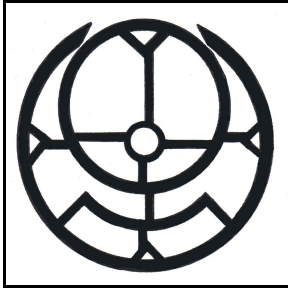
B4: Cη Eβ(?) Fα Fζ Lγ Lε
Lη Oζ Oτ Oυ Pα Pμ Pτ Qβ
Qγ Qλ Qμ Sδ Wβ



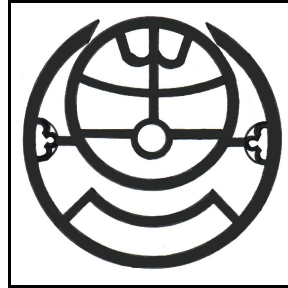
B5: Cι Mκ Pδ



C: Bγ



D: Pγ



E: Bε



F1: Vσ Wι



F2: Mη



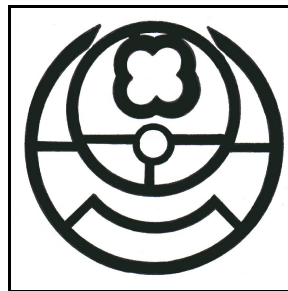
F3: Eτ Eυ Mν Mo Po Pυ
Vβ Vκ



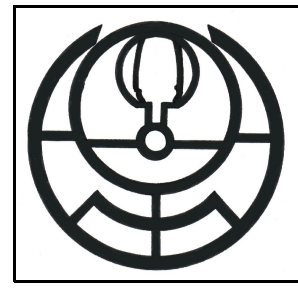
G1: Bκ Lζ



G2: Bι



H: Mλ



I: Sβ



J: Rα

[Caption]

Rethe ... Alhantabuz] *om.* Βι Βκ Cβ Cθ Cι Eη Eο Eυ Λγ Πγ Ρμ Ρο Ρρ Ρτ Ρυ Qδ Σκ Vσ Wι Wβ; De preparatione tabule regionis et divisione equinoctis linea Pq; Figura rethis vel tele aranee Bε; Figura adaptationis rethis et stellarum fixarum in rethi Vβ; Figura vocata rethe, aranea, alanathabum, valsaraga Eα; Figura tabule que dicitur rethe, volvellum, valzagora, aranea, alhantabuz Fβ(*twice*)

rethe] Bγ Cη Eο Eτ Eυ Fα Fζ Λε Λζ Λη Μκ Μλ Μο Οζ Οτ Ου Pδ Πλ Qβ Qγ Qλ Qμ Ρα Sβ Sδ Tδ Vκ Xβ; arecte Eβ; rete Bη Mη Mν; rete perfetum Pγ; rethea Ρα volvellum] Bγ Bη Eβ Eο Eτ Eυ Fα Λε Λζ Λη Mη Μκ Mν Μο Οζ Οτ Ου Ρα Pδ Πλ Ρρ Qβ Qγ Qλ Qμ Sβ Sδ Tδ Vκ Xβ; wolvellum Ρα; wovella Fζ Μλ valzagora] Bγ Eβ Eο Eυ Fα Fζ Λε Λη Mη Μκ Οζ Οτ Ου Ρα Pδ Πλ Ρρ Qβ Qγ Qλ Qμ Sδ Tδ Xβ; valcagora Eτ; waldagora Μο; walzagora Bη Λε Μλ; walzagorora Vκ aranea] Bγ Bη Eβ Eο Eτ Eυ Fζ Λε Λζ(*twice*) Λη Mη Μλ Μκ Mν Μο Οτ Ου Ρα Pδ Πλ Ρρ Qβ Qγ Qλ Qμ Ρα Sβ Sδ Tδ Xβ; arane Vκ alhantabuz] Bγ Eβ Fζ Λε Λη Οτ Ου Ρα Πλ Qβ Qγ Qμ; alhamabuz Sδ; alhamtabuth Vκ; alhantabuch Mν; alhantabur Tδ; alhantabuth Eτ Eυ Λζ Mη Μο; alhantaleum Xβ; alhantebuz Bη; alhanthabut Cι Pδ; alhanthabuth Μλ Ρα; alhanthubuth Sβ; alhantibur Οζ cursor] Vκ

[Zodiac]

Names and divided 10 | 20 | 30: Bγ Bη Cη Cι Eα Eη Eβ Eο Eτ Eυ(*numbers for Gemini, Cancer, Leo only*) Fα Fβ Fζ Λε Λη Mη Μλ Mν Ρα Pδ Πλ Ρμ Ρο Ρρ Ρτ Οζ Οτ Ου Ρυ Qβ Qγ Qμ Sβ¹² Sδ(*numbers for Aries and Libra only*) Σκ Tδ Vβ Vκ Wι Xβ

Names and divided 5|10|15 ... 30: Bε

Names and no divisions: Βι Βκ Cβ Cθ Λζ Μο Qδ Qλ Πγ Vσ Wβ

[Other information]

add. almuri Bγ Βι Cη Eβ Eη Eο Eτ Eυ Fα Fζ Λη Mη Μκ Μλ(*twice*) Μο(*twice*) Οζ Ρα Πγ Pδ Πλ Ρμ Ρο Ρτ Ρυ Qγ Qλ Vκ Wβ Xβ; *add.* almuri | denticulus | ostensor | divisor Βκ; *add.* almuri graduum Bε Οτ; almuri vel calculator vel ostensor graduum Eα; muri vel almeri graduum Cβ; *add.* axis Cβ; *add.* calculator Eβ Eη Eο Eτ Eυ Fζ Λη Mη Μκ Μλ Μο Οζ Ρα Ρτ Qγ Qλ Wβ Xβ; *add.* ostensor Eη Eτ Eυ Mη Μλ Μο Οτ Ρτ Wβ; *add.* ostensor graduum Eβ Eη Fζ Λη Μκ Ρα Qγ Qλ Xβ; *add.* denticulus Eη Eυ Mη Ρα Ρτ; *add.* divisor Eβ Eη Eτ Fζ Λη Μκ Μλ Μο Ρα Qλ Xβ; *add.* idem Λζ; *add.* muri vel almuri graduum Cθ

[Pointers¹³]

Too faint: Qλ

Incomplete pointers: Ρρ Sβ

None: Cβ Cθ Fβ Vε

13: Eα

18: Βκ

20: Βι

23: Λζ

26: Eυ

27: Bγ Mη Σκ

28: Eη Πγ

29: Vσ

30: Eτ Μο Ου Tδ Vκ

31: Μλ Mν Ρο Ρυ Vβ Wι

32: Eο Ρα

33: Cη Pδ Qδ

34: Λγ Ρα Ρμ Xβ

35: Cι Eβ Λε Λη Οζ Οτ Ρλ

Qγ Qμ

36: Fα Fζ Ρτ Qβ Sδ

38: Bη Wβ

43: Bε

¹² In ms Sβ the zodiac has been divided into 13 parts, one of which is blank (before Aries), which means that the other signs have shifted counter-clockwise to a greater or lesser extent.

¹³ Note: not all pointers have labels, and not all labels have pointers.

[Star names]

Deciphering the star names as found in the diagrams for Capitulum 11 is very problematic. The choice of stars varies from diagram to diagram. Sometimes the Latin name is used, sometimes a transliteration of the Arabic name; a variety of transliterations exists for each Arabic original and the scribes, not knowing the correct form of a name, would misinterpret their exemplars and create new variants. (For further information on the various stars, see List of Stars – Appendix I.)

Insofar as it has been possible to decipher the stars and their names, I have created the following list. I have started with the beginning of Aries and worked (counter clock-wise) through the signs of the zodiac. I have grouped the variants under the modern star designation for ease of analysis. If a star has not been identified, it has been inserted according to its position vis-à-vis other stars in the diagram.

Note: Some pointers have no names; these have not been noted. A question mark behind a siglum indicates that the reading is probable but not definite.

Note: in mss Bε Eη Pδ Qδ and Tδ, Yed/Aladil/Alhau are sometimes switched with Wega/Altair/Delphinus

[ARIES – GEMINI]

ζ Cet (1)¹⁴ [Baten Kaitos/Venter Ceti]: Bacencaytoz Eα Qγ; Bachenkaytoz Pυ; Bantheukaitos Wβ; Baratenkaytoz Pτ; Batencaytoz Bγ; Batenk' Pδ; Batenkaiθos Bε Eη; Batenkaiθoz Cη Eβ? Fβ Fζ Lγ Lε Lη Oυ Pμ Qβ Qλ Sδ Tδ; Batenkartoz Fα Qμ; Batenkatoz Sκ; Batenkautos Qδ; Batenkaytar Xβ; Batenkayton Rα; Batenkaytoz Eτ Mκ Oτ Pλ Sβ Vκ; Bathenaytoz Wι; Bathenk' Pγ; Bathenkaiθoz Bη; Bathenkayθos Cι; Bathenkayto~ Mλ; Bathenkaytoz Mν Mo Oζ Po Vβ; Daventanet Pq; Venter Caytet Vε; Venter Chator Cθ; Venter Chitor Cβ; *illeg.* Pα

ζ Cet (2)[Pantakaitos]: Pantaikatoz Sκ; Pantakai Bη Cη Eβ? Fβ Fζ? Lγ Lε Lη Oζ Oτ Pq Qβ Qλ Sδ; Pantakay Fα Oυ Pλ Qγ Wβ Xβ; Pantakaytoz Tδ; Pantaketicoz Mκ; Pantekai Pμ; Pantekar Qμ; Pantenkait' Pτ; Panth' Pδ; Panthacayton Eα; Panthakai Eη; Panthakay Bε; Panthakayθos Cι; *illeg.* Pα

θ Eri [Acomar]: Finis Lγ Pq; Finis Arietis Bε; Finis fluxus Bγ Bη Cη Cι Eβ Eη Fα Fβ Fζ Lε Lη Mκ Oζ Oτ Oυ Pδ Pκ Pλ Pμ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Wβ Xβ; Fluxus Eα; *illeg.* Pα

α Cet [Menkar]: Algenip¹⁵ Pγ; Azerikar¹⁶ Xβ; Mekar Qμ Vσ; Memkar Eυ; Menbair Mo; Menc/t Lζ; Mencar Tδ; Menhar Cη; Menk Pδ; Menkar Bε Bη Cι Eα Eβ? Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mη Mκ Mλ Mν Oζ Oτ Oυ Pα Pλ Pμ Po Pτ Pυ Qβ Qγ Qδ? Qλ Rα Sδ Sκ Vβ Vκ Wβ Wι; Menter Bκ; Merchm Pq; *illeg.* Sβ

¹⁴ In 30 mss there are two different pointers for ζ Cet, labelled Baten Kaitos and Pantakaitoz. Both appear to be original. See Lists of Stars – Appendix I.

¹⁵ Misnamed: Algenip (α Persei/Algenib) has a declination of about +50°. Kunitzsch, *Sternnamen*, pp. 69, 113.

¹⁶ Erroneous reading of the exemplar by the scribe? “M” becomes “Az” and “n” becomes “ri”?

α Per [Algenib]: Alban? E α ; Alg~ L η O ζ ; Algenib R α V β ; Algenub B γ F ζ ?; Algo~ O τ ; Algon C η L γ L ϵ P μ P τ Q γ Q λ Q μ S δ T δ ; Algonue P α ?; Caput Algon B ϵ ; Fron [= Frons Algonis?] E ν ; *illeg.* E β F α O ν P δ P λ Q β V σ W β

τ^2 Eri [Angetenar]: Agentenar X β ; Algetenar C η E η F α F β L γ L ϵ L η M κ M \omicron O ζ O τ O ν P α ? P λ P μ P ρ P τ Q β Q γ Q λ S δ T δ ; Algetenei Q μ ; Algeteuan E α ; Algethenar B ϵ ; Alhaiot¹⁷ E ν ; Angetenar C ι ; Augea P γ ; Augenenar W ι ; Augerenax Q δ ; Augetena B η ; Augetenar M λ M ν P δ P ρ P ν R α S β V β V κ V σ W β ; Augthenar E τ ; *illeg.* E β

α Tau [Aldebaran/Cor Tauri]: Aldeban O ζ O τ P ρ W ι ; Aldebanar W β ; Aldebans P γ ; Aldebaran B γ B ϵ B η B ι C η C ι E α E β E η E \omicron F α F β F ζ L γ L ϵ L η M κ M λ M ν M \omicron O ν P α P δ P λ P μ P ρ P τ P ν Q β Q δ Q γ Q λ Q μ R α S β S δ S κ T δ V β V κ V σ X β ; Atabanar E τ ; Cor Tauri B κ C β C θ L ζ V ϵ

β Ori [Rigel/Pes Geminorum]: Alhaiot¹⁸ M η ; Bagel B ι ; Pes Geminorum C β C θ V ϵ ; Regilal T δ ; Rigel B ϵ B η B κ E η E τ L ζ V κ ; Rigib P ρ ; Rigil B γ C η C ι E β F α F β F ζ L γ L ϵ L η M κ M λ M ν M \omicron O ζ O τ O ν P α P γ P δ P λ P μ P ρ P ν Q β Q γ Q δ Q λ Q μ R α S β S δ S κ ¹⁹ V β V σ W β W ι X β ; Rigli E α ; *illeg.* P τ

α Aur [Alhailoth]: Al L η ; Alh~ C η E α F α Q μ ; Alha~ L γ L ϵ M λ O ζ P α P ν Q γ Q λ S δ T δ ; Alhae M λ ; Alhaioc P ρ ; Alhaios M κ ; Alhaiot B ϵ E η V κ ; Alhailoth B γ R α ; Alhaut O τ ?; Alhaye S β ; Alhayot W ι ; Ursa²⁰ L ζ M ν ; *illeg.* E β E τ M η O ν P δ P λ Q β

α Ori [Betelgeuse]: Algege T δ ; Algen P ρ ; Algensasa B ϵ ; Algente E α E \omicron ? W ι ; Algenza F β M ν P λ X β ; Algere P τ ; Algeu P δ ; Algeusa F α ; Algeuze B γ B η C η C ι E τ F ζ L γ L ϵ L η M η M κ M λ O ζ O τ O ν P α P μ P ρ P ν Q β Q γ Q λ S δ ? V β V κ V σ W β ; Algraza Q μ ; Bedel B ι B κ ; Elgeuze M \omicron ; Humerus Geminorum C β C θ ; *illeg.* E β E η Q δ

[CANCER – VIRGO]

α CMa [Alhabor]: Alhabor M ν ; Algabor X β ; Alhabez W ι ; Alhabor B γ B ϵ B η B ι B κ C η C ι E α E β E η E τ E ν F α F β F ζ L γ L ϵ L ζ L η M η M κ M λ M \omicron O ζ O τ O ν P α P γ P δ P λ P μ P ρ P ν Q β Q γ Q δ Q λ Q μ R α S β S δ S κ T δ V β W β ; Alhaboz V σ ; *cut off* V κ ; *illeg.* P τ

α CMi [Algomeiza]: Algemeza P ρ ; Algom~ P γ ; Algomaza F β ; Algomeisa B η F α M κ P λ Q μ ; Algomeiza B ι B κ E β E η E τ F ζ L γ L η M η O ζ P α P δ P μ P ρ P τ P ν Q β Q γ Q λ S β S δ W β W ι ; Algomera E α Q δ X β ; Algomerza B γ C η L ζ M \omicron ; Algomeuza C ι ; Algomeysa B ϵ T δ ; Algomeyza E \omicron

¹⁷ Misnamed: Alhaiot (α Aurigae/Capella/Alhailoth) has a declination of about +45°, while the pointer in E ν is about -15°; its right ascension is also about 1 hour greater.

¹⁸ Misnamed: Alhaiot (α Aurigae/Capella/Alhailoth) has a declination of about +45°, while the pointer in M η is about -10°.

¹⁹ In ms S κ , Rigil is misplaced – moved well to the north of the ecliptic.

²⁰ “Ursa” (“bear”) is a name given to a variety of stars in Ursa Maioris and Ursa Minoris. Usually, however, in these rete diagrams Ursa is found in Cancer or Leo, rather than in Gemini, as here. The position in these two manuscripts is that of α Aur.

Λε Μλ Οτ Ου Ρα Vβ Vκ; Algomezza Mv; Algoumeiza Vσ; Algumeiza Ev; Moriens Filius²¹ Cβ Cθ Vε *add.* Prochion Bε

ρ Pup [Markep]: Marchep Eα; Markab Rα; Marke~ Qλ; Markeb Bε Bη Eη Eτ Μλ Mv Mo Po Pv Sβ Vβ Vκ Vσ; Markep Cη Cι Eβ Fα Fζ Λγ Λε Λη Μκ Οζ Οτ Ου Πα Πδ Πλ Πμ Ρο Ρτ Qβ Qγ Qμ Sδ Tδ Wβ Wι; Market Fβ; Merkep Xβ; Mikel Qδ

α Hya [Alphard]: Alf~ Pδ; Alfarad Bκ Λζ; Alfarath Mκ; Alfart Bγ Bε Bη Cη Cι Eβ Eη Eο Eτ Ev Fα Fβ Fζ Λγ Λε Λη Mη Μλ Mv Mo Oζ Oτ Ου Πα Πλ Πμ Ρο Ρο Ρτ Ρυ Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vκ Vσ Wβ Xβ; Alferaz Bι; Alfert Pγ; Alfrat Wι; Alpharat Eα

α Leo [Regulus]: Cor Leonis Bγ Bε Bη Bι Bκ Cβ Cη Cθ Cι Eα Eβ Eη Eο Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mη Μκ Μλ Mv Mo Oζ Oτ Ου Πα Πγ Πδ Πλ Πμ Ρο Ρτ Ρυ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vε Vκ Vσ Wβ Wι Xβ; Leo Ρο

β UMa [Merak/Mirak]: Benenar²² Mη; Benenaz²³ Mv; Egg Eα?; Gel Λζ; Ur Λη; Ursa Bε Cη Eβ Eη Fα Λγ Μλ Οζ Οτ Ου Πα Πλ Πμ Ρο Ρτ Ρυ Qβ Qγ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vκ Wι; Veniutab²⁴ Ev; *illeg.* Eτ Λε

α UMa [Dubhe]: Dibhe Bε; Dubhe Bγ Eα

ι UMa [Talitha]: Egregen[us] Sκ

β Leo [Denebola]: Caud' Λη; Cauda Λγ Λε Οζ Οτ Ου Πα Πλ Πμ Qβ Qγ Qλ Sδ Tδ Xβ; Cauda Leonis Bε Bκ Λζ Pγ; *illeg.* Cη Eβ Fα

γ Crv (1)²⁵ [Corvus]: Cauda Leonis²⁶ Λγ Qγ?; Chorus Ρο; Corus Qμ Vσ; Coruus Bγ Bε Bη Cι Eα Eβ Eη Eο Eτ Ev Fα Fβ Fζ Λε Λη Mη Μκ Μλ Mv Mo Oζ Oτ Ου Πα Πγ Πδ Πλ Πμ Ρο Ρτ Ρυ Qβ Qδ Qλ Rα Sβ Sδ Tδ Vβ Vκ Wβ Wι Xβ

γ Crv (2) [Algorab/Ala Corvi]: Alacorni Vε; Ala Corui Cβ Cθ; Algor~ Pγ; Algorab Bγ Bε Bη Cι Eα Eβ Eη Eο Eτ Fα Fβ Fζ Λγ Λε Λη Μκ Μλ Mv Mo Oζ Oτ Ου Πα Πδ Πλ Πμ Ρο Ρο Ρτ Ρυ Qγ

²¹ See Lists of Stars – Appendix I for details of this identification/name.

²² Variant of Benetnasch (η UMa).

²³ Variant of Benetnasch (η UMa).

²⁴ Variant of Benetnasch (η UMa)? Kunitzsch records “venetuala” as a variant for η UMa (*Typen*, p. 29).

²⁵ γ Crv became duplicated; see Lists of Stars – Appendix I. Both are shown in 38 mss, separated in declination and right ascension by several degrees.

²⁶ Misnamed. The pointer in these two mss is definitely Corvus. Cauda Leonis (or simply Cauda) refers to a different star, i.e., β Leonis. But the declination of β Leo is +14° 39', a long ways further north than Corvus.

Qβ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vκ Vσ Wβ Xβ; Cauda²⁷ Ev Mη

? In Cancer or Virgo: Algol' Mκ; Algon Sβ

[LIBRA – SCORPIO]

α Vir [Spica/Alchimeth]: Alazel Cβ Cθ; Alchim[*illeg.*] Pα; Alchim^c Fα Lη; Alchimec Cι Pδ Po; Alchimech Cη Eβ Eη Mv Oζ Pμ Pρ Pv Qβ Qγ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vσ Xβ; Alchimet Mκ Vκ; Alchimeth Bγ Bε Fβ Fζ Lγ Lε Mλ Oτ Oυ Pτ Vβ Wι; Alchimoch Eα Alchymech Bι Mo; Alfumech Bη; Alhimeth Pλ; Allumeth Wβ; Alramech²⁸ Mη; Alhimec Bκ Lζ; Altimeth Eτ; Alutimech Ev; Spica²⁹ Bε

η UMa [Alkaid/Benetnash]: Bene Bγ Eβ Fα Fζ Lγ Lε Lη Mλ Oζ Oτ Oυ Pα Pλ Pμ Pτ Qγ Qλ Qμ Sδ Tδ Xβ; Bene~ Eτ; Beneñ Vκ; Benenaz Bε(*later hand*) Mv Po Pv Rα Vβ Wι; Bennaz Sβ; Benne Qβ; Rebene Fβ; Ursa maior Pρ; *illeg.* Cη

α Boo [Arcturus]: Al Pδ; Alchimet Ev³⁰ Mη³¹; Alhimet Vε; Alm Wβ; Alr Fζ? Pτ; Alř Eβ; Alra Bγ Fα Pλ? Qγ; Alra' Mκ Oζ; Alram' Fβ Lγ Lε Lη Oτ Oυ Pα Pμ Qβ Qδ Qλ Sδ; Alrame' Eη; Alramech Cβ Cθ Eτ Mλ Mo Po Pv; Alrameh Mv; Alramet Rα Vκ; Alrameth Bε Lζ Vβ Wι; Alramich Eο; Alranech Sκ; Alrb' Tδ; *illeg.* Cη Sβ Qμ Xβ

α CrB Afeca Eο; Alf' Pτ; Alfa' Fζ Oτ Pλ Qβ Qλ?; Alfaca Lγ; Alfaz Fα; Alfe Bγ; Alfeca Eτ Mκ Pα Pδ Vκ; Alfera Sκ; Alfeta Ev Qδ; Alfetaha id est stella lucida in corona sept[en]trionali Cβ Cθ; Alfecas Bε; Corona Bι(*twice*) Bκ Lζ; Efa' Tδ; Efeca Mη; Effeca Rα; Elfa' Eβ Fβ Lη Oζ Oυ Pμ Qγ Qμ Sδ; Elfaca Bη?; Elfeca Mλ Po Pv Sβ Wι; Elfeka Wβ; Elfeol Vε; Elfera Mv; Elfeta Vβ Vσ; Elpert Ev; *illeg.* Cη Lε Xβ

β Sco [Aladil]: Aladil Bη Cη Eβ Fα Fβ Fζ Lγ Lε Lη Oζ Oτ Oυ Pα Pλ Pμ Pρ Pτ Qβ Qγ Qλ Qμ Sδ Wβ Xβ; *reversed for α Aql/Altair* Aladil Eη Tδ; Alfadil Bε

δ Oph³² [Yed]: Bed Sβ; Ged Vσ; Jed Eτ Mη; Yed Bγ Bη Cη Eβ Fα Fζ Lγ Lε Lη Mλ Mv Oζ Oτ Oυ Pα Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qλ Qμ Rα Vβ Vκ Wβ Xβ Wι; Yel Fβ; Uda Ev; *reversed for ε Del/Delfinus* Yed Bε Tδ

²⁷ Misnamed. The pointer in these two mss is definitely Gienah. Cauda (or Cauda Leonis) refers to a different star, i.e., β Leonis. But the declination of β Leo puts it much farther north than Gienah.

²⁸ It appears that the names for α Vir/Alchimet and α Boo/Alramech have been reversed in ms Mη.

²⁹ In Bε there are two pointers for α Vir, labeled Alchimeth and Spica; the latter appears to be a later addition.

³⁰ Possibly a variant of “alchimech alramech” (*Typen*, p. 90).

³¹ It appears that the names for α Boo/Alramech and α Vir/Alchimet have been reversed in ms Mη.

³² Or ε Oph, but the δ Oph is brighter. The two actually are a double star, indistinguishable to the naked eye.

α Sco [Cor Scorpii]: Cor Leonis³³ Ου Vκ; Cor Scorpii Bγ Bι Bκ Cη Cι Eβ Eη Eο Eτ Fα Fβ Fζ Lγ Lζ Lη Mκ Mλ Mν Mo Oζ Oτ Pα Pδ Pλ Pρ Pτ Pυ Qβ Qγ Qδ Qλ Rα Sδ Vβ Wι; Cor Scorpionis Bε Bη Cβ Cθ Eυ Lε Mη Po Qμ Sβ Σκ Tδ Vε Vσ Wβ Xβ

λ Sco: Cauda Qμ(?); Cauda Scor[pionis] Bε(later addition?)³⁴

α Oph [Alhaue, a.k.a. Capud Draconis]: Ahaue Sδ; Alane Mη; Alaue Eα³⁵; Alh Qμ; Alha Bη Fβ Fζ Lε Lη Ou Pρ Pτ Qλ Wβ Xβ; Alhaβ Lγ; Alhane Eο Mν Vκ; Alhau~ Sβ; Alhaue Bγ Cη Cι Eβ Eτ Eυ Fα Mκ Mλ Oζ Oτ Pα Pλ Pμ Po Pυ Qβ Qγ Qδ Rα Σκ Wι; *reversed for α Lyr/Vega* Alha Tδ; Alhane Bε; Alhaue Eη Pδ Vσ

γ Dra [Etamin]: Cap[ud Serpentis] Bκ; Cap[ud] S[erpentis] Lζ; Taben Eυ; Tova? Wι

? In Libra: Denle Wβ

? In Sagittarius: *illeg.* Mη

[CAPRICORN – PISCES]

α Lyr [Wega/Vega]: Vega Bγ Bη Eα Fα Fβ Lη Mη? Mκ Oζ Oτ Pγ Pρ Pτ Qβ Qδ Qλ Sδ Σκ Vβ Wβ Xβ; Voora Eυ; Vuega Pυ; We Lζ; Wega Cη Cι Eβ Eο Fζ Lγ Lε Mλ Mν Ou Pα Pδ Pλ Pμ Po Qγ Qμ Rα Vκ Wι; Vultur Cadens [*position reversed with α Aql/Altair/Vultur Volens*] Cβ Cθ Vε; *reversed for α Oph/Alhaue* We Eη; Wega Bε Pδ Tδ; *illeg.* Vσ

α Aql [Altair]: Alcar Xβ; Alchair Sβ; Alkair Bε; Alta Pδ; Altahir Eα; Altair Bη Bι Bκ Cη Cι Eτ Eυ Fβ Fζ Lε Lζ Lη Mκ Oζ Oτ Ou Pα Pλ Pμ Pρ Pτ Qβ Qγ Qλ Qμ Sδ Σκ Vκ Wβ; Altaire Mν; Altayr Eβ Eο Lγ Mκ Pγ; Altha Wι; Althair Fα Mλ Po Pυ Rα Vβ; Althar Vσ; Althayr Bγ; Vultur Volans [*position reversed with α Lyr/Vega/Vultur Cadens*] Cβ Cθ Vε; *reversed for β Sco/Aladil* Altar Qδ; Altair Eη Tδ

ε Del [Delphinus]: Del Fα Lη Oζ Pρ Xβ; Delf Fζ Lε Ou Pτ Qγ; Delfim Eβ; Delfin Bη Cη Cι Eτ Eυ Fβ Lγ Mλ Mν Oτ Pα Pδ Pμ Po Pυ Qβ Qλ Rα Sβ Sδ Σκ Vβ Vκ Vσ Wβ; D[e]lfin Eα; Delfinus Cθ Vε; Delfⁿ Pλ; Delphin Eο; Delphinus Cβ; [*position reversed for δ Oph/Yed*] Delf Qδ Tδ; Delfin Bε Eη Qμ

α Cyg [Elrif/Deneb] Alrif Bγ Bι Lζ; De Fβ Tδ; Dea Qλ?; Den Bη Lγ Pλ Pτ Qμ; Dena/Deta Alhαιet Mν; Dene Cη Fα Lε Oζ Oτ Ou Pμ Qγ; Deneb Lη Pα Qβ Sδ; Deni Wβ; Dens Xβ; Dera Po Pυ Vκ; *illeg.* Eβ Vσ

α Cep [Alderamin]: Aldera Mη; Aldira Vβ; Alhera Eυ

ε Peg [Enif]: Enifalfa Lζ; Enifalfaz Bι; Musid' eq' Po; Musida equi Mλ Mν Pυ Wι; *illeg.* Vσ

δ Cap [Deneb Algedi]: Cauda Capricorni Bι Bκ Cβ Cθ Lζ Vε; Deneba Mη; Denebagedi Rα; Denebaldegi Mo; Denebalg~ Pγ; Denebalgedi Eτ Mλ Mν Po Pυ Vβ Vσ Vκ Wι; Denehal Eυ; Libedeneb Bε Bη Cη Cι Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mκ Oζ Oτ Ou Pα? Pδ Pλ Pρ Pμ Pτ Qβ Qγ Qδ

³³ An obvious scribal error.

³⁴ Identification probable; see Kunitzsch, *Typen*, pp. 82, 115.

³⁵ The pointer for this star in ms Bε is much further north than normal for α Oph/Alhaue.

QL Qμ Sδ Tδ Wβ Xβ; Liberneneb Eo

δ Aqr [Skat]: Sceach Bγ Mλ Mν Mo Po Vβ Vκ Vσ Wι; Sceahc Pυ; Scehah Sβ; Sechath Rα

β Peg (1) [Markab/Humerus Equi]: Equi Pλ; Equi humerus Qδ; Humerus Equi Bε Bη Cβ Cη Cθ Eα Eβ Eη Eo Eτ Eυ Fα Fβ Fζ Lγ Lε Lη Mη Mκ Mλ Mν Mo Oζ Oτ Oυ Pα Pγ Pδ Pμ Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Tδ Vε Vκ Wβ Wι Xβ

β Peg (2) [Alferaz]: Alf Fζ Lη Pτ; Alfam Sβ; Alfam Xβ; Alfar Eo? Mκ; Alfas Oτ; Alfaz Bγ Bη Cη Eβ Fα Fβ Lγ Lε Oζ Oυ Pα Pμ Qβ Qλ Sδ Tδ Wβ; Alferam Sk³⁶; Alferaz Rα Vβ; Alfes Eα?; Crupa Equi Cβ Cθ; Crpua Et' i Vε; Elfa' Pλ Qμ; Elfa's Qγ Qδ; *illeg.* Eτ

α Cas [Schedar/Shedir]: Sc~ Sβ; Sced Mλ Rα; Scedar Sκ

β Cet or ι Cet³⁷ [Deneb Kaitos]: Cauda Ceti Bε(*later addition*); Cauda Chitor Cβ Cθ; Deneb Bι Bκ Eτ Lζ; Denebcaitoz Oυ; De[neb]caytos Bη; D[e]nebcaytoz Eα; Denebfaytoz Wι; Denebkaim Mν; Denebkaitos Bε Cι Eη; Denebkaiton Qμ; Denebkaitos Mκ Oτ Pα? Pδ Qδ; Denebkaitoz Cη Eυ Fα Fβ Fζ Lγ Lε Lη Mη Oζ Pμ Qβ Qλ Sδ Tδ Vβ; De[neb]kaitoz Wβ; Denebkartoz Eβ Pλ Pτ; Denebkaytor Mo Xβ; Denebkaytoz Mλ Po Pυ Qγ Vκ; Denebchaychos Eo; Tenebraitoz Vσ; Veneb kaitoz Pρ; *illeg.* Sβ

β And [01h 09'] [Mirach]: Mirach Bα Bι; Mirat Lζ³⁸ Vκ

β Per [03h 08m] [Algol]: Algol Eα

? In Aquarius: Pegasus³⁹ Bε(*later hand*)

? In Aquarius: Alhera⁴⁰ Eυ Mη?

? In Pisces: Sichil Sβ; Slichil Rα

³⁶ The pointer in ms Sk is significantl into Aries.

³⁷ The pointers in mss Eυ, Mη and Mo are significantly into Aries.

³⁸ In Aries in ms Lζ

³⁹ Possibly ε Peg.

⁴⁰ Ms Eυ has two different pointers with this name; the other is α Cep. The same is probably the case for Mη.

[CAPITULUM 12.] DE INSCRIPTIONE CIRCULI HEMISPHERII SUPER LATITUDINEM REGIONIS

Post hoc accipies tabulam aliam et ipsa est in qua erit circulus hemispherii et

- 1 De ... regionis] *om.* Aα Bα Bζ Bκ Cβ Cδ Cε Cθ Dγ Eα Ev Lζ Mλ Nα Oα Oσ Pγ Pφ Rα Sβ Sδ Sθ St Vα Vε Vχ Xα; Capitulum. De preparatione [*illeg.*] tabule. De almath' Eo; Compositio tabule regionis Dη; De almicantharath Pο; De almicantharath. Rubrica Eδ; De almocantarath Vυ; De almucantarath Wι; De almucantaraz Qα(*marg.*); De almucantharath Eζ; De almucantharath Qμ; De almucantharath Et; De circulo emispherii Mν; De constitutione almucantaraz Cζ(almucantazar) Eμ(*marg.*) Mθ(almucantarath) Mκ Oη Oκ Pψ(abmicantesar) Sλ; De constitutione almutaniuz Vσ; De divisione equinoctialis et est tertia pars libri Bγ; De inscriptione vel(*om.* Lε) preparatione tabule regionis et divisione equinoctialis in ipsa Lε Tδ; De modo inscribendi lineas progressionarias sive almucantharath Bι; De preparatione tabule ad almucantarath et eorum figuracione Vν; De preparatione tabule ad almucantharath Pτ; De preparatione tabule regionis et divisione equinoctialis in ea Pλ Pq; De preparatione tabule regionis et divisione equinoctialis in ipse Bη Lβ Lη Mδ Oξ(*marg.*; *add.* Rubrica) Pα(*marg.*) Qγ Wβ; De tabula latitudinis Bθ Ev Mη Pυ; De tabula latitudinum Vκ(*other hand, marg.*) Vπ; De tabulis latitudinum. Et primo de divisione equinoctialis ad almucantarath Vβ; Preparatio tabule regionis Mο; Preparatio tabule regionis atque divisio equinoctialis in ipsa Xβ; *add. in marg.* Tertia pars principalis: de almuc^{rat}, secundo de azimuth, et post hoc oportet tertio de horis et prius "Post hoc" Bι; *add. in marg.* Super hac tabula poteris aponere(?) quod iam docuit facere Eα
- 1 *before* De] Capitulum Bε Fβ De inscriptione] scriptione Oτ circuli] *om.* Cι Lγ Pδ Pθ Vψ hemispherii (*and elsewhere*)] emispherii *many* super] *add.* .12. Qδ super ... regionis] *om.* Fβ; et cetera Sκ regionis] *add.* .b. Pν; *add.* Capitulum 12 *and in marg.* 12^m Bε
- 2 Post] Postea Bε Rα accipies] accipietis Oκ; *add.* etiam Bζ Pφ St Vν aliam] *om.* Wβ; ut veriter matris Qμ; *add.* ut veriter matris Bζ Eο Mη Pτ Vν; *add. interlin.* a rete Oα; *add.* quam alancabuz scilicet Qα est] *om.* Vκ; erit Dη erit] *om.* Qλ Wα; erat Ev; eris Cη; est Bζ Mν Pφ; *corr. to* erit Sλ circulus] *marg.* Pν; *add. interlin.* ut patet in secunda figura Cδ hemispherii] *add.* id est orizon qui est primus almucantaraz Cζ(*interlin.*; almucantazar) Eμ(*marg.*) Mκ(*interlin.*)
- 2-3 erit ... circuli] *om.* St et circuli] *om.* Eδ Eζ Et Pο
- 2-15 Post ... reflexa]¹ Accipias² tabulam aliam in qua erit circulus emispherii et circuli qui succedunt ei, scilicet almucantarath, id est progressiones solis et hore et azimuth in qua fac circulum Arietis et Libre sicut in rethe et Capricorni et Cancri. Bα

¹ Ms Bα (an early ms) replaces the entire capitulum with these few lines.

² Cf II. 2-4.

[CHAPTER 12.] ON THE INSCRIPTION OF THE CIRCLE OF THE HEMISPHERE AT THE LATITUDE OF
THE REGION

Afterwards, you will take another plate and this is the one in which will be the
circle of the hemisphere [i.e., the horizon]

circuli qui succedunt ei in directo eius qui dicuntur “almucanthat”, quos Latini vocant “progressiones solis” et “lune hore” atque “azimuth”. Sitque hec tabula maior

- 3 circuli] *marg.* Wι; *om.* Sκ succedunt] *add. in marg.* scilicet ei Mκ; *add. interlin.* id est reliqui almucantar Mκ; *add. interlin.* [illeg.] Oα ei in] eum³ Eη Oζ Oξ Oτ Pμ Pν Pρ(*add. interlin.* in) Qβ Qγ; eum in Aα Bη Bθ Bι Cβ Cδ Cε Cζ Cη Cθ Dγ Eα Eδ Eζ Eμ Ev Eτ Ev Lζ Mθ Mκ Mλ Mν Nα Oα Oη Oκ Oσ Pα Pγ Pλ Pο Pτ Pυ Rα Sβ Sθ Sκ Sλ Vε Vα Vβ(*add. interlin.* al' ei) Vκ Vπ Vσ Vυ Vχ Wβ Wι Xα; eum in *corr.* to ei in Bγ; *add. interlin.* id est reliqui almucantaraz Ev eius] eius eius Qλ almucanthat] al|almucanthat Aα; almucanthat Eδ Ev; almucanthat Pλ; almucantaraz Bκ Oα Oη; almucanthat Eτ Pν Sδ; almucanthat Oξ; almucanthat Lε; almitanthat Cθ; almu^{ath} Eζ; almucanthat Pα; almucantarach Xβ; almucanthat Pγ; almucanthat Mθ Vα Vχ(*corr. from* almucanthat); almucanthat Bθ Eα Eη Mδ Pθ Pφ Vβ Vν; almucantaraz Eμ Mκ Oκ Oσ Pψ Qα Sβ Sθ Sλ Vε Vκ; almucantazar Cζ; almucanthat~ Pτ; almucanthat Fα Oυ Rβ Sκ Vψ Wι; almucanthat Bε Bη Cι Eβ Ev Lβ Lγ Lη Mυ Mφ Nα Oζ Oτ Pδ Pμ Pρ Pυ Qβ Qγ Vπ Wβ; almucanthat Lζ Mλ Rα; almucantaraz Cβ Cδ; almucanthat Vι; almucanthat Bζ Dγ Qδ; almucanthat Bι; almucanthat Cε; almucanthat Fβ; almucanthat Wα; almucanthat^t Eο; almucanthat Fζ; almucanthat Tδ; almutara^s Vυ; almu^{ath} Xα; almu^{ath} Mο Pο Qμ; almutanthat Mν Sι; almutanthat^hz Vσ; almutanthat Mη Qλ; almutanthat Dη; almutanthat'ath Bγ Cη
- 4 vocant] notant Vε; *add.* eum in directo eius Xα lune] *om.* Aα Bγ Bζ Bθ Bι Bκ Cβ Cδ Cε Cζ Cη Cθ Dγ Dη Eδ Eζ Eμ Ev Eο Eτ Ev Lζ Mθ Mκ Mλ Mν Mο Nα Oα Oη Oκ Oσ Pγ Pο Pτ Pυ Pφ Pψ Qα Qμ Rα Sβ Sθ Sι Sκ Sλ Vα Vε Vκ Vν Vπ Vχ Vσ Vυ Wι; *add.* et Lγ Vψ hore] *om.* Pλ Pρ atque] *om.* Aα Vψ; *erased* Vκ azimuth] adimuth Qβ; amiuth Pρ; antimut Cζ; arimuth Qγ; arimuth *corr.* to azimuth Oξ; armivich *corr.* to azimuth Wβ; atimuth Vυ; aximath Pν; aximuth Mν; azimuth Cε Cι Vκ Xβ; azimuth Bζ Bη Bκ Cβ Cδ Cθ Dγ Eο Fα Fβ Lζ Mθ Mλ Oα Oσ Oυ Qα Rα Sβ Sλ(*corr. from* azimuths) Vα Vχ(*corr. from* asimut); azimuth Eμ Oκ Pψ; azimuth Vι; azsi[illeg.] Ev; azum^t Vε; azumuh' Xα; azumut Wα; azurimrith Nα; gradus et minuta hore Oη; *add.* inscribuntur Vψ; *add. interlin.* ut patet in tertia figura Cδ; *add. 2-line gloss* Cζ Sitque] *add.* etiam Pγ hec] *om.* Bζ Bι Xβ; ista Rβ maior] *add. and del.* in Pγ
- 4-5 Sitque ... alhantabuz] *om.* Mν maior tabula] *interlin.* Cβ; *om.* Cθ; *add.* id est rethi Mη

³ In some manuscripts, e.g., Oτ and Sδ, “eū” [eum] could actually be “ei ī” [ei in].

and the circles which follow directly from it, which are called “almucantars”, which the Latins call “the progressions of the sun” and “hours of the moon” and “azimuth”.⁴ And this plate should be larger

⁴ Azimuths (lines of equal azimuth) mark angular distances (east/west) in reference to the observer’s zenith point overhead. From the Arabic, *al-sumūt* (السمت). See Kunitzsch, *Glossar*, no. 44, pp. 550-553.

5 tabula alhantabuz per quantitatem limbi. Et quod primum oportet te facere in hac figura facies scilicet circulum maiorem, et sit circulus ABCD et extrahe diametra eius

- 5 alhantabuz] rethis et alabut Eo; retis et alamabuch Pφ Si; alamcabut Cβ; alamtabuz Cδ; alancabū Nα; alancabut Eμ Ev Mθ Ok Pψ Sθ Vχ; alancabuth *corr. to* alantabuth Vβ; rethis et alancabuth Bζ; alancabuz Lζ Oα Oσ Qα; alancabz *corr. in marg. to* alahantabuz Qμ; alancanbut Vε; alanchabut Dγ; rethis et alanchabuth Vv; alantabit Eν; alantabū Eδ; alantabut Oη Vv; alantabuth Cζ; alantabuz Aα Bθ Bκ Cθ Eζ Mλ Mo Po Pv Rα Vπ Wι; alanthabuz Mη; alatanbut Vα; alantabuz Sλ; alancabuz Sβ; alcantabut Eα; alchanchabuz Cε; alhan Pθ; alhancabuth Bη Bi Pτ; alhancabuz Mv; alhantabu' Xα; alhantabuch Vκ; alhantabur Pv Pρ; alhantabutz Bε Eη Oξ Oτ; alhantabuz Cι Eβ Fα Fβ Fζ Lβ Lγ Lε Mδ Mφ Mκ Oζ Ov Pδ Pλ Pμ Qβ Sδ Vi Vσ Vψ; alhanthabur Tδ; alhanthabuth Bγ Cη; alhanthabuz Pα Qγ; alhatabur Qδ Xβ; alhatabuz Rβ; alhaurabuch Wβ; alhautabuz Qλ Wα; allantabuz Pγ; al mucantharat Sκ; ascanthabuth Dη; halhantabuz Eτ Lη; *add. et rethis Pα(marg.); add. id est rethe alcantabut Eα; add. id est rethi Bε Cι Eβ Eη Fα Fβ Fζ Lγ Lε Lη Mδ Mo Mφ Oα(interlin.) Oζ Oξ Oτ Ov Pα Pθ Pλ Pμ Pv Pρ Qβ Qγ Qλ Sδ Vi Wα Xβ; add. id est rethi ahantabu' Xα; add. id est rethis Bκ Dη Lζ(interlin.) Tδ Vψ limbi] sibi Eζ; add. id est mater and add. in marg. aliter ut est Ov; add. ut est mater Bε Bζ Cι Eα Eβ Eη Eo Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mu Mφ Oζ Oξ Oτ Pα(interlin.) Pδ Pθ Pλ Pμ Pρ Pτ Qδ Qλ Qμ Rβ Sδ Tδ Vβ(interlin.) Vi Vv Vψ Wα Xβ; add. ut sit mater Fα; add. interlin. and marg. gloss Eμ quod] om. Bε Cε Cι Dη Eα Eβ Eδ Eζ Eη Eτ Fα Fβ Fζ Lβ Lγ Lη Mδ Mo Mu Mφ Nα Oζ Pγ Pδ Pλ Pμ Pv Po Pu Qβ Qγ Qδ Qλ Rβ Sδ Sκ Tδ Vi Vψ Wα Xα Xβ; marg. Wι; hoc est quod Sβ quod ... facere] primum quidam Cδ Sλ primum] primo Dη oportet te] debet Xα te] om. Bζ Bη Bθ Bi Bκ Cε Eδ Eζ Eτ Fβ Lζ Pα Pγ Po Qδ Qλ Rα Rβ Sβ Sκ Vε Vκ Wα Wβ; marg. Wι; se Si hac] om. Pδ*
- 5-6 quantitatem ... circulum] om. Ev 5-6 Et ... scilicet] Et primo Qα
- 6 figura] tabula Dη; *add. ibi superius vides scilicet in predicta Bκ; add. interlin. [illeg.] figura Eα facies scilicet] om. Dη Eδ Pδ Pρ Qδ Rβ; est ut facias Bγ Bζ Bη Cη Eo Pα Pτ Si(add. scilicet) Vβ(corr. to facias) Vv Wβ; facias Pφ; facies Cδ Cε Sλ Wι; scilicet Bε Cι Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mu Mφ Nα Oζ Oξ Oτ Ov Pθ Pλ Pμ Pv Pρ Qβ Qγ Qλ Sδ Tδ Vα Vε Vi Wα Xβ; add. interlin. est quod Cβ circulum] om. Pv Pρ; add. qui erit extremitas tabule Cζ maiorem] add. qui extremitas tabule est Mκ(interlin.); add. per extremitatem tabule Bζ Cι Eα Eη Eo Fα Fβ Fζ Lβ Lγ Lη Mδ Mη Mu Mφ Oζ Oξ Oτ Ov Pα(marg.) Pδ Pθ Pλ Pμ Pv Pρ Pτ Qγ Qβ Qδ Qλ Qμ Sδ Tδ Vβ Vi Vv Vψ Wα Xα Xβ; add. qui extremitas tabule erit Eμ(interlin.) Oη circulus] add. hic Bγ Cη Pα Wα; add. diametri scilicet Vε ABCD] abut Aα extrahe] add. hac Vε diametra] diametros Dη; diametrum Vv eius] interlin. Cβ*

than the plate of the spider⁵ [i.e., rete] by the width of the rim. And what you should first do in this figure, namely you will construct a larger circle, and let it be circle ABCD, and extend its diameters

⁵ See note to Cap. 11, line 14.

quousque se abscindant rectis angulis super E, eritque linea EA linea medii celi, et linea EB linea occidentis, et linea ED linea orientis; linea vero EC erit linea recessionis.

10 Postea pones punctum E cuspidem et facies circulum cuius dimidium diametri sit sicut dimidium diametri circuli Capricorni, quem fecimus in rethi, et est circulus

- 7 quousque] usque Sβ abscindant] abscindat Qγ rectis] retis Pφ; rectam Pγ; *add.* 4/quatuor Vψ Xα angulis] regulis Eo; *add.* sit Vε lineae₁ ... celi] *marg.* Mκ
lineae₁ EA] *om.* Pυ Xα EA] *om.* Bζ Bθ Vπ; *interlin.* Eδ; EGA Pγ; eius Sβ; ex linea Vε; *add.* illa Eδ EA linea] E.A.L.M. ea Vψ lineae₂] *om.* Bζ Cδ Eα Eo Vυ Sλ Xβ
medii] *add.* diei Oα celi] *add.* vel meridiei Cε Dη
- 7-8 eritque ... EC] *marg.* Bε; et Eυ linea EB] *om.* Eζ
- 7-9 eritque ... E] *om.* Eη
- 8 EB] DO Vε; EV Pφ lineae₁] *om.* Bκ Eo Qα Vκ occidentis] occidentalis Cδ Cζ Nα
Oη Pυ Pφ Vα Vυ; *add.* *interlin.* al' occidentalis Vβ et ... orientis] *om.* Lβ ED] E_b
Pγ; CD Vε; *add.* erit Pq lineae₃] *om.* Aα Bγ Bη Bθ Bι Bκ Cδ Cη Dγ Eζ Eτ Lζ Mλ Mo Nα
Po Qα Qδ Rβ Sβ Sκ Vκ Vπ Wβ Xα; *interlin.* Pα lineae₃ orientis] *marg.* Oξ
orientis] evenas Cθ; occidentalis Vι; orientalis Cζ Eμ Nα Oη Pυ Vυ Pφ Sι; *add.*
interlin. al' orientalis Vβ lineae₄ ... lineae₅] *om.* Pq vero] *om.* Vε EC] ET Xα; LR
Vε erit] *om.* Bζ Eτ Fβ Mυ lineae₅] *om.* Bζ Eτ recessionis] *crossed out* Pq;
medie nocte Bε; septentrionalis Fβ; *add.* *interlin.* septentrionalis Cβ; *add.* *interlin.* id est
septentrionalis Mθ Vβ; *add.* 9-line gloss Cζ
- 9 Postea] Post hec/hoc *many:* Post Vε Postea ... E] *marg.* Bε pones] *om.* Lβ; pone
Cδ Eo Mυ Vυ; ponesque Oη punctum] *om.* Aα Bγ Bθ Bι Bκ Cε Cη Dγ Eτ Eυ Lζ Mλ
Nα Pυ Qμ Rα Sβ Vε Vκ Vπ Wβ Wι; *marg.* Pα; *add.* super Vυ punctum E] *om.* Mo
cuspidem] cupsides Mo facies] fac Cδ Sλ; faciem Vε cuius] eius Vυ
cuius ... diametri] cuius medium diametrum Cε; eius dimidium diametrum Cη
dimidium] *om.* Oη; medium Dη Mθ Oκ diametri] diameter Mδ; *corr.* from
diameter Vβ
- 10 sit ... diametri] *om.* Mη Pγ Xα; *marg.* Qδ; *marg.* [illeg.] dimidium diametri Eδ sicut]
om. Aα Bγ Bζ Bθ Bι Bκ Cε Cη Cθ Dγ Eζ Eυ Eo Eτ Eυ Mλ Mo Nα Pα Po Pυ Rα Sβ Vπ Vχ;
interlin. Wι sicut dimidium] *interlin.* Cβ dimidium] *om.* Bζ Cθ Eυ Mυ; *interlin.*
Lζ diametri] *om.* Eα Vχ; *corr.* from diameter Vβ circuli] *om.* Xβ; *repeated* Oτ
quem] quid Mυ; quod Cζ Oη; quemadmodum Bζ Eo Vυ; *corr.* to quemadmodum
Vβ; o[mn]e (!) Po rethi] rete Cβ Cζ Cθ Eμ Mθ Pφ Pψ Oκ Sθ Sι Sλ Vα Vψ; rete *corr.*
to reti Mκ; rethe Dγ Eυ Eυ Mυ Oα Oσ Qα Oη Vε Vπ Vυ Vχ Xβ; reti Bθ Cδ Vσ; rheti Rβ;
directi Vκ circulus] *om.* Eυ

until they intersect at right angles at E, and line EA will be the line of mid sky, and line EB the line of the west, and line ED the line of the east; line EC, however, will be the line of recession.⁶

Next you will set point E as centre, and make a circle whose radius should be as the radius of the circle of Capricorn, which we made in the rete, and it is circle

⁶ I am not sure of the meaning of this term as used here. Obviously EA would be the midday (= "mid-sky") line, and EC would be the midnight line. In the *Practica*, Cap. 10 line 2 "recessionis" refers to the sun sinking in the sky after midday. Here, after midnight, it may mean that the sun is returning from the other side of the earth toward the east and dawn.

ZHTK. Deinde facies super hunc circulum alterum qui sit equalis circulo rethis prope eum. Post hoc divides eum per 360 divisiones et scribes in eo numerum sicut vides in hac figura. Fac etiam in ea circulum per quem vadit caput Arietis et Libre, sicut fecisti in rethi qui est circulus LMNS, et circulum Cancrī qui est circulus GFQO. Et erit punctus A

- 11 ZHTK] CHTK Eα Xα; SHTK Mv; THTK Vv; ZBCK Aα; ZHCK Bθ; ZH et TH Xβ; ZHETK Mη; ZHH Vε super] repeated Lβ; supra Po super hunc] om. Aα Bθ Ev Vπ hunc] om. PΛ Xα; istius Eα circulum] twice Vε alterum] aliud Bε; alium Qβ; add. interlin. circulum Vβ alterum ... rethis] altet/ Vv qui ... rethis] om. Cβ Cδ Cθ Ev Mv Oα Oσ Pφ Pψ Qα Sθ Sλ Vα Vv; marg. Pα(partly cut off) Vχ qui ... propre] om. Si circulo] arco Nα rethis] re| thetis Po; retis Bθ Eδ Nα Pγ Vψ; zechis Vκ; add. his Eζ
- 11-12 Deinde ... eum₁] om. Cζ Mθ Mκ Oη Oκ Vσ
- 12 eum₁] om. Bη Wβ; m̄ Vε; add. Hoc non oportet nisi(om. Cζ) ut dividatur una quarta eius ut supra docuit ad(et Cζ) hoc ut ex hoc circulo fiat circulus Arietis et si scribitur numerus, scribitur ita ut(quod Mκ) posset deoleri Cζ Eμ(marg.) Mκ(marg.) divides] pones divisiones Eδ eum₂] om. Fα 360] 160 Pψ et scribes] repeated Eδ in eo] om. Eβ vides] fides Mv; videmus Pγ
- 13 hac] om. Bζ Bκ Eo Nα Vι Pυ Vv; predicta Pτ; sequenti Dη; sua Bε; add. superius Bκ; add. interlin. scilicet presenti Vβ figura] add. vel non oportet Qα; add. precedenti Sι; add. predicta Pυ Fac] om. Sκ; Facies Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mκ Mv Oα Oη Oκ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vv Vχ; Facit Nα; Arietis Bθ Mθ Vπ etiam] om. Dη Mθ Oκ Vε in ea] om. Wι ea] eo many; add. interlin. scilicet figura Vβ circulum] om. Qδ; circulum circulum Cζ; add. interlin. id est circulum equinoctiale Cβ per] super Vε vadit] add. cadit Eζ caput] cadit Rβ sicut] quemadmodum Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mθ Mκ Mv Oα Oη Oκ Oσ Qα Pφ Pψ Sθ Sι Sλ Vα Vβ(add. interlin. in al' sicut) Vε Vv Vσ Vυ Vχ fecisti] om. Lβ Vε
- 13-14 in rethi] om. Qλ; marg. Wα
- 14 rethi] rethe Dγ Ev Ev Lε Mv Mv Mφ Oα Oη Oσ Pφ Pψ Qα Vε Vι Vυ; rete Cβ Cδ Cζ Cθ Eμ Mθ Oκ Pφ Sθ Sι Sλ Vα Vχ Vψ; reti Bθ Vπ Vσ; rete corr. to reti Mκ; rheti Rβ LMNS] FMNS Sι; LMRNS Sθ; LMVS Aα Bθ Sκ; QMNS Vv; QMNL Pφ LMNS ... circulus₂] marg. Ou et₁] add. fac Pα circulum] illum Eα GFQO] FGNO Vπ; FGQO Aα Bγ Bθ Bι Bκ Cε Cη Dγ Dη Eζ Eτ Ev Fα Lζ Mλ Mο Nα Pγ Pο Pτ Pυ Qδ Rα Rβ Sκ Vκ Wβ Wι Xα; corr. to FGFQO Pα; FGQO Sβ; FGTQO Eδ; FGUT Vε; FQO Cι; GFAO Eο; GFKO Eα; GFLO Bζ Vv; GFQR Cβ; GSQO Pφ Sι erit] om. Ev; interlin. Xβ; est Lε Vυ; dicitur Vε A] om. Bζ Nα Qλ; interlin. Wα; AC Vσ

ZHTK. Then you will draw over this circle another one [*or over this another circle*], which should be equal to the circle of the rete, near to it. After this you will divide it into 360 parts and write in it [i.e., in each division] the number, as you see in this figure.⁷ In addition draw on it the circle though which passes the head of Aries and Libra, just as you did on the rete which is circle LMNS, and the circle of Cancer which is circle GFQO. And point A will be

⁷ Although instructed to divide the Circle of Capricorn, these divisions are not used in the subsequent capitula; only the equivalent divisions of the equatorial circle are used. However, this may simply be a reflection of the instruction to divide the rim of the plate so that these divisions will appear in the final instrument. See Cap. 1.

There is also the possibility that one could use the divisions of the Circle of Capricorn, rather than the divisions of equatorial circle, in placing the stars in the rete since the divisions would be larger and easier to work with. Apparently this is a suggestion of Ibn al-Samḥ (see Samsó, *On Both Sides*, p. 426 note 465).

15 locus allidadath que est armilla reflexa.

- 15 locus] *om.* Cζ Eμ allidadath] ab Vν; addadath Mη; alhaidith Oυ; alhalacht Mθ; alhtatath Sι; alidadach Vπ; alidadat Mλ; alidadath Bε Bθ Cε Eη Oξ Pυ Qδ Rβ; alidade Eα; alilacahlarateb Eν; alilachat Pψ; alilada Oα Oσ; alilamich Vε; alilarath Eο; alilatach Cζ; alilatat Oη; alilathat Cβ Eμ Sθ Vα; alilathât Cθ; allalachat Mκ; allialachat Oκ; alliba | ath Vψ; allibachach Wβ; allidacahe Cδ; allidachach Bη; allidact/ Nα; allidada Vυ Wι; allidadat Bκ Rα Sβ Vκ; allidadath Aα Bγ Bι Cη Dη Eβ Eδ Eζ Eτ Eυ Fα Fβ Fζ Lβ Lγ Lε Lη Mο Mυ Mφ Oζ Oτ Pα Pγ Pθ Pλ Pμ Pν Pο Pρ Qβ Qγ Qλ Sδ Sκ Tδ Vι Wα Xα Xβ; allidadach Vβ; alidade Mδ Pτ; allidatath aliladatath Bζ; allilacath Cι Pδ Pφ; allilachat Vσ Vχ; alliladat Lζ; alliladit Dγ; allilath Mν; allilathat Sλ; allithat Qα que] qui *some* est] *interlin.* Wι reflexa] re reflexa Lε; *add.* ut hic Pρ; *add.* ut patet in figura precedenti Fβ; *add.* in *marg.* Mφ.⁸

Signa	Gradus	Minuta
Aries	15	54
Thaurus	19	53
Gemini	27	52
Cancer	36	34
Leo	39	55
Virgo	[3]9	44
Libra	39	44
Scorpius	39	55
Sagittarius	36	34
Capricorn	[2]7	52
Aquarius	19	53
Pisces	15	58

Virgo 39] *ms* 29; Capricorn 27] *ms* 37

⁸ This list in *ms* Mφ gives the rising times in oblique ascension of the zodiacal signs for a latitude of around 48°. The two corrections are necessary in order to preserve the symmetry of the table. These emendations were suggested to me by Julio Samsó, who also notes that there are systemic problems with the list since the oblique ascensions at the end of the signs are off, overall, by 10 degrees, i.e., the sum of the ascensions to the end of Virgo add up to only 175° rather than 180°, and to the end of Pisces to 350° rather than 360°. [Note: there is another such list, without minutes, in *mss* Mφ and Wα at the end of the next capitulum. See Cap. 13, line 21 apparatus criticus.]

the place of the “ring” [i.e., allidadath],⁹ which is the armilla reflexa.

⁹ See the note to Cap. 4 line 27.

[FIGURA 12]

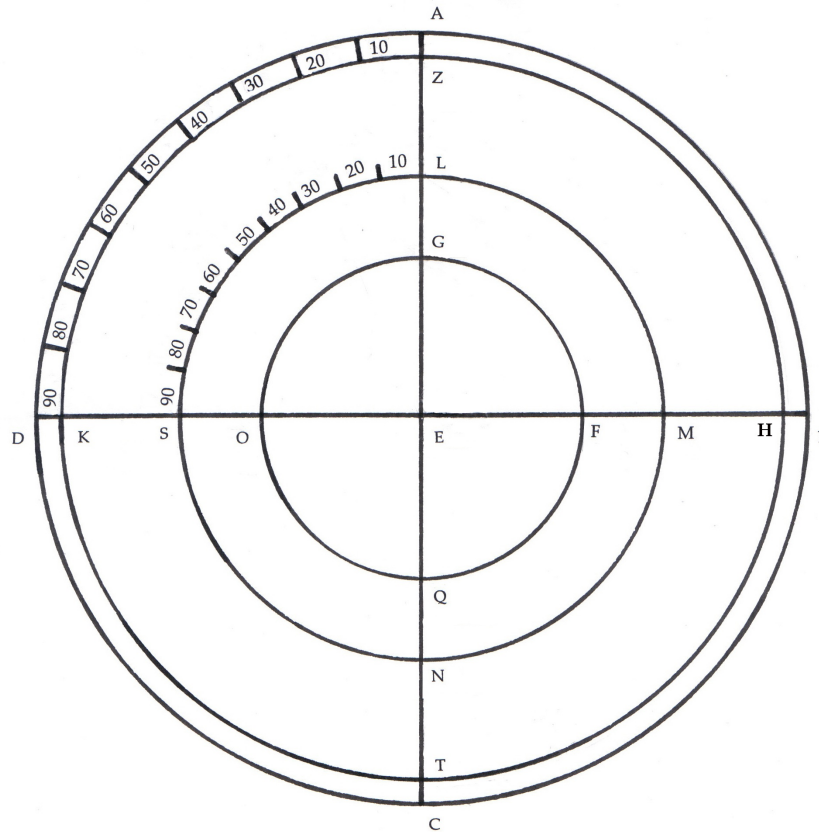


Figura inscriptionis hemispherii super latitudinem regionis

[Complete diagram] Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev¹⁰ Eτ Ev Fα Fβ Fζ Lγ Lε
 Lζ Lη Mδ¹¹ Mη Mθ Mκ Mλ Mν Mo Mv Oζ Ok Oξ Oσ Oτ Ov Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ
 Qγ Qδ Qλ Qμ(fol. 155')¹² Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι(fol. 332') Vκ Wα Wι Xβ
 [Partial diagram] Eo Vχ Wβ

¹⁰ There are two diagrams in ms Ev. One is simply a quartered circle labelled A, B, C, D, E; the other is more complete and its lettering is given in the apparatus.

¹¹ The diagram in ms Mδ contains elements from Figura 17 or 18.

¹² The diagram in ms Qμ (fol. 155') is not linked (like other diagrams) to the text. It also shows indications of the beginnings of Figure 13, which does exist separately.

[*Outline or space only*] Αα Βζ Βθ Cε Dγ Dη Eδ¹³ Eζ Λβ Μφ Οα Pν Pφ Qα Rβ Vπ Vσ Vυ Vψ
 [No space] Βα Bγ Cζ Nα Oη Sι Sκ Sλ Vν Xα
 Pθ: “L”

[Caption]

Figura ... regionis] Cη Cι Eη Fζ Λγ Oξ Oτ Pδ Pα Pτ Qβ Qγ Qλ Sδ; *om.* Bι Bκ Cβ Cδ Cθ Eμ Ev Λζ Mη Mθ Mκ Mλ Oσ Pλ Pψ Rα Sβ Sθ Vε Wα; [*cut off*] divisionis equinoctialis [*cut off*] almucantherach Bη; Figura divisionis equinoctii Vβ(*add. interlin. al' equinoctialis*); Figura divisionis equinoctialis Et Mv Mo Mu Pγ Po Pv Vι Wι; Figura divisionis equinoctialis per almucantarath Eβ Fα Λε Oυ Xβ Tδ Vκ Wβ (almacantharath Wβ; almucantarath Fα Λε Oυ; almucantherath' Xβ; almucantherath Eβ Tδ; almucantarach Vκ); Figura inscriptionis circuli hemisperii super latitudinem regionis et de divisione equinoctialis per almucantarath Oζ; Figura inscriptionis hemisperii super latitudinem regionis et de divisione equinoctialis per almucantarath Qμ; Figura inscriptionis tabule regionis *and* Figura tabule regionis Pρ; Figura preparationis tabule regionis et inscriptionis orizontis cum divisione equinoctialis per almucantarath Mδ; Inscriptione circuli hemisperii et divisione equinoctialis per almucantarath Λη; Hec figura pro almucantarath principio Oκ(*later hand*); Recapitulatio tabule propter facere aa almucantarath Eα; Tabula latitudinis Ev; *add.* Figura capituli 12 Bε inscriptionis] *add.* circuli Fβ Pμ hemisperii] orizontis Bε latitudinem] *om.* Qδ

[Lettering on the diagram]

A] Bε Bη Bι Bκ Cβ Cδ Cθ Cι Eα Eβ Eη Eμ Eτ Ev Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Mκ Mλ Mv Mo Mu Oζ Oκ(*twice*) Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *om.* Cη Ev Fα B] Bε Bη Bι Bκ Cβ Cδ Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Mκ Mλ Mv Mo Mu Oζ Oκ(*twice*) Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *om.* Cη; *cut off* Bκ c] Bε Bι Bκ Cβ Cδ Cθ Cι Eα Eβ Eη Eμ Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Mκ Mλ Mv Mo Mu Oζ Oκ(*twice*) Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *om.* Bη Cη Pτ; N' Ev d] Bε Bι Bκ Cβ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Mκ Mλ Mv Mo Mu Oζ Oκ(*twice*) Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *cut off* Bη Cδ Sθ e] Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mθ Mκ Mλ Mv Mo Mu Oζ Oκ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ f] Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mκ Mλ Mv Mo Mu Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *om.* Mθ Oκ Pμ g] Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eη Eμ Ev Eτ Ev Fα Fβ Fζ Λγ Λε Λζ Λη Mδ Mη Mκ Mλ Mv Mo Mu Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Po Pρ Pτ Pv Pψ Qβ Qγ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; *om.* Eβ Mθ Oκ Pμ Qδ h] Bη Bι Bκ Cβ Cδ Cθ Eα Eβ Eμ Ev Eτ Ev Fα Λε Λζ Λη Mδ Mη Mκ Mλ Mv Mu Oζ Oκ Oσ Oυ Pγ Pλ Po Pρ Pv Pψ Qμ Rα Sβ Sθ Tδ Vα Vβ Vε Vι Vκ Wι Xβ; *om.* Bε Cη Cι Eη Fβ Fζ Λγ Mo Oξ Oτ Pα Pδ Pμ Pτ Qβ Qγ Qδ Qλ Sδ Wα; B Mθ k] Bη Bι Bκ Cβ Cδ Cθ Eα Eβ Eμ Ev Eτ Fα Λε Λζ Λη Mδ Mη Mκ Mλ Mv Mo Mu Oζ Oκ Oσ Oυ Pλ Po Pρ Pv Pψ Qμ Rα Sβ Sθ Tδ Vα Vβ Vι Vκ Wι Xβ; *om.* Bε Cη Cι Eη Fβ Fζ Λγ Oξ Oτ Pα Pγ Pδ Pμ Pτ Qβ Qγ Qδ Qλ

¹³ Ms Eδ contains other diagrams unrelated to the text..

Sδ Wα; D Mθ; F Vε; O Eυ L] Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ
 Lη Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ
 Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; om. Oκ Pμ; T Mθ; add. Z Bε Eη M] Bη Bι Bκ Cβ
 Cδ Cη Cθ Cι Eα Eβ Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Oξ Oσ Oτ
 Oυ Pα Pγ Pδ Pλ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ;
 om. Oκ Pμ; H Mθ; add. H Bε Eη; add. T Oξ N] Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eμ Eν Eτ Eυ
 Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pο Pρ Pτ Pυ Pψ
 Qβ Qγ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; om. Oκ Pμ; K Qδ; R Mθ; add. T Bε Eη
 O] Bε Bη Bι Bκ Cβ Cδ Cη Cι Eα Eβ Eη Eμ Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mν
 Mο Mυ Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ
 Vι Vκ Wα Wι Xβ; om. Cθ Mθ Oκ Pμ; B' Eν; E Vε Q] Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη
 Eμ Eν Eτ Eυ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mκ Mλ Mν Mο Mυ Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pο
 Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ Wα Wι Xβ; om. Mθ Oκ Pμ
 S] Bι Bη Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mο Mυ
 Oζ Oξ Oσ Oτ Oυ Pα Pγ Pδ Pλ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sθ Tδ Vα Vβ Vε Vι Vκ
 Wα Wι Xβ om. Oκ Pμ; B' Eν; G' Mν; K Mθ; S Eυ; add. K Bε Eη; add. H Oξ T] Bη Bι Bκ Cβ Cδ
 Cθ Eα Eβ Eμ Eν Eτ Eυ Fα Lε Lζ Lη Mδ Mη Mκ Mλ Mν Mο Mυ Oκ Oσ Oυ Pγ Pλ Pο Pρ Pυ Pψ Qμ
 Rα Sβ Sθ Tδ Vα Vβ Vε Vι Vκ Wι Xβ; om. Bε Cη Cι Eη Fβ Fζ Lγ Oξ Oτ Pα Pδ Pμ Pτ Qβ Qγ Qδ Qλ
 Sδ Wα; C Mθ; I Oζ Z] Bη Bι Bκ Cβ Cδ Cθ Eβ Eμ Eν Eτ Eυ Fα Lε Lζ Lη Mδ Mη Mκ Mλ Mν
 Mο Mυ Oκ Oσ Oυ Pγ Pλ Pο Pρ Pυ Pψ Qμ Rα Sβ Sθ Tδ Vα Vβ Vε(twice) Vι Vκ Wι Xβ; om. Bε Cη
 Cι Eα Eη Fβ Fζ Lγ Oξ Oτ Pα Pδ Pμ Pτ Qβ Qγ Qδ Qλ Sδ Wα; A Mθ

[Divisions of the circles]

Capricorn (ZK) divided: 10/20/.../90: Bι Bκ Eβ Eμ Eτ Eυ Fα Lε Lζ Lη Mδ Mη Mθ Mκ Mλ Mν
 Mο Oζ Oκ Oσ Oυ Pλ Pρ(all 4 quadrants) Pο Pυ Qμ Rα Sβ(all 4 quadrants) Tδ Wι Xβ
 10/20/30/40: Mυ arc ZK] 5/10/15 Cβ; 10/20/30 Vι; 360 Pγ arc ZH] 5/10/15 Cβ;
 10/20/30 Pγ divided but no numbers: Vβ
 Equator divided: 10/20/.../90: Bη Bκ Eβ Eμ Fα Lε Lζ Lη Mδ Mθ Mκ Mλ Oζ Oκ Oυ Pλ Pρ
 Qμ Rα Sβ Tδ Vκ Xβ 30/60/90: Bι divided but no numbers: Mο Wι
 Neither divided: Bε Bη Cδ Cη Cθ Cι Eα Eη Eν Fβ Fζ Lγ Mυ Oτ Pα Oξ Pδ Pμ Pτ Pψ Qβ Qγ
 Qδ Qλ Sδ Sθ Vα Vε Vκ Wα

[Other information]

add. meridies Eα Eυ Mδ Pλ Pρ Qλ add. oriens Eα Eυ Lγ Mδ Oζ Pλ Pρ Qγ Qλ add.
 occidens Eα Mδ Oζ Pλ Pρ Qγ Qλ add. o[ccidens] Lγ add. septrentio Mδ Pλ Pρ
 add. equale latitudini Cη Lγ Qλ; add. latitudo regionis Cη Lγ Qλ Qμ; add. latitudo Qδ
 add. hemisperii Pρ; add. circulus emisperii Oξ add. linea recessionis it est angulus cre
 Eα add. Cancri Pρ; add. circulus Cancri Vβ add. Arietis Libre Pρ; add. cculus
 equinoctialis id est Arietis et Libre Vβ add. Capricorni Pρ; add. circulus Capricorni Vβ

[Additions from Figure 13]

Lines for drawing azimuth added : Bε Cι Eβ Eη Fα Fζ Lγ Lη Mδ Oζ Oτ Pα Pδ Pλ Pμ Pτ Qβ Qγ Qδ Sδ
 Wα
 Azimuth circle added: Cι Cη Eβ Eη Fα Fβ Fζ Lγ Mδ Oζ Oξ Oτ Pα Pδ Pλ Pρ Pτ Qβ Qγ Qδ Qλ Sδ Wα
 Azimuth lettering added: Bε(L, M, N)

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[CAPITULUM 13.]¹ DE INSCRIPTIONE ALMUCANTHARAT

Post hoc debes facere circulum hemisperii et circulos qui succedunt ei in directo,

- 1 De ... almucantharat] *om.* Aα Bα Bζ Bι Bκ Cβ Cδ Cε Cθ Dγ Eα Ev Eo Lζ Mθ Mκ Mν Nα Oα Oη Oκ Oσ Pγ Pφ Pψ Rα Sβ Sθ Sι Sλ Vα Vε Vκ Vν Vσ Vυ Vχ Xα; Capitulum scientia inscriptionis al~ Fβ(*marg.*); De al~ Pτ; De circulo emisperii quod est primum al~ Qα(*marg.*); De descriptione circuli emisperii et suorum al~ Bη Wβ; De inscriptione circuli(*superscr.*) emisperii ad al~ Mη; De inscriptione circuli (h)emisperii et al~ Bθ Ev Fa Pυ Vβ Vπ(*add.* Rubricum); De inscriptione circuli emisperii seu orizontis Mo; De inscriptione circuli hemisperii seu orizontis et ipsorum al~ qui dicuntur progressionones solis et lune super ipsam tabulam latitudinis regionis Mδ; De inscriptione ipsius circuli hemisperii seu orizontis et ipsorum al~ qui dicuntur progressionones solis super ipsam (*add.* tabulam Lη Oξ) latitudinis regionis Lβ Lη Oξ Qγ; De invencione circuli emisperii Dη; Incipit opus Eμ(*marg.*); *add. in marg.* [*illeg.*] Cζ Eδ; *add. in marg.* Capitulum 13 Eβ
- 1 before De] *add.* Capitulum Bε Fβ Lε inscriptione] *add.* circuli Qβ almucantharat] almucant. Wβ; almicant[~] Eζ; almicantharat Eδ; almuc' Fa; almucantarath Bθ Eη Mλ Oυ Pδ Qβ Qδ Rβ Vβ Vψ Wα Xβ; almucanterath Sκ; almucantha[*cut off*] Pα; almucantha^{ac} Bη; almucantharat Oζ Qγ Vι; almucantharath Eβ Ev Lβ Lγ Lη Mυ Mθ Oξ Oτ Pμ Pρ Pυ Qλ Sδ Tδ Vπ Wι; almucant^t Qμ; almucant^z Po; almucantz Qα(*marg.*); almucatharath Cι Mδ; almuchantarach Bγ Pτ; almuchantarath Fβ(*marg.*); almuchantharat Eτ; almuchatarach Pτ; almuhantarath Be; almukantarath Fβ; almunacantharath Fζ; almutantharath Lε Pθ Pλ; almuth Mη; almuthantharath Pν; *add.* Capitulum Cη Qλ
- 2 hoc] *om.* Bα debes] deberes Fζ debes facere] fac Bα facere] *add. and canc.* figuram Pα; *add. in marg.* in alia tabula super quam postea ponetur rethe Eα ei] *interlin.* Wι; *om.* Sκ; eum Sλ ei in] eum *corr.* to ei in Bγ; eum in Aα Bη Bι Bθ Cβ Cδ Cε Cζ Cη Cθ Dγ Eδ Eζ Eμ Ev Eτ Ev Lζ Mθ Mκ Mλ Nα Oα Oη Oκ Oσ Pα Po Pτ Pυ Pψ Rα Vα Vβ(*add. interlin* al' ei) Vκ Vπ Vσ Vυ Vχ Vε Wβ Xα; in Pρ in directo] *marg.* Sλ directo] recto Mν; *add.* eius Fβ; *add.* equidistant' Pτ; *add.* et equidistant Bε Eα Eβ Eη Fa Fβ Fζ Lγ Lε Lη Lβ Mδ Mφ Mυ Oξ Oυ Pα Pλ Pμ Pν Qβ Qγ Qλ Rβ Sδ Tδ Vι Wα Xβ; *add.* et equidistanter Qδ; *add.* et equidistantur Cε; *add.* et equidistent Mo Oζ; *add.* et qui distent Pρ; *add.* id est equidiscordantur Vκ; *add.* id est equidistant Bθ Vπ; *add.* id est (*add. interlin.* vel) equidistanter Vβ (*with deletion dots below*); *add.* id est equidistantes Sκ Xα; *add.* id est equidistantur Aα Bγ Bη Bι Cη Cι Dγ Dη Eδ Eo Eτ Ev Lζ Mη Mκ(*marg.*) Mλ Oτ Pδ Pυ Qμ Rα Sβ Vψ Wβ; *add.* id est equidistant Bκ Eζ Pγ Wι(*corr.* to equidistantes); *add.* id est equidistent Po; *add.* id est qui equidistant Bζ; *add.* id est rath equidistantur Pθ; *add.* vel equidistantii Nα
- 2-3 hemisperii ... circulum,₁] *om.* Sθ in ... almuthanthanth] *om.* Bα

¹ A number of manuscripts continue on from Capitulum 12 without a break.

[CHAPTER 13.] ON THE INSCRIBING OF THE ALMUCANTARS

After this, you ought to make the horizon and the circles which follow directly from it

5 qui sunt almucanthat. Ponesque circulum Capricorni, circulum ABCD, et abscindant se diametra super punctum E. Circulus vero Arietis et Libre erit circulus ZHTK, et punctus allidadath erit punctus A. Deinde divides circulum ZHTK per 360 divisiones.

- 3 qui sunt] *om.* Ev Mv sunt] *om.* Dη; dicuntur Vv; *add. interlin.* dicuntur Vβ almucanthat] almicantharht Ev; almicantharat Bκ; almicantharat *corr. to* almucanthat Vχ; almicantharath Eδ Pλ; almicantharaz Cδ; almicantharach Cε; almicantharath Xα; almichantharath Dη; almu' Vε; almucanthat Pα; almucanthat Er; almucanthat Cι; almucanthat Sβ; almucanthat Oκ Pψ Vα; almucanthat Bι Eα Eζ Mδ Mo Nα Oη Oξ Ou Pv Pφ Qμ Rβ Si Vβ Vψ Wι; almucanthat *corr. to* almucanthat Qλ; almucanthat Eμ Oα Oσ Qα Sλ; almucantazar Cζ; almucanth Fα Lη Pτ; almucanthat *corr. to* almucanthat Bγ; almucanthat Cθ Eβ Fζ Pq Sκ; almucanthat Lζ Mλ; almucanthat Cβ; almucanthat Bθ Vπ; almucanthat Aα; almucanthat Fβ Mκ; almucanthat Vv Qδ Wα; almucanthat' Eo; almutanthat Vσ Vv; almutanthat Mv Po; almutanthat Lβ Pγ; almutanthat Mη; almutanthat Bη; almutanthat' Bζ; almutanthat Cη; almutanthat Pv Ponesque] pones Bζ Cβ Eδ Qλ; pones igitur Bα; *add. super* Bβ circulum₂] *om.* Bα Bζ Cβ Cδ Qμ Sλ Vv ABCD] ZHTK Qα abscindant] abscindunt Lε Pφ; abscindat Eα Ev Oκ Pq Vπ; abscindut(!) Qγ
- 4 se] *om.* Cζ Eζ Mv; *interlin.* Wι diametra] diametri Dη Eβ super] supra Eζ Eτ Fα Lβ punctum] puncto Eβ E] C Vε circulus₁] *ms* Mγ resumes (f. 17^{ra}) vero] *om.* Fα; autem Bε Mγ Vβ circulus₂] *om.* Bα Bη; *add. and canc.* et Cη ZHTK₁] EHTK Xα; LMNO Qα; RHTK Nα; XHTK Mη; .S. HTK Mv; ZHTBR *corr. to* ZHTK Wβ; *add. divides per 360* Rβ
- 4-5 et₂ ... A] *om.* Aα Ev; et₂ ... ZHTK] *om.* Cε Eδ Eζ Eτ Mv Pγ Po Pv Sκ Vε Xα; dividens Bθ Vπ; et divide Wι(*add. in marg.* et₂ ... ZHTK); quem divides Nα
- 5 punctus.] punctum Dη; *add. in marg.* Ego Iohannes de Calomonte:² Multa ex exemplaria carent hac littera "Et punctus almucanthat erit punctus A. Deinde divides circulum ZHTK," tamen est utilis et bona et non reputanda pro extrema. Vβ allidadath Bγ Cη Fβ Mφ Oζ Oτ Ou Pλ Pq Pτ Qλ Vι Wα Xβ; *corr. to* allila CATH Wβ; alarath Vv; alibarach Bζ; alidadath Bε Eη Mv Qδ Rβ; alilacant Bα; alilacath Eα Ev; alilacaz Cζ; alilachacht Eo; alilachaz Oσ; alilarach Mγ; alilatahat Sθ; alilatath Cθ Oη Oκ(*corr. from* alilathat) Vv Vχ; alilatath Eμ Pψ; alilath Vα; alilathal Cβ; alilathat Mθ; alilathaz Oα; alladadat Vκ; alliathat Mκ; allidada Mo; allidadat Bκ Fζ Rα Sβ; allidade Bι; allilacache Cδ; allilacath Cι Eβ Fα Lγ Lη Oξ Pα Pφ Qγ Tδ Pμ Vψ; allilacaz Dη; alliladat Dγ Lζ Mλ; alliladath Bη Pθ; allilatath Lε Lβ Mη Pv Sδ; allilathat Sλ Vσ; allilathath Mδ Pδ Qβ; allilathaz Qμ; allitathat Si; almucanthat Vβ; armille Qα erit] *om.* Mv Mφ Qα Vι punctus₂] *om.* Bα Qα A] *add.* Immo/ymmo(Divides immo Ou) solam quartam ut in proximo apparet ut possint/possunt ex illa quarta(*om.* Ou) sumi omnes latitudines regionum Bη(*om.* ut₁ ... apparet; *add. et suffit~*) Cζ Eμ(*interlin.*) Mκ(*interlin.*; ut₁ ... apparet *crossed out*) Ou(*om.* ut₁ ... apparet) Deinde] *om.* Aα Ev; Post hoc Bα; circulum ZHTK] *om.* Ev Qα Wι; *add. interlin.* equis[*illeg.*] Cβ; *add. qui est* Si ZHTK] *om.* Pq; HTK Pμ; THTK Vv; XHTK Mη; ZHTLR *corr. to* ZHTK Wβ; Arietis ZI' Qα; ipsum Mo

² See note to Cap. 7 line 9.

which are the almucantars. And you will set out the circle of Capricorn, circle ABCD, and the diameters should intersect on point E. The circle of [the beginnings of] Aries and Libra, on the other hand, will be circle ZHTK, and the position of the ring [i.e., allidath]³ be point A. Then you will divide circle ZHTK into 360 divisions.

³ See note to Cap. 4 line 27 (English).

Postea pones arcum KL sicut latitudinem regionis, et arcum HM similem eius, arcum quoque ZG similiter.⁴

Postea iunges G cum H et abscindet diametrum AC super P, eritque punctus P punctus cenith caputum. Deinde iunges H cum L et abscindet diametrum AC super S.

- 6 Postea] Post hoc *many*; *om.* Bζ; *add. interlin.* al' Post hoc Vβ arcum₁] *om.* Mλ Pτ KL] *om.* Eδ; BL Vι; HM in circulo equinoctiale Qα regionis] *add. versus* T Mη; *add. in marg.* adquam vis facere astrolabium per illam tabulam secundum illam regionem Eα arcum₂] archum *several* HM] *illeg.* Vε; AKM Nα; KM Aα; LBM Bα; YN Qα; *add.* est Fβ similem] consimilem Vπ eius] *om.* Bε Bζ Bη Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Rβ Sδ Tδ Vα Vπ Vυ Wα Xβ; ei Bα Cι Eδ Mη Mυ Mφ Pδ Pθ Qα Qδ Qμ Sι Vι Vψ Xα; eis Vε; *add. interlin.* al' ei Vβ; *add. versus* Z Mη
- 7 quoque] *om.* Bα Bη Cδ Sλ Vυ; *add. tertium* Qμ ZG] Z tertium (?) versus KZG Mη; LG Qα; RG Nα; TP Vυ; ZS Bη; ¶G Sι
- 8 Postea] *om.* Eυ Vκ iunges] *om.* Qλ; *marg.* Wα G] *om.* Mν; GT Bι G cum H] G^{cum} H *corr. from* G CH Pα; G cum M Qα et] *add.* dy[ametrum?] Mυ abscindet] *illeg.* Eη; abscindes Bη Cε Cη Dη Eδ Eζ Mη Mo Ou Pγ Pν Po Pτ Wβ Wι Xα; abscindat Bε Cδ Sλ; abscindent Dγ Qα diametrum] *om.* Bζ AC] AT Aα Bι Eδ Fβ Lβ Lζ Mλ Mφ Oξ Pθ Pλ Pμ Pν Po Qβ Qγ Qλ Rα Sδ Wβ Wι Xα super] *add.* punctum Eμ P₁] B.P Bζ; E Mν; F Eν; P scilicet Lβ eritque] *marg.* Wα eritque punctus P] *om.* Oη punctus P] *om.* Wι P₂] *om.* Fβ; C Oζ; F Eν; scilicet P Cβ Oα
- 8-9 eritque ... punctus] post hoc iunges A *with erasure dots*; *add.* pones Vε eritque ... s] *om.* Cε Eη
- 9 punctus] *om.* Bα Bγ Bε Bη Cδ Cη Dη Eτ Mθ Pτ Rβ Sκ Sλ Vε Vσ; puncto Pγ punctus ... s] *om.* Eη cenith] *om.* Fα; cenich Oκ Xβ; cenihth Cβ; cenit Bα Cθ Dγ Lζ Oσ Pλ Pφ Rβ Vε Vχ; cen^t *and add. in marg.* zen^t caputum Bη; cent Eν; cerath *corr. to* cenit Oξ; zenith Bε Pρ Vα caputum] *om.* Bα; capitis Pλ Pρ; *add. 4-line comment/gloss* Cζ Deinde] Post Bα; KC. Inde Nα Deinde ... s] *om.* Qα iunges] *om.* Dη Vσ H] K Nα L] A Vε abscindet] abscindat Bε Cδ Pρ; abscindes Wβ; scindet Bα AC] AT Eβ Eδ Fβ Mφ Oζ Oξ Oτ Pα Pδ Pθ Pλ Pρ Qβ Qγ Qδ Qλ Sδ Vε Vι Wα Xα; HC Aα Lγ Lη Pν Vν super] *om.* Eζ; *add.* punctum Cδ s] B Nα; C Vε; F Pφ; G Vα; G *corr. to* S Pθ; P *corr. to* S Aα

⁴ Some mss (e.g., Wβ) treat *similiter* as the first word of the next sentence.

Afterwards you will set arc KL in the same way as [i.e., equal to] the latitude of the region, and arc HM similar [i.e., equal] to it, and likewise arc ZG.

Afterwards you will join G with H and it will cut diameter AC at P, and point P will be the point of the zenith overhead. Then you will join H with L and it will intersect diameter AC at S.

- 10 Postea iunges H cum M et extrahes HM quousque iungatur super N, eritque NS diametrum circuli hemisperii, quem divides per medium et facies partem circuli abscindentem circulum Capricorni super puncta V, F, et est arcus, scilicet VSF; quod si
- 10 Postea] Post hoc *many*; Deinde Bγ Eτ Pτ Sκ iunges] iunge Mv; coniunges St Vv; *ms* Oφ *begins* H cum M] A cum G Vε et ... HM] *om.* Nα Rα extrahes] extrahe Cι Eα Qλ; extrahe *corr.* to trahe Pq; prodendes(!) Bα HM] AG Vε; CA Mθ Oα Sθ Vv; CA *corr.* to lineam HM Eμ; CA *corr.* in *marg.* to MH Sλ; lineam CA Cζ Oκ; H in directo Fβ; HM et CA Bα Mκ; M Pψ; MA *corr.* to HM et AC Vχ; MH Cδ Cθ Ev Eo St; MH et AC Mγ; MH et cum HC Bζ; MH et HT Vv; MH *and add. interlin.* et AC Cβ; TA Mv Oσ; *add.* et dyametra AC Qμ; *add.* et diametra AS Mη; *add.* et AC Vσ; *add. in marg.* et HC in alia cum TA Vβ HM [et AC] quousque] *marg.* Mκ quousque] donec Bα quousque iungatur] cum AC Pφ iungatur] coniungatur Bε; iungantur Mη Pq; iungam Aα; *add.* in sumitate protracti diametri Qα; *add.* MH cum AC Bα Bζ Mγ Vv super] cum Dη N] *om.* Lβ; eum Mv; H Cδ; K Pv; S Oζ; V Qα NS] MS Vε; NG Oη; NF Pφ; NG Mv; NR *or* NT Sκ; VS Qα; S^M Pq
- 11 circuli,] *om.* Bε Eη Qα hemisperii] e emisperii Bζ quem] quam Dη Mη Xα; quod Eα divides] dividimus Eα per medium] *om.* Mκ partem] *om.* Lγ
- 12 abscindentem] *add.* quam circuli absindentem Bζ circulum] partem Nα puncta] *om.* Bη; *add. interlin.* C Bθ V, F] C, N, F Vπ; M, S Pq; N, F Cε Ev Sκ; V, S Cη Oσ Pφ et ... VSF] *om.* Oη est] erit Fβ Pλ; si Dη arcus] arcus vel pars Pδ Pθ; pars Cζ Cε Cθ Eη Eμ Ev Mθ Mκ Mv Oα Oκ Oσ Pψ Sθ St Vα Vσ Vv; pars *corr.* to arcus Sλ; pars eius Qα; pars illa Bγ Bη Bθ Bκ Cη Dγ Dη Eδ Eζ Eτ Ev Lζ Mλ Mo Nα Oφ Pγ Po Pτ Pv Rα Sβ Sκ Vε Vβ Vι Vκ Vπ Vχ Wβ Wι Xα scilicet]⁵ *om.* Bα Bε Bθ Cβ Cδ Cθ Eη Eμ Ev Eo Fa Mγ Mδ Mθ Mκ Mv Oα Oκ Oσ Oφ Pμ Pq Pφ Pψ Qα Qγ Sδ Sθ St Sκ Sλ Vα Vε Vv Vπ Vσ Vυ Xβ; *erased* Bθ; N *or* enim Vψ; secundum Nα; *add.* Arietis Pτ scilicet VSF] .SV.SF. Aα VSF] EV Lβ; F Bζ; FB Lγ Tδ; FNV Mφ Mu Pμ Vι; FSV Bε; FV Eα Eβ Eη Fζ Lη Mδ Oζ Oξ Oτ Pα Pv Qδ Rβ Sδ; FVN Pλ; MFS *and illeg. corr.* Pq; NSF Eδ Ev Po; NV Fβ Qλ Wα; NVS Bη; NVSF Cι Pδ; NVST Wβ; PSF Vπ; SFV Qγ; SV Mδ; SVF Sκ; V Qβ; VF Eτ Sθ; VLF Vε; YZT Qα quod] *illeg.* Bε; et Mκ Pθ Qβ Sδ
- 12-13 quod ... pars] *om.* Dη

⁵ *Scilicet* abbreviated can be confused in some mss as part of VSF. When S precedes VF, I generally treat it as *scilicet*.

After this you will join H with M and extend HM until it is joined [with the diameter] at N, and NS will be the diameter of the horizon, which you will divide in half and make part of a circle intersecting the circle of Capricorn on points V and F, and it is this arc, that is VSF; because if

hec pars abierit super punctos H, S, K iam invenisti et opus certissimum est. Si vero aliter fuerit, errasti; reitera ergo opus.

- 15 Postea abscindes ex puncto M versus Z arcum ex 3^{bus} gradibus vel 10 vel
- 13 hec] *om.* QΛ pars] *om.* Bγ Bη Cη Pτ Σκ Wβ; *add.* circuli emisperii Bα Bζ Mγ Vν abierit] *corr.* to abscinderit Wα; ab'icerit Xβ; abiecerit Oφ(*add. in marg.* al' abscinderit) Vε; abhierit Qα; hierit Bα Fβ; absciderit Bγ Bι Cι Lζ Mο Mυ Mφ Vι Vκ; abscidet Bη; abscinderit Aα Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Eυ Mη Mλ Nα Pδ Pθ Po Pτ Pυ Qδ Qμ Rβ Rα Sβ Σκ Vβ Vψ Wι Xα; abscindit Pγ Vπ Wβ; obierit Pφ; *add.* circulum emisperii Pφ H S K] HCK Vε; HGK Vσ Vυ; HK Bε Eη; HLK Σκ; HSHK Eζ; M et S Qα iam ... et] *om.* Bα est] *om.* Eo; et est primum almucantaraz scilicet orizon Qα vero] *om.* Qα; autem Bε vero ... fuerit] non autem Bα aliter] alibi Eo Mγ Vν
- 13-14 Si ... opus] *om.* Mν
- 14 fuerit] *om.* Mo Mυ Mφ Qα Vι; facies Vε; invenisti Eα; *add.* iam Cβ Cδ Cθ Eμ Ev Eo Mγ Mθ Mκ Oα Oη Oκ Oσ Oφ Pθ Pφ Qα Sθ Vε Vν Vυ Vχ reitera] *blank* Nα reitera ergo] et iterabis Sι; et reiterabis Bζ Mγ Pφ Vν; et reiterabis igitur Cδ; itera Eα; perterea(?) Sθ ergo] *om.* Bα Cβ Cζ Cθ Eμ Eo Mθ Mκ Oα Oη Oκ Oσ Oφ Pψ Qα Vα Vυ Vχ opus] *add.* donec invenisti Fβ; *add.* tuum Dη Xα
- 15 abscindes] abscindas Bε; abscindens Pα Xα ex₁] a Bε Bζ Eα Eβ Eη Eo Fα Fβ Fζ Lγ Lε Lη Mγ Mδ Mυ Mφ Oζ Oξ Ou Pα Pλ Pμ Pν Pρ Qβ Qδ Qλ Rβ Sδ Tδ Vι Vν Wα Xβ; de Lβ ex puncto] *om.* Cε M] *marg.* Eo; H Qα versus] super Eα; usque ad Lη; *add.* arcus Dγ; *add.* punctum Bε Bη Cι Eα Eβ Eη Fα Fβ Lβ Lγ Lη Mδ Mυ Mφ Oζ Oξ Oτ Ou Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qδ Qλ Rβ Sδ Tδ Vι Vψ Wβ Wα Xβ z] *om.* Mη Vπ; ZG Aα; K Nα; L Qα; R Mγ; T Σκ Vυ; scilicet Mν; et Bζ arcum] *om.* Pθ Vψ Wβ; *add.* et est Nα arcum ... gradibus] arcum DZ *corr.* to ex 3^{bus} gradibus Wα ex₂] *om.* Eζ Wι; et ex Cι ex₂ ... vel₂] *erased* Pρ 3^{bus}] 3/tribus *many*; 30 BγCη; quibus Bζ Mδ Mλ; *add. in marg.* id est spacium almucantarath quarum quilibet valitur unam vel 2^{am} vel 3, secundum quantitatem tabule secundum quod volueris eam dividere per gradus Eα 10] decem Cε Oη Pλ Pφ Wβ; x Cθ Eo Ev Oα Pψ Qδ Rβ Vχ; *ex corr.* to 10 Mκ; 5 vel 10 Dη; *add. in marg.* quamvis dicunt omnem 8.10. transcendo 4 Vβ vel₂] *om.* Cζ Eζ Xα; aut Ev
- 15-16 vel₁ ... vis] id est x vel ib(?) vel quod volueris Bζ; in 4 secundum quod volueris Vε

this part [i.e., arc] falls on points H, S, K, you have now found [the horizon] and the work is extremely accurate. If, however, it is different, you have erred; therefore, repeat the work again.

After this, you will cut off from point M towards Z an arc of 3 degrees, or 10, or

quotquot vis, et est arcus MR et arcus LQ similiter.⁶ Postea iunges H cum Q et abscindet diametrum super I;⁷ deinde iunges H cum R et extrahas lineam donec abscindat

- 16 quotquot vis] quantam volueris Eν; quod volueris Oφ Σκ; quot volueris Βα Βγ Cβ Cδ Cζ Cη Cθ Eμ Eο Eτ Mγ Mθ Mκ Mν Oα Oη Oκ Oσ Pφ Pψ Qα Sθ Sι Sλ Vα Vβ Vν Vπ Vσ Vυ Vχ; quotque vis Vκ; quotquo vis Mη; quotquot volueris Aα Bθ Bι Dη Eυ; quot vis Bη Cι Eα Eη Pτ Pυ Wβ Wι; quovis Nα; *add. interlin.* al' quotquot Oφ vis] *add.* quod almucantaraz contineat Qα est] sit Βγ Cη Eτ Qα Σκ; *add.* eius Cζ arcus₁] archus Lβ arcus₁ ... et₂] *om.* Vα MR] CYR Vκ; HR Nα Qα; MK Cζ Mθ Oη Oκ; ML Pν; MN Cε; ON Bη(*add. later* MR) Wβ; *erased, add. interlin.* NOZ Pq; *add. in marg.* Ego Iohannes de Calomonte.⁸ Quasi omnia exemplaria carent hac littera “Et similiter totidem ab L versus K. Et est arcus LQ. Et hunc loco illius littere sit “Et arcus LQ similiter” (*add. interlin.* [*illeg.*] scilicet ex alia parte). Sua littera prima est clarior pro rudibus. Vβ MR ... similiter] MR et hunc ABL versus K et arcus LQ similiter Bε; ML et similiter accipiatur LQ Bα; MR et similiter totidem ab L versus K est arcus LQ Vβ; MR et TO idem ab L versus K et est arcus LQ. Similiter Mγ; MR et totidem AB versus et est arcus LQ similiter Bζ; MR et totidem ABL versus LZ et est arcus LQ similiter Pτ; MR et totidem ab L versus X et est arcus LQ similiter Vν; MR et totidem ABL versus Z est arcus LQ similiter Eο et₂] id est Cε et₂ ... similiter] *canc.* Bε; LQ similiter Vσ arcus₂] *om.* Βγ Cη Σκ LQ] HQ Pq; IO Vε; LA Xβ; LK Vψ; LKQ Cε; MQ Oη; NQ ex alia parte Qα Postea] Post hoc *many* H cum Q] A cum Q Vε; H cum V Nα; M cum Q Qα abscindet] abscindat Pν; abscindes Cζ Cθ Eυ Mκ Mo Oα Oη Oκ Oσ Oφ Pψ Qα Qβ Vα Vσ Vχ; scindet Βα
- 17 diametrum] *add.* AC Bα Bζ Bη Dη Eο Fζ Mγ Pφ Sθ Sι Vβ Vν; *add.* AIT Vσ; *add.* NC Cβ Cθ Eα Eβ Fα Fβ Lβ Lγ Lε Lη Mδ Mκ(*interlin.*) Oζ Oτ Oυ Pμ Qβ Qγ Qδ Qμ Rβ Tδ Wα Wβ Xβ; *add. interlin.* scilicet NC Vχ; *add.* NS Bε; *add.* NT Cι Eη Mη Mθ Mυ Oξ Pγ Pθ Pλ Pμ Vψ Wδ Xα; *add.* lineam TD Pq; *add.* UT Pδ super I] *om.* Mo; super N *corr.* to NC super N Sλ; similiter N Bα I] H C super N Cδ; Π or II Aα Cβ Cζ Cθ; IO Vε; A Bη; C Bθ; L Lγ; N Bζ Mγ Mθ Mν Oα Oη Oκ Oσ Pφ Pψ Sθ Vα Vν Vυ; N *corr.* to I Mκ; O Vπ; TL Eν; V Eυ; *add. interlin.* scilicet punctum diametri Vχ H] *om.* Mν Vσ H cum R] B cum K Vε; M cum K Qα R] K Bκ Mθ Oη Oκ; L Bα; M *corr.* to R Eδ; N Vπ; T Mν; Z Bη Wβ extrahas] extrahas Fζ Lη; protrahas Bα; *add. interlin.* protrahas Vχ lineam] *om.* Fβ; lineas Pq; litteram Bζ abscindat] *illeg.* Eη; abscindant Vσ; abscindas Bη; abscindes Mθ Oκ Wβ; abscindet Aα Bθ Bι Cε Cι Dγ Dη Eζ Eμ Eτ Eυ Lζ Mη Mλ Mo Nα Pγ Pδ Pθ Po Pυ Pψ Qδ Rα Rβ Sβ Vα Vε Vπ Vψ Xα; abscindet *corr.* to abscindat Mκ; abscindetur Βγ Cη Pτ; scindat Eα

17-18 deinde ... O] *marg.* Cθ

⁶ In some manuscripts, e.g. Mφ, *similiter* is written as the first word of the next sentence.

⁷ The character used in the diagram and/or text of some manuscripts resembles a conjoined double-I, or the Greek letter π, which can later morph into a lower-case N. The same occurs at line 17 (Oι).

⁸ See note to Cap. 7 line 9.

as many as you wish, and this is arc MR and similarly arc LQ. Afterwards you will join H with Q and it will cut the diameter at I; then you will join H with R and extend the line until it cuts

20 diametrum super O. Post hec divides OI per medium et facies partem circuli
abscindentem circulum Capricorni super punctos Y, X, et est arcus YIX. Similiter non
cessabis facere donec pervenias ad punctum cenith capitem, scilicet P, secundum quod

- 18 diametrum] *add.* AC Cζ Eμ Eο Eτ Mθ Mν Oα Oη Oκ Oσ Pτ Pψ Sθ Sι Vα Vν; *add.* AC *corr.*
to NC Mκ Sλ; *add.* AN Bα Bζ Mγ Pφ Vβ(*add. in marg. in al' MT*) Vν; *add.* Hs Cδ; *add.* NC Cβ
Cθ Ev Oφ Vχ; *add.* NS Bε Bη Cι Dη Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mν Mφ Oζ
Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Qβ Qγ Qδ Qλ Qμ Rβ Sδ Tδ Vι Vσ Vψ Wβ Xα Xβ; *add.* TA
PQ; *add. interlin.* VNC Bθ O] *om.* Eζ; D Bζ; OI Qδ O ... divides] *om.* Vψ hec]
om. Sκ OI] *om.* Wα; OC Oφ; OH Cδ; OII Bη Cβ Cζ Cθ Eζ Mλ Pγ Vν; ON Bα Bζ Bθ Bκ
Eδ Eμ Lζ Mγ Mθ Mν Nα Oα Oη Oκ Oσ Po Pv Pφ Pψ Qμ Rα Sθ Sλ Vα Vε Vκ Vν Vπ; OV
Ev; H.Q.TL.R Ev; *erasure, add. interlin.* YI PQ per medium] *om.* Bκ; *marg.* Cζ et] A
Vε facies] fac Bα Qα partem] *om.* Qα; *repeated* Qδ
- 19 abscindentem] scindentem Bα Eζ circulum] partem circuli Cζ circulum ...
punctos] *om.* Cε super] *om.* Dγ super punctos] *om.* Bγ Cη Eδ Eζ Eτ Mo Pγ Po
Rα Vε; *interlin.* Bι; in Xα super ... YIX] YVC Sκ punctos] *puncta and add. interlin.*
al' punctos Vβ Y, X] ISX Mη; IX Pv; PT Mθ; VF Vκ; VX Sβ; Y Bη(*add. in marg. super*
punctos y, t); YIX Bι Eδ Eζ Eτ Lβ Lζ Mo Mλ Pq Pv Qμ Rα Vβ; Y n X Dγ; YNX Vπ; YNX *corr.*
to YX Vχ; YOX Oφ(*add. interlin. al. I*); YT Bα Cδ Cζ Eμ Mγ Mν Oα Oη Oκ Oσ Pφ Pψ Qα Sθ
Sλ Vα Vν Vυ; YTH Ev; YTX Vε; YX *corr.* to VNXC Bθ; YZ Fβ Fζ Qλ Wβ; YZ *corr.* to YX Wα
et ... YIX] *om.* Bη(*add. in marg. sunt punctos YT et est YVT*) Bθ(*add. in marg. ex pars*
YNX) Cη Lβ Oη Oφ Vπ(*add. et expones*) Wι arcus YIX] arcus RYIX PQ; arcus YI et X Pλ;
pars ill' as VSF Vκ; pars INT Pφ; pars YCRX Mη; pars PNT Mθ Oκ; pars VIX Nα; pars YAX Qδ;
pars YEX Sβ; pars YHT Cδ; pars YIX Bι Bκ Cε Pγ Qμ Rα Vβ(*add. interlin. scilicet totius*
circuli); pars YIIX Cβ Cθ; pars YNT Bα Bζ Cζ Eμ Mγ Mν Oα Pψ Sθ Sλ Vα Vν; pars YNX Dγ
Eο; pars YT Vυ; pars YTLQ Ev; pars YTX Po Vε; pars YUT Oσ; pars YX Aα Cι Eδ Ev Mυ Mφ
Pδ Pθ Sι Vι Vψ Xα; pars YXX Vχ; pars YZ Fβ Qλ Wα(*corr. to pars YX*); pars YZT Qα; YIX Vσ
Similiter] *om.* Fβ Qλ Wα; sic Vε; *add. faciendo* Qα; *add. vero* Oη; *add. N fanen D*
pveni quod ipsem eo que arcus XL est quarta noctem est esse equalis sit Mη(?)
non] nec Fβ Qλ
- 19-20 non cessabis facere] fac Bα
- 20 cessabis] cesses Qα; *add.* hoc Bε Eα Eβ Fα Fβ Lβ Lε Mδ Mυ Mφ Oζ Oξ Oυ Pα Pμ Pν Vι Xβ
pervenias] perveniat Fζ; veniat Bα; venies Eζ ad punctum] a puncto Vκ
punctum] *om.* Bα; *add.* F Sι; *add. illeg.* Mη; *ms Rβ ends* cenith] canich Oκ; cen^t
Bη; canich Aα Xβ; cenit Bα Cθ Dγ Ev Eο Lζ Oα Oσ Oυ Pλ Pτ Vυ Sλ Vχ; cenithe Eζ;
cenitht Po; cinich Cι Mκ; tenich Vσ; zenith Bε Pq Vα capitem] *om.* Bα; capite Tδ;
capitis Eβ Lγ Lη Mδ Mφ Oζ Oξ Oτ Oυ Pλ Pμ Pq Qβ Qγ Qδ Sδ Wα Xβ scilicet P] *om.*
Cβ Cδ Cζ Cθ Eμ Ev Eο Mγ Mθ Mκ Mν Oα Oσ Pψ Sθ Sι Sλ Vα Vε Vπ Vσ Vυ Vχ; *interlin.*
Oφ P] FP Aα; FP *corr.* to P Bθ; Y Eη secundum] X Xβ; Y Po quod] *om.* Cζ
Rα
- 20-21 scilicet ... figura₁] *om.* Bα scilicet ... figura₂] *om.* Oη secundum ... figura₁] ut
patet in figura presente Bη

the diameter at O. After this you will divide OI in half and make part of a circle cutting the circle of Capricorn at points Y, X, and it is arc YIX. Similarly you will not cease your activity until you reach the point of the zenith overhead, that is P, according to

processit in hac figura. Et scribes super almucanthatat numerum, sicut vides in figura.

21 processit] patet Dη; processerit seu processit Xβ; se^{ur} Bε hac] *om.* Bε Cε Dη Fα Pδ Pο
 figura₁] linea Bθ Bι Dγ Eδ Eζ Lζ Mο Mη Mλ Nα Pγ Pο Qμ Rα Sβ Vβ(*add. interlin.* in
 al' figura) Vκ Wι Xα; l̄c̄iti(?) Aα; *add.* producta postea Cζ; *add.* que hic ponitur
 Eμ(*interlin.*) Mθ(*interlin.*) Oκ; *add. in marg.* scilicet P Eο Et ... figura₂] *om.* Sκ; Hoc est
 quemadmodum in magna figura sequenti Pψ(*other hand*) scribes] *om.* Eα; scribas Bζ;
 scribe Bα super] *om.* Mγ; in Fβ; etiam super spatia inter Bε almucanthatat] *om.*
 Bι; almicantarath Vχ; almicantarath Eδ Eν; almicantaraz Cδ; almicantha Dη;
 almicanthatrach Bζ; almicanthatrat Cθ; almicanthatrach Pν; almicatarat Bκ; almicatarath Eα;
 almichancarath Cε; almucan^{rat} Eτ; almitantatach Mν; almucancharath Pα; almucant~ Fα;
 almucantar~ Qα; almucantarā Vε; almucantarac Lζ; almucantarach Vκ; almucantarath Vα;
 almucantarath Eη Eμ Mδ Mκ Pθ Pλ Pν Pφ Qμ Sθ Sλ Vβ Vν Vψ Wι; almucantaraz Oα Oσ;
 almucanthat *corr. to* almucanthatrach Bγ; almucanthatrach Xβ; almucanthatram Sβ;
 almucanthatrat Fζ Mο Oφ Pο; almucanthatratht Pο; almucanthatrach Mλ; almucanthatrus Bη;
 almucantraz Cβ; almucatarath Oκ; almucatarant Mθ; almucatharath Nα; almuchancarach
 Mγ; almuchantarach Bθ; almuchantarath Fβ; almuchantarath Vπ; almuchanthatrach Wα;
 almuhanthatrh Bε; almui cantarath Vσ; almuicatatharath Eζ; almuscantarat Bα;
 almutanth' Pγ; almutantarach Sι; almutanthatrach Lβ; almutatat Vν; almuthanthatrh Cη
 numerum] *om.* Cζ Pδ; *add.* graduum Oν; *add. interlin.* graduum id est almu^{rat} Cδ
 sicut] quemadmodum Bα Bζ Cβ Cδ Cζ Cθ Eμ Eν Eο Mγ Mθ Mκ Mν Oα Oκ Oσ Oφ
 Pφ Sθ Sι Sλ Vα Vβ(*add. interlin.* al' sicut) Vε Vν Vπ Vν Vχ; sic Qβ; sicut sicut Xα; *add.* et
 Mη sicut ... figura₂] que egent Qα vides] videre potes Dη in figura] *om.*
 Vι; *illeg.* Qα; hic Bα; in hac figura Bι Bκ Cβ Cδ Cζ Cθ Eδ Eμ Eν Mθ Mκ Mν Oα Oσ Sβ Sι
 Sλ Vα Vβ Vε Vσ Vν Vχ; in posita figura Bζ; in anposita figura Vν; in antiposita figura
 Mγ; patet in figura Cε; poita figura Eο figura₂] *add.* et quemadmodum in magna
 figura sequenti Oα; *add.* hoc est quemadmodum in maga figura sequenti Oσ; *add.*
 immediate sequenti Tδ; *add.* que sequitur Cζ Eμ(*interlin.*); *add.* sequenti Vα; *add.* transacta
 Pν; *add. interlin.* scilicet in mediatr(?) transacta Vβ; *add. in marg.* Mφ Wα

Signa	Gradus
Aries	15
Taurus	19
Gemini	27
Cancer	36
Leo	39
Virgo	[3]9
Libra	39
Scorpius	39
Sagittarius	36
Capricorn	[2]7
Aquarius	19
Pisces	15

Virgo 39] *mss* Virgo 29; Capricorn 27] *mss* Capricorn 37

the procedure in this diagram. And you will write the number on the almucantar, as you see in the diagram.⁹

⁹ The list (apparatus criticus, previous page) in mss M φ W α gives the rising times in oblique ascension of the zodiacal signs for a latitude of around 48°. The two corrections are necessary in order to preserve the symmetry of the table. These emendations were suggested to me by Julio Samsó, who also notes that there are systemic problems with the list since the oblique ascensions at the end of the signs are off, overall, by 10 degrees, i.e., the sum of the ascensions to the end of Virgo add up to only 175° rather than 180°, and to the end of Pisces to 350° rather than 360°. [Note: there is another such list, with minutes, in ms M φ at the end of the previous capitulum. See Cap. 12, line 15 apparatus criticus.]

For a further discussion of this list, see Samsó, *On Both Sides*, p. 426.

[FIGURA 13]

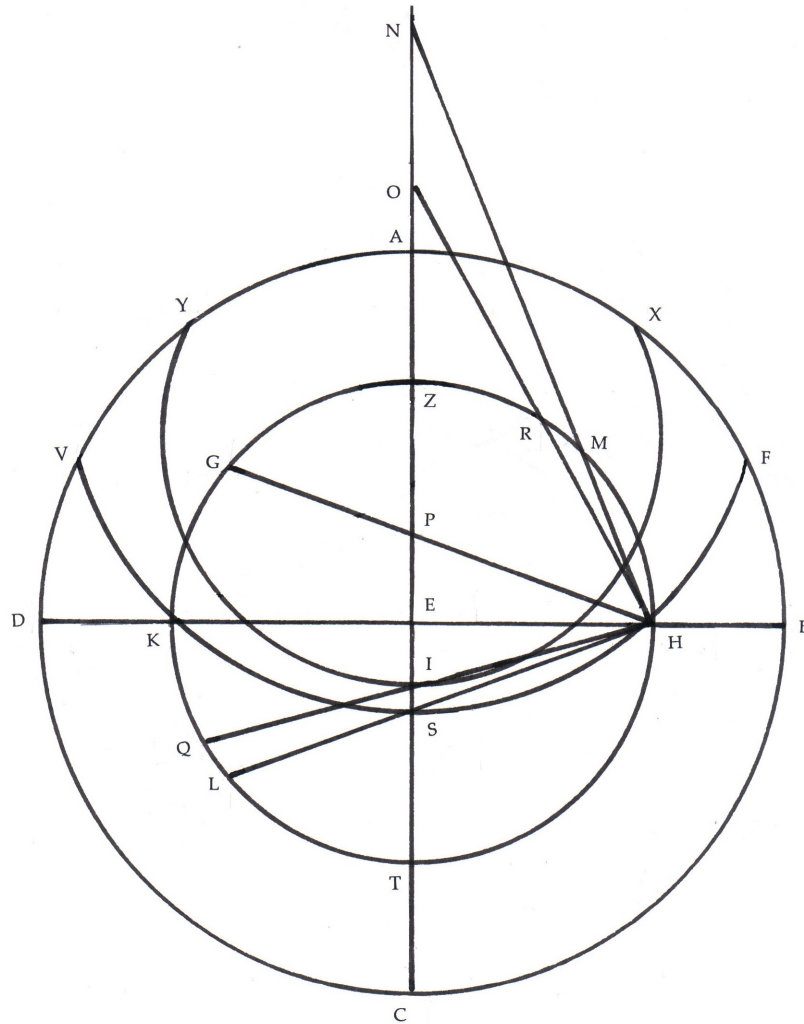


Figura inscriptionis almucanthat super latitudinem regionis

[Complete diagram] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eν Eτ Eυ(upside down) Fα Fβ Fζ Lγ Lε Lζ Lη Mγ(sideways) Mδ Mη Mθ Mκ Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ¹⁰ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qμ Rα(upside down) Sβ(sideways) Sδ Sκ Tδ Vα Vβ₁(fol. 96^v)¹¹ Vβ₂(fol. 97^v) Vε Vι(fol. 332^v) Vκ Wβ Xβ

¹⁰ In ms Oφ, κ is on the right side and H is on the left, and the construction lines and associated letters radiate from left to right.

¹¹ In the first diagram in Vβ (fol. 96^v), only the first arc is drawn.

[*Partial diagram*] Eo Si Vχ Wα Wι

[*Outline or space only*] Bζ Bθ Cε Dγ Dη Eδ¹² Eζ Lβ Mφ Oα Pν Pφ Qα Vν Vπ Vσ Vυ Vψ

[*No space*] Aα Cζ Nα Oη Qλ Sθ Sλ Xα

Pθ: "M"

[*Caption*]

Figura ... regionis] Bε Cη Cι Eβ Eη Ev Fα Fζ Lγ Le Lη Mδ Mη Mν Oζ Oξ Oτ Ou Pα Pδ Pλ Po Pτ Qβ Qγ Qδ Qλ Sδ Tδ; *om.* Bα Bκ Cβ Cδ Cθ Eμ Ev Lζ Mγ Mθ Oσ Pυ Pψ Vα Vβ₁ Vε Xβ; almucancharath Pq; Figura almucancharath Bι Oφ; Figura descriptionis orizontis et almucancharath Wβ; Figura descriptionis orizontis per almucancharath Bη; Figura inscriptionis almucancharath Fβ Mλ; Figura inscriptionis almucancharath et horizontis Vκ; Figura inscriptionis almucancharath in tabula Eα; Figura inscriptionis almucancharath super totam latitudinem regionis et est 49 gradibus Vι; Figura inscriptionis ciculi orizontis et almucancharath~ Pγ; Figura inscriptionis orizontis id est circuli hemisperii; et almucancharath super totam latitudinem regionis Vβ₂; Hec figura pro complendo almucancharath Oκ(*later hand*); Tabula almucancharath ad latitudinem 48 g~ Rα Sβ; *add.* Figura capituli 13ⁱ Bε

almucancharath] Bι Eα Fα Lη Mκ Mλ Mν Oτ Pδ Po Pq Pτ; almucancharath Pλ; almucancharath Vι; almucancharath Bε; almucancharath Qβ; almucancharath Bη; almucancharath Fζ Oκ Qγ Qμ Sδ; almucancharath Cη Ev Lβ Lγ Mδ Oζ Oφ Pα Pμ Tδ Vβ₂ Vκ; almucancharath Sκ; almucancharath~ Pγ; almucancharath Cι Eτ Oξ; almucancharath Sβ; almucancharath Eβ Eη Mυ; almucancharath Rα; almucancharath Wβ; almucancharath Mo; almucancharath Bγ; almucancharath~ Fβ; almucancharath Mη; almucancharath Qδ; almucancharath Bγ; *illeg.* Ou super] *add.* regionis Qδ; *add.* totam Bγ Eτ Mo Mυ Pμ inscriptionis] *add.* orizontis et Bγ Mκ regionis] *add.* fatispone(?) est eius gradus equalis Mυ

Add. marginal note: Ego Iohannes de Calomonte:¹³ Multi non ponunt hanc figuram quia figura immediate sequens et ista est una et eadem res. Si rethe intelligis, tamen est utilis pro rudibus ut possint melius intelligere figuram sequentem. Vβ₁(*fol.* 96v)

[*Lettering on the diagram*]

A] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mυ Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pυ Pψ Qγ Qδ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ Xβ; *om.* Mκ; *illeg.* Qβ B] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mυ Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pq Pτ Pυ Pψ Qγ Qδ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ Xβ; *om.* Mκ; *illeg.* Qβ C] Bα Bγ Bη Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mυ Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pq Pτ Pυ Pψ Qγ Qδ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ Xβ; *om.* Mκ Pγ; *illeg.* Qβ D] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ Ev Fα Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mυ Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pq Pτ Pυ Pψ Qγ Qδ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ Xβ; *om.* Mκ Pγ; *illeg.* Qβ E] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Ev Eτ

¹² Ms Eδ contains other diagrams.

¹³ See note to Cap. 7 line 9.

Eu Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pl Pμ Po Pρ Pτ
 Pu Qβ Qγ Qμ Sβ Sδ Tδ Vβ₁ Vβ₂ Vε Vi Wβ Xβ; *om.* Mθ Mν Pγ Pψ Ra Sk Va Qδ Vκ F] (*right*)¹⁴
 Be Cη Ci Eβ Eη Fa Fβ Fζ Lγ Le Lη Mδ Mθ Oζ Ok Oξ Ot Ou Oφ Pa Pδ Pl Pτ Qγ Qδ Qμ Sδ Tδ Xβ;
 (*left*) Ba Bγ Bη Bi Bκ Cβ Cδ Cθ Eμ Et Ev Lζ Mγ Mη Mλ Mν Mo Oσ Pμ Po Pρ Pu Pψ Ra Sβ Va
 Vβ₁ Vβ₂ Vε Vi Vκ Wβ; *om.* Mκ Mu Pγ Sk; *illeg.* Qβ; vi Ev; γ' Ea G] Ba Bγ Be Bη Bi Bκ Cβ Cδ
 Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Oζ Ok Oξ Oσ
 Ot Ou Oφ Pa Pγ Pδ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qμ Ra Sδ Sk Tδ Va Vβ₁ Vβ₂ Vi Vκ Wβ Xβ; *om.*
 Mκ Mu Qδ; *illeg.* Sβ; ε' Ve H] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa
 Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu (*misplaced*) Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pγ Pδ
 Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qδ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vε Vi Vκ Wβ Xβ; *om.* Mκ I]
 Ba Bγ Be Bη Bi Bκ Cη Ea Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mu Oζ Ok Oξ
 Ot Ou Oφ Pa Pγ Pδ Pl Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₂ Vi Vκ Wβ Xβ; *om.* Mκ
 Qδ Vβ₁; γ' Ev; ν' Cδ Mγ Mθ Oσ Pψ Vε; ρ' Ci; τi Cβ Cθ Ev κ] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη
 Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu Oζ Ok Oξ Oσ
 Ot Ou Oφ Pa Pγ Pδ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qδ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vε Vi Vκ
 Wβ Xβ; *om.* Mκ λ] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le
 Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pγ Pl Pμ Po Pρ Pτ Pu Pψ Qβ
 Qγ Qδ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vε Vi Vκ Wβ Xβ; *om.* Mκ Pδ μ] Ba Bγ Be Bη Bi Bκ
 Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu Oζ
 Ok Oξ Oσ Ot Ou Oφ Pa Pl Pμ Po Pτ Pu Qβ Qγ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vi Vκ Wβ Xβ; *om.*
 Mκ Pγ Pδ Pψ Qδ Vε; ν' Pρ ν] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Et Ev Fa Fβ
 Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pγ Pδ Pl Pμ Po Pτ
 Pu Pψ Qβ Qγ Qδ Sδ Qμ Ra Tδ Va Vβ₁ Vβ₂ Vε Vi Vκ Wβ Xβ; *om.* Ev Mκ Sk; *illeg.* Sβ; μ' Pρ
 ο] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ
 Mη Mθ Mλ Mν Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qδ Qμ Ra
 Sβ Sδ Va Vβ₂ Vi Vκ Wβ Xβ; *om.* Mκ Pγ Sk Tδ Vβ₁; ε' Ve; ρ' Pρ π] Ba Bγ Be Bη Bi Bκ Cβ Cδ
 Cη Ci Ea Eβ Eη Eμ Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Oζ Ok Oξ Oσ Ot Ou
 Oφ Pa Pγ Pδ Pl Pμ Po Pρ Pτ Pu Qβ Qγ Qδ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vκ Wβ Xβ; *om.* Cθ Ev
 Mκ Mu Pψ Vε Vi ρ] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ea Eβ Eη Eμ Et Ev Fa Fβ Fζ Lγ Le Lζ
 Lη Mγ Mδ Mη Mθ Mλ Mν Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pγ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qδ
 Qμ Ra Sβ Sδ Sk Tδ Va Vβ₂ Vε Vi Vκ Wβ Xβ; *om.* Ci Mκ Pδ Vβ₁; γ' Mo; λ' Ev ρ] Ba Bγ Be Bη
 Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo
 Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pl Pμ Po Pτ Qβ Qγ Qμ Ra Sβ Sδ Tδ Va Vβ₂ Wβ; *om.* Mκ Pγ Pδ
 Pψ Qδ Sk Vβ₁ Vε Vi Xβ; *illeg.* Pν; ο' Pρ; χ' σ] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη
 Eμ Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mθ Mλ Mν Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pγ
 Pδ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qδ Qμ Ra Sβ Sδ Sk Tδ Va Vβ₁ Vβ₂ Vi Vκ Wβ Xβ; *om.* Mκ; ε' Ve;
 ις Ev τ] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Ea Eβ Eη Eμ Ev Et Ev Fa Fβ Fζ Lγ Le Lζ Lη Mγ
 Mδ Mη Mθ Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pδ Pl Pμ Po Pρ Pτ Pu Pψ Qβ Qγ Qμ Ra Sβ Sδ
 Sk Tδ Va Vβ₁ Vβ₂ Vε Vi Vκ Wβ Xβ; *om.* Mκ Mν Pγ Qδ; δ' Pa υ] (*left*)¹⁵ Be Bη Cη Ci Eβ Eη Fa
 Fβ Fζ Lγ Le Lη Mδ Mθ Oζ Ok Oξ Ot Ou Oφ Pa Pγ Pl Pτ Qγ Qδ Qμ Sδ Sk Tδ Xβ; (*right*) Ba Bγ Bi

¹⁴ Whether F should be on the right or left of the diagram is not specified in the text; the only relevant information is that it is opposite v.

¹⁵ Whether v should be on the right or left of the diagram is not specified in the text; the only relevant information is that it is opposite F.

Bκ Cβ Cδ Cθ Eμ Eτ Eυ Λζ Μγ Μη Μλ Μν Μο Οσ Ρμ Ρο Ρq Ρυ Ρα Σβ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ;
om. Eα Eν Mκ Mυ Pδ; *illeg.* Qβ; γ' Pψ x] (*right*)¹⁶ Bε Cη Cι Eβ Eη Eυ Fα Fβ Fζ Λγ Λε Λη Mδ
 Mη Mθ Oζ Oκ Oξ Oτ Oυ Oφ Pα Pδ Pλ Pq Pτ Qγ Qδ Qμ Sδ Tδ Xβ; (*left*) Bα Bγ Bη Bι Bκ Cβ Cδ Cθ
 Eα Eμ Eτ Λζ Μλ Μο Οσ Ρμ Ρο Ρυ Ρα Σβ Vα Vβ₂ Vε Vκ Wβ; *om.* Mγ Mκ Mυ Pγ Sκ Vβ₁ Vι; *illeg.*
 Qβ; vι Eν Mν; τ' Pψ γ] (*left*)¹⁷ Bε Cη Cι Eβ Eη Eυ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mθ Mν Oζ Oκ
 Oξ Oτ Oυ Oφ Pα Pλ Pq Pτ Qγ Qδ Qμ Sδ Sκ Tδ Xβ; (*right*) Bα Bγ Bη Bι Bκ Cβ Cδ Cθ Eμ Eτ Λζ Μγ
 Μλ Μο Οσ Ρμ Ρο Pψ Ρα Σβ Vα Vβ₂ Vε Vκ Wβ; *om.* Eα Eν Mκ Mυ Pγ Pδ Pυ Vβ₁ Vι; *illeg.* Qβ
 z] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eν Eτ Eυ Fα Fβ Fζ Λγ Λε Λζ Λη Μγ Mδ
 Mη Mθ Μλ Μν Μο Μυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pδ Pλ Pμ Ρο Ρq Ρτ Ρυ Qβ Qγ Qμ Ρα Σβ Sδ
 Sκ Tδ Vα Vβ₁ Vβ₂ Vε Vι Vκ Wβ Xβ; *om.* Mκ Pγ Pψ Qδ

[*Other information*]

add. meridies Bι Bκ Eτ Eυ Λζ Ρο Ρq Ρυ Vκ *add.* oriens Bκ Eτ Λζ Ρq *add.* occidents Bκ Λζ
 Ρq *add.* septentrio Bκ Λζ Ρq

add. Cancri Bι Bκ Λζ Ρq; Cancer Ρq; circulus Cancri Ρα Σβ *add.* Arietis Bι Bκ Λζ; circulus
 Arietis Oσ(*later hand*); Arietis et Libre Ρq Pτ; Aries Ρq *add.* Capricorni Bι Ρq; circulus
 Capricorni Bκ Λζ 1q Oσ(*later hand*) *add.* orizon Λζ; circulus hemisperii Ρq Pτ

P] *add.* cenith Bγ Bι Cη Eβ Eυ Fα Fζ Λη Λγ Mκ Μλ Μν Μο Oζ Oυ Pα Pδ Ρο Qβ Ρα Σβ Sδ Tδ Vκ
 Wβ Xβ; cenit Bκ Fβ Λε Λζ Μη Ρμ Ρτ Ρυ Qδ Qμ; cinich Cι; zenit capitis Ρq; zenith capitum Oκ(*later
 hand*); punctum cenit horizontis Oξ v] *add.* primum Bι Cθ Λζ Ρα Σβ Vε; primum occidents Eτ
 Mν Ρο Ρυ Vβ₂ γ] *add.* quartum Λζ Vε; *add.* x^m [= decem] Cθ

arc KL] *add.* latitudo Mδ; *add.* latitudo regionalis Mκ Pλ Ρq Ρυ Qγ Vβ₁; *add.* latitudo regionis 45
 graduum Oκ(*later hand*) *arc* HM] *add.* equale latitudo Mκ Pλ Qγ Ρυ; latitudo regionis Vβ₁;
add. 45 graduum latitudo regionis Oκ(*later hand*) *arc* ZG] *add.* equale latitudo Mκ; latitudo
 regionis Oκ(*later hand*) Pτ Vβ₁; et hic latitudini Ρυ *arc* LT] *add.* 48 Fζ; *add.* residuum Mδ Ρυ
 Qγ *arc* MZ] *add.* equale residuo Ρυ Qγ *line* LG and *line* GM: *add.* *illeg.* Ρυ

Circles numbered: 5, 10, 15 Oκ(*later hand*); 6, 12 ... 90 Vβ₂; 10, 15, 20, 25 ... 40 Qδ 10, 20, 30 Bη
 Cη Eβ Fα Λγ Mδ Oξ Oυ Pα Pτ Qβ Qγ Qμ Sδ Sκ(*add.* 40) Tδ Wβ Xβ 10, 20, 30, 40, 80, 90 Eη
 10, 20, 30, 40, 50, 80, 90 Bε

Extra arcs or circles drawn: 1: Bι Λζ Mθ Pγ Oκ Vκ; 2: Eν Μλ Vι Wβ; 3: Bη Cδ Eυ Fβ Fζ Μη Oφ Ρο
 Ρα Σβ; 4: Cι Eβ Eη Λγ Λη Μν Μο Oξ Pτ Ρυ; 5: Bε Fα Λε Mδ Mκ Oυ Pα Pδ Qβ Sδ Tδ Xβ; 6: Ρμ Ρq
 Qγ; 7: Mκ Oζ Qδ Sκ; 8: Eτ; 9: Eα; 15: Vβ₂

¹⁶ Whether x should be on the right or left of the diagram is not specified in the text; the only relevant information is that it is opposite γ.

¹⁷ Whether γ should be on the right or left of the diagram is not specified in the text; the only relevant information is that it is opposite x.

[CAPITULUM 14.] DE DIVISIONE ORIZONTIS ET AZIMUTH PER ARCUS

- 1 De ... arcus] *ms* Gα *begins; om.* Aα Bα Bζ Bκ Cβ Cε Cθ Dγ Eα Eζ Ev Fβ Gα Lζ Nα Oα Oσ Pγ Pο Pφ Pψ Qα Qδ Rα Sβ Sθ Sι Sλ Vα Vε Vυ Vχ; Dcō de almu hic docet inscribere azimuth Wι; De azimuth primum Vκ; De azimuth Bγ Eδ Qμ; De compositione azimuth et primo de divisione emisperii Dη; De constitutione azimuth Mθ Oκ; De divisione circuli emisperii azimuth inscribendo Eτ; De divisione circuli emisperii per azimuth Bη Oφ; De divisione circuli (h)emisperii per azimuth inscribendis Lε Pα(*marg.*) Tδ Wβ; De divisione circuli emisperii per azimuth inscribendis vel de divisione orizontis per azimuth ab equinoctiali Mυ Vι; De divisione emisperii ad azimuth Mλ; De divisione orizontis ad azimuth Mη Sδ(*add. per alt^{us}*) Vπ(*add. Rubrica*); De divisione orizontis ad constitutum azimuth in ipso Cζ(*marg.*) Eμ(*marg.*) Vσ(*om. in ipso*); De divisione orizontis et consticutione azimuth in ipso Oη; De divisione orizontis quod constitutionem azimuth Mκ; De fiburatione azimuth in orizonte Pτ; De inscriptione azimuth Mυ; De ordine azimuth et orizontis Cι; Divisio circuli emisperii ad constitutionem azimuth Cδ(*marg.*); *add. in marg.* Secundo d[ivisio] azimuth et primo dividit hemisperium super dimidia altitudine regionis secundo inscribit azimuth super cenith Bι; *add. in marg.* “Et Post”: In hoc secunda parte docet descriptionem azimuth et primo docet dividere circulum emisperii per arcus transeuntes per punctum diametri circuli Arietis opposita et per punctum altitudinis mediate que sit ex ductu linee BK in diametra super L. Secundo docet describere azimuth super duo puncto emisperii modo praedicto inventa et super punctum cenith ibi “Cum aut divisens” [Capitulum 15]. Lζ
- 1 *before* De] *add. Rubrica* Pλ et] in Lη Sκ et ... arcus] *om.* Eο Mγ Pδ Pυ Vυ; ad azimuth Bθ Ev Pυ; per azimuth Vβ; per azimuth ab equinoctiali Mφ; pro azimuth Bι azimuth] Bγ Bε Bθ Bι Cζ Eδ Eη Eτ Ev Fζ Lβ Mθ Mκ Mλ Mυ Oζ Oκ Oξ Oτ Pα(*marg.*) Pδ Pθ Pλ Pμ Pτ Pρ Pυ Qβ Qγ Qλ Qμ Sδ Tδ Vβ Vσ Wα Wβ Wι Xβ; *illeg.* Pυ; arimuth Vπ; arimutht *corr. to* azimutht Cη; asimut Mυ; asimuth Mυ; asmut Vι; azim^t Lη; azimuth Oη; azimuth Cι; azimuth Mη; azimuth Bη Eβ Eμ Fα Lγ Lε Mo Ou Pα Vκ; azimuth Cδ; azmt Vι; azymuth Oφ per] secundum Lβ per arcus] *om.* Pυ Pθ Sκ Vψ arcus] *add. Rubrica* Qβ; *add in marg.* Secundo de azimuth et primo dividere hemisperium super dimidiam altitudinis regionis, secundo inscriberit azimuth super cenith Bι; *add. in marg.* Capitulum 14^m Bε

[CHAPTER 14.] ON THE DIVISION OF THE HORIZON AND THE AZIMUTHS BY ARCS

Et post hoc oportet facere azimuth, quorum opus est ut figas tabulam in aliqua tabula lignea cum pice vel aliter et perficies in ea circulum hemisperii. Deinde divides

- 2 hoc] add. etiam Pq oportet] debes Fβ; oportebit Mγ Vv; *add.* te Bι Eμ Ev Eo Mγ Mκ Oα Oσ Sι Vv oportet facere] fac Bα; facies Cδ Sλ facere] componere Dη azimuth] *interlin.* Qμ; arimuth Vπ; asimut *corr.* to azimuth Mκ; asimuth *corr.* to azimuth Mv; atimuth Vv; azimath Sι; azimith Mγ; azimuc Lζ Mλ Oη; azimuch Cι; azimuth Bα Bζ Bη Bι Cβ Cθ Dγ Eμ Eo Mv Oσ Ov Pψ Qδ Sθ Sλ Vα Vκ Vv; azimuz Cδ Sβ; azmuth Vι; azsumut *corr.* to azumut Vχ; azsumuth Ev; azumut Vε; azumuth Nα; azymut Oα; mintus Vσ quorum ... est] sed oportet Bα figas] facias Sβ; fig^al sni Dγ; figat Bθ Vπ; figi^s Mv; figuras Mη Sθ; figuras *corr.* to figas Bγ; figures Cη; fingas Gα Sι
- 2-3 aliquam tabula] *om.* Bα
- 3 tabula] *om.* Sκ; tabella Mv lignea] *om.* Bη Xα; ligno Bα; linea Bκ Sι cum pice] compice Bα; compice Mv pice] pisce Sβ Sι; pise Dγ vel ... et] tabul~ quod Gα aliter] cum aliqua alia re tenaci:
 cum aliqua alia] Cβ Cδ Cθ Eμ Mγ Mκ Mv Oα Oσ Pφ Pψ Sι Sλ Vα Vv Vσ Vv; alia Qα; aliqua Oφ; aliqua alia Ev; cum alia Mη Sθ; cum alio Bα; cum aliquo alio Eo; cum aliqua Cζ Mθ Oη Oκ Pτ Vε Vχ; in aliqua alia Bζ re tenaci] Cδ Ev Pφ Sλ Vα Vε Vσ; *om.* Mη; re tenabili Cζ Cθ Mγ Mθ Pψ Sι Vv; re tenabili *corr.* to re tenaci Mκ; re tenabli Eo Qα; re tenab'li Cβ Eμ Oκ; re tenabl'i Sθ; re tenabuli Oα Oη; retenabili Oφ(*add. interlin.* al' tenati) Vv; retenablī Bζ; retenaci Pτ; te deuati Mv; tenabili Oσ; tenabili *corr.* to tenaci Vχ; tenaci Bα
 aliter] cum alia Qμ; *add. and marked "glossa"* cum alia retenabili Vβ; *add. in marg.* Hoc melius faciet operator per sua industria Mκ et] *add.* tunc Bα perficies] facies Pq ea] eam Sι circulum] circulus Cη Deinde] Post hoc Bα divides] divide Bα
- 3-4 et ... circulum,] *om.* Eη Deinde ... hemisperii] *om.* Bκ Cη Dη Eα Mδ Pθ Pφ Vβ Vε Vψ

And after this it is necessary to make the azimuths;¹ to make these you should attach the plate to some other wooden surface with pitch or with something else, and you draw on it the horizon. Then you divide

¹ The next step, after the almucantars (Cap. 13), is to draw the azimuths. But to do this one must first divide the horizon into segments equivalent to the spacing of the azimuths. This division is covered in Cap. 14, and the drawing of the azimuths themselves is the subject of Cap. 15.

5 circulum hemisperii sicut divisisti circulum signorum per ipsos tres modos; sed uteris in loco totius declinationis tota altitudine Arietis et Libre in eadem regione. Altitudo

4 circulum₁] *om.* Bθ Vπ; eum Ev hemisperii] *om.* Bζ Ev; *add. in marg.* quem divides Bε sicut] quia Lβ divisisti] *add. in Vψ* circulum₂] circulum circulum Mη signorum] *om.* Gα; *add. circulum* Bθ Vπ per ... modos] *om.* Bα tres] 3 *many* modos] *add. scilicet* Mο; *add. p^o/primo* per diametros Bε Bζ Cε Cι Dη Eα Eβ Eη Eο Fα Fβ Fζ Lβ Lγ Lε Lη Mγ Mδ Mο Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Qγ Qδ(diametro) Qλ Sδ Vι Vν Vψ Wα Xβ; *add. 2^o/secundo* per gradus Bζ Eο Mγ Mδ Mο Vν; *add. 2^o/secundo* per gradus assensionum Bε Cε Cι Dη Eα Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Qδ Qγ Qλ Sδ Vι Vψ Wα Xβ; *add. 3^o/tertio* per medium altitudinis computado sicut ibi patuit Fβ Fζ Oξ Qλ Wα Xβ; *add. tertio* per medium declinationis Mο; *add. 3^o/tertio* per medium declinationis (*add. altitudinis* Mυ Mφ Vι) computado sicut ibi patuit Bε Cι Dη Eα Eβ Eη Fα(ibi] prius) Lβ Lγ Lε Lη Mδ Mυ Mφ Oζ Oτ Oυ Qγ Qδ(sicut] ut) Pα Pδ Pθ Pλ Pμ Pν Pρ Sδ Vι Vψ; *add. tertio* computando maximam declinationis solis ut ibi patuit Cε; *add. t[erti]^o* computado maximam solis declinationem ut ibi et postea constitutionem horarum et cum (*add. ut* Bζ) tibi patuit Bζ Vν; *add. tertio* computado maximam solis declinationem ut ibi. Et post constitutionem horarum et cum tibi patuit Mγ Pτ; *add. tertio* computando maximam solis declinationis ut ibi et punctus constitionem horem et t' tibi patuit Eο; *add. Tres* modos etc: unus modus fuit dividere equinoctialem. Alius modus sumitur medietatem declinationis solis. Tercius, per illam medietatem in diametro signata et predictas divisiones equinoctialis, arcus dividentes zodiacum. Eodem modo(*om.* Bη) facies hic. "Sed (uteris *inserted* Mκ) in loco et c[etera]" Bη(*marg.;* *om.* "Sed ... cetera"); Cζ(*after line 9*) Eμ(*marg.*) Mκ(*marg.*) *add. 16-line marginal comment* Qα sed] et Eη; si Qα uteris] numerus Vψ; *rep. va-* sicut signorum circulum dividisti per ipsos tres modos Sed uteris ^{-cat} Qδ

5 in₁] *om.* Eη; hic Bζ Bη Cε Cι Dη Eα Fβ Lβ Lγ Lε Mγ Mδ Oτ Oυ Pα Pδ Pλ Pμ Qβ Qλ Sδ Tδ Xβ hoc Eο Fα Fζ Pρ Pτ Qγ Qδ Vι Vψ; hoc in Xα; *add. interlin* hoc Pο loco] *om.* Eτ Sk in₁ ... declinationis] per tota declinatione Bα totius] *add. regionis* Bζ tota] *om.* Ev Mγ tota ... Libre] altitudinem arcus tota Pφ altitudine] altitudo Bζ; altitudines altitudinis Vκ; *add. ipsius* Gα; *add. line 7* (regionis) – *line 8* (deus) Aα et Libre] *om.* Bα Bζ Cδ Cζ Cθ Eν Eο Mθ Mκ Oα Oη Oκ Oσ Pψ Qα Sθ Si Sl Vε Vν Vσ Vυ Vχ; *interlin.* Oφ; *suprascr.* Eμ; tanta Mγ in₂] et Vν eadem] adem Sθ; eandem Eζ Pγ Pο; eiusdem Mη; teodem *corr. to* eodem Vσ regione₁] *add. expositio*(exponit Cζ) quid sit altitudo Arietis Cζ Oη; *add. in marg.* quid sit altitudo Arietis Bη; *add. est* ut minuas alti^{ua} Aα; *add. Addendum 14* Qδ Altitudo] *add. interlin.* Expon^t quod sit altitudo Arietis Eμ

5-6 Altitudo ... regione] *om.* Bζ Cη Mη Pμ Pψ Sk Vψ; Altitudo autem Arietis et Libre Bγ(*marg.*); Et Eτ

5-7 Altitudo ... est] *marg.* Eο

the horizon as you divided the circle of signs with those three methods;² but you use, in place of the whole declination, the whole altitude of Aries and Libra in the same region. Moreover, its altitude

² See Cap. 9. Here in Cap. 14 the last method found in Cap. 9 is not mentioned. Ps.-Māshā'allāh does give the first method in detail, and mentions the second in the addendum, but does not describe the third (using a table of right ascensions). Samsó says that Maslama also gives these three methods (*On Both Sides*, pp. 426-428).

autem eius in eadem regione est ut minuas latitudinem regionis ex 90, et quod remanserit ipsam erit altitudo Arietis. Et iteremus narrationem in eo quod magis propalabitur, si deus vult.

10 Ponamus igitur circulum hemisperii ABCD, et circulum Arietis et Libre EBZD et eius diametra abscondant se super centrum H, et extrahemus diametrum ZE in directo

- 6 eius] *om.* B ι E ν V χ ; *marg.* O ϕ ; cuius V α est ut] ut est ut A α minuas] minues F ζ P α ; numeriat(?) *corr. in marg. to* minues P σ ; *add.* altitudinem(*explunged*) B η latitudinem] altitudinem C θ G α N α V π ; *corr. from* altitudinem C β 90] l \times C θ ; 20 V κ ; 60 E ν ; *add.* g[radibus] D η V α quod] *marg.* M ν ; q^t S ι
- 7 remanserit] remansit V α ipsam] *om.* B α B ζ C δ C η E α E η E τ F β L ϵ L β L γ M γ M ν M ϕ O ζ O υ P λ Q β Q λ S δ S ι T δ V ν V σ ; ei E σ erit] est A α B γ L ζ M σ P θ Q μ R α S κ V ψ W ι ; et M ν N α altitudo] *om.* P ρ Arietis] *add.* et Libre B γ (*interlin.*) E α G α ; *add.* vere M γ V ν Et₂] Vero et B ζ ; *add.* que L γ iteremus] *om.* G α ; intremus O ϕ (*add. interlin. al' iteremus*); reiteremus V κ ; *add.* huius B ϵ ; *add.* magis M ν narrationem] rationem C η in] inde M θ O κ quod] quare E ν magis] *add.* ut P ν
- 7-8 Et₂ ... vult] *om.* B α
- 8 propalabitur] *illeg.* E η ; *corr. from* probabitur W β ; vel propalabitur approbabitur L β ; propabilitur N α ; propalabitur *corr. to* prolabitur V χ ; propallabitur D γ ; propolabitur E ν ; approbatur Q λ ; approbabitur B ϵ E β F α F β L γ L η M η M ν M ϕ O ζ O τ O υ (*add. in marg. propolabitur*) P α P λ P ν P ρ Q β Q γ S δ V ι ; dabitur P ϕ S ι ; proabitur O α ; probabitur A α B θ C ζ E μ E ν O η O κ P ψ Q α Q δ V α V π ; probatur M κ M ν V ν ; probetur C δ M θ ; probitur C β O σ si deus vult] *om.* B ζ C δ E σ M γ P ρ S λ V ν W ι vult] voluerit *many*; *add.* 3-line comment as in E μ and M κ at line 4 C ζ
- 9 Ponamus] Primo pone B α igitur] ibi P τ ; super V ν ; *add.* hic V σ hemisperii] *om.* E α V κ ; *add.* circulum B ζ C β C ζ C θ E μ E ν E σ M γ M θ M κ O η O κ O σ P ψ Q α S θ S λ V α V ϵ V σ V ν V χ ; *add.* iterum O ϕ ; *add.* scilicet S ι ; *add.* scilicet circulum P ϕ ABCD] ABD G α et circulum₂ ... EBZD] *om.* F α E Libre] *add.* circulum B ζ E σ M γ V ν EBZD] ABZD S κ ; EBSD *corr. from* EBP δ M ν ; EB et D N α ; EBT δ V ν ; EER δ P ϕ ; EHZ δ M ϕ ; EHZQ P ρ
- 9-15 ABCD ... hemisperii] *marg.* W ι
- 10 eius] *om.* P ϕ ; cuius M γ ; eorum S β diametra] *marg.* W α abscondant] abscondantur P ψ ; abscondat P ρ ; scindant B α se] *om.* A α B α B θ B ι B κ D γ E δ E ζ E ν F α G α L ζ M λ M σ N α P σ P τ P ν V κ W ι X α ; C C ϵ ; se se X β super] supra E η centrum] *om.* B α B ζ C δ C θ E μ E ν E σ M γ M θ M κ M ν O α O κ O ϕ P ϕ P ψ Q α S θ S λ V ϵ V σ V χ V ν X β ; puncto B ϵ ; punctum E δ W ι H] E P ρ ; V P ϕ ; *add.* recto B ϵ ; *add. in marg.* id est tota illa altitudo emisperii per divisionem circulum Arietis et Libre Q α extrahemus] prorende B α diametrum] *om.* P δ ; diametra M δ ; *add.* abscondant se super centrum H et extrahemus P μ ZE] E M η ; EZ A α B θ E ν Q α Q δ V π ; RE N α ; S'E M ν ; TE V ν ; ZQE *corr. to* ZE P γ ; *add.* et DB P ρ in directo] *om.* B α E δ
- 10-11 et ... A] *om.* E α G α

in the same region is such that you subtract the latitude of the region from 90, and what will remain this will be the altitude of Aries.³ And we repeat the instruction about this because it has been shown [to be] better (God willing).

And therefore we take the circle of the horizon ABCD, and circle of [the beginnings] of Aries and Libra EBZD and its diameters intersect on centre H, and we extend diameter ZE straight

³ In other words, you use the co-latitude of the observer.

versus A. Postea ponemus arcum DT altitudinem Arietis in eadem regione. Deinde dividemus eum per 2 equalia super K et iungemus K cum B, et abscindemus diametrum AZ super L. Postea ponemus arcum EN 10 gradus aut quantum vis, et arcum ZM similem eius. Postea proice arcum qui est super punctum M et L et N, et abscindet ipse arcus

- 11 A] *om.* Nα Postea] *om.* Cη ponemus] pone Bα; pones Dγ arcum] *om.* Wι
DT] CD Aα Eν Fζ Pγ; DC Vε Vσ; ED Eζ; OC Bη Wβ; TB Mδ; TD Bε Bθ Cε Cη Cι Dη Eα
Eβ Eδ Eη Eο Eτ Fα Fβ Gα Lγ Lε Lη Mη Mo Mv Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Po
Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Vπ Vχ Wα Xβ; et D Lβ; *add.* id est Wβ
altitudinem] latitudinem Oη Arietis] *add.* et Libre Dη; *add. and del.* et Libre Wι
regione] rōne regione Bθ? Deinde] Quod Bα
- 11-13 Postea ... L] *marg.* Lε
- 12 eum] *om.* Bα Bζ eum per 2] et E et 3 Nα per] in Gα 2] 2°/duo *some; add.*
interlin. scilicet equalia Cβ 2 ... super] duos u per Mv equalia] *om.* Cβ Cδ Cζ
Mθ Mv Oα Oη Oσ Pψ Sθ Sλ Vα Vε Vv; *marg.* Mκ; *interlin.* Eμ Oφ super] in puncto
Bα; scilicet Oφ (*add. in marg.* al' scilicet DK) K₁] H Mγ; QK Cι; *add.* cum B Vσ; *add.*
interlin. centrum Eμ K et iungemus] *om.* Cη Pδ; *marg.* Bγ iungemus] iunge Bα;
add. eum per duo super R et iungemus Vα K₂] *om.* Bζ Vv; KM Mv K₂ cum B] H
cum K Vε; K super B Gα abscindemus] scinde Bα; *add.* eum per duo Vα
diametrum] diamet. diametrum Nα
- 13 AZ ... L] *om.* Gα AZ] *om.* Sι; *corr. to* AEZ Cδ; AR Nα; AS Mv; AT Vυ L] A Pφ; S Sι Vε
Postea] Post hac *some* ponemus] pone Bα; ponens Oξ EN] N Bζ; DN Nα;
add. ex Qα; *add.* ex O Bη EN ... ZM] AC ad gradus aut prout volueris AM et EM Vε
EN ... arcum₂] *om.* Pρ 10] x Cθ Mθ Mκ Ok Pψ Vσ Vχ; 2° Nα; ex 10 Qα
gradus] graduum Aα Bθ Bι Eδ Eη Fα Lγ Pλ Pμ Sδ aut] atque Vv aut ...
vis] vel plurius vel paucior Bα quantum] quod Mv vis] volueris *many*
vis et arcum] *om.* Fα arcum₂] *om.* Cε Vυ ZM] *om.* Bζ; S'M Mv; M Nα; RM
Pφ; TM Vv; Z Mγ; ZN Eν; secundum Vψ similem] visibl'e Mγ
- 14 eius] ei Bα; eis Fα; *add.* 3 Fβ Postea] Post hoc *some* proice] proice *corr. to*
prohice Pο; aspicias Vε; pi et Xβ; prociplies Oη; prohice Aα Bι Eδ Eζ Eη Fα Fβ Lγ Lε Oξ
Oτ Oυ Pα Pμ Qγ Qλ Tδ; pro^hice Pο; prohicias Bα Eμ Mκ Oφ Pψ; prohicias *corr. to*
proficias Cβ; prohicies Mγ Vv Vχ; prohyce Xα; proicias Cδ Cθ Mθ Mv Oα Oσ Ok Qα Sθ
Sλ Vα Vσ Vv; proicies Cζ Eο; proijce Pρ; pronte Mδ; propicies Eν; propior Pγ; prospice
Bγ; protrahas Pφ Sι; raproicies Bζ; *add. interlin.* id est figas duo locu orizontum tamen in
oppositis partis Pα arcum] punctum Mv; *add.* x Eα Fζ Pν Qβ Sδ; *add. interlin.* qui
scilicet transeat per tria puncta M, L, N Eμ qui] XQLN Lγ; est] eat Cβ Cδ; est est
Pθ; est *corr. to* eat Sλ; *add.* AT Vε super] *om.* Oυ punctum] puncta Eο Vv
M] H Cδ M et L et N] L et M et N Eα; L, M, N Eο; M et L Oξ Pρ; M, L, N Bα Bζ Mγ
Pφ Sι Vv Vυ; M et L, N Lβ; M et L et N *corr. to* MNL Bθ; M et L, N, R Nα; M et L et V Qδ; M et
LM et N Vε; M, N Mv; M, N, L Vπ; M et N Mθ Oα Ok Oσ Oφ Pψ Qα Vα; M et N *corr. to* M et N
et L Eμ; M et N *corr. to* M et L et N Vχ; M et N et L Cδ Mκ Vσ; M, Z, L Xβ; N et M (*add. interlin.*
et L) Sλ; *add.* id est figura 2 loca orizontum tamen in oppositis partibus ut patet in figura
presenti Fβ; *add.* scilicet qui dicati sit punctos puncta M, L, N Cζ abscindet] abscindat
Eα Eο; scindet Bε ipse] *om.* Sκ; ille Dη Eα Wβ

towards A. Afterwards we take arc DT as the altitude of Aries in the same region. Then we divide it into 2 equal [parts] at K and we join K with B, and we cut diameter AZ at L. Afterwards we take arc EN as 10 degrees, or however much we wish, and arc ZM similar to it. Next sketch out the arc which is through points M, L and N, and this arc cuts

- 15 circulum hemisperii super punctos S et O. Iterum fac similiter quousque divides reliquam ABCD. Postea divides quartam AD sicut quartam AB; et quartam CB secundum divisionem CD sicut fecimus in divisione circuli signorum, et similiter divides
- 15 hemisperii] *add. and del.* Ponamus igitur circulum emisperii W ι punctos] puncta B α ; *add. interlin.* puncta V β punctos ... reliqua] *illeg.* E η s et O] *om.* B α ; S, O *many*; SO *corr. to* S et O A α ; et O M η ; FCDO F β ; FO Eo; L, O N α ; N et O D γ ; S G α ; X, O B ϵ C ι E α E β F α F ζ L β L γ L ϵ L η M δ M ν M ϕ O ζ O ξ O τ O υ P α P λ P μ P ν P ρ Q β Q γ T δ V ϵ V ι W β X β ; x et O Q δ ; ZO V ψ ; *add. in marg.* X W α ; *add. in marg.* X et O Q μ Iterum ... quousque] Similiter quoque B ϵ E α E β F α F ζ L β L γ L ϵ L η M δ O ζ O τ O υ P α P λ P μ P ν P ρ Q β Q γ S δ X β Iterum fac] *om.* O ξ T δ fac] facies B α C β C δ C ζ C θ E μ E ν Eo M γ M κ M ν O α O η O κ O σ O ϕ Q α S θ S ι S λ V α V ϵ V ν V σ V υ V χ quousque] *add. interlin.* similiter C β divides] dividens Q α *add.* quartam CB B ζ ; *add.* quosque divides L γ
- 15-16 divides ... Postea] *om.* D η
- 16 reliquam] reliquam partem C ζ M θ O η O κ Q α ; reliquam partem circuli P τ ; reliquam 4^{tam}(*marg.* V ν) circuli M γ V ν ; reliquam quartam/4^{tam} scilicet B ϵ P ϕ ; *add. interlin.* partem scilicet E μ ; *add. interlin.* [*illeg.*] E α ; *add.* circuli B α ; *add.* scilicet B η C ι E α E β E η F α F β F ζ L β L γ L ϵ L η M δ M η M ν M ϕ O ζ O η O ξ O τ O υ P α P δ P θ P λ P μ P ν Q α Q β Q γ Q λ Q μ S δ S ι T δ V ι V ψ W α W β X β reliquam ... divides] *interlin. and marg.* R α ABCD] *om.* V σ ; AB et CD C β ; cand' (?) AB Q α ; AB X α Postea] *twice* E δ ; Post hoc/hec *many*; *add. in marg.* Aliter postea divides AD sicut 4^{am} AB; 4^{am} CB secundum divisionem CD sicut fecimus in divisione circuli signorum P σ ; *add. 39-line note in marg.* B θ divides] divideris D η quartam₁] 4^{am}/4^m *some* AD ... CB] AB Q μ R α AD ... secundum] ab W ι ; AB S λ quartam₂] 4^{am}/4^m *some* AB et quartam] *om.* B η et ... CB] *om.* G α quartam₃] 4^{am}/4^m *some* CB] CD S κ V ψ secundum] sicut V β (*add. interlin.* secundum)
- 16-17 quartam₁ AD ... CD] quartam AB secundum divisionem AD O ϕ V ϵ V χ ; quartam AB secundum divisionem AD et quartam CD secundum divisionem BC V υ ; quartam AB secundum divisionem CB A α B ι B κ C δ C ζ C θ D γ E ζ E μ E ν Eo E υ L ζ M η M θ M κ M λ M ν Mo N α O α O η O κ O σ P ϕ Q α V α V κ W β ; quartam AB secundum divisionem CD B θ P τ P υ R α S β V π ; quartam AD secundum divisionem CB B α E δ P γ P ϕ S ι ; quartam CB secundum divisionem CD B ζ M γ V ν ; quartas AB et CB(*interlin.*) secundum divisionem CD C β ; quartam AB sicut quartam CD et postea quartam DA sicut quartam CB D η
- 17 CD] CB Q μ W ι ; ED Q δ ; *add.* gradus C ζ sicut] quemadmodum B ζ C β C δ C θ E η E μ E ν Eo M γ M θ M κ M ν O α O η O κ O σ O ϕ P ϕ P ψ Q α S θ S ι S λ V α V ϵ V ν V σ V υ V χ ; *add. interlin.* quemadmodum V β fecimus] *om.* B α ; facis S λ divisione] *add.* per V π

the horizon at points S and O. Again do likewise so that you cut the rest [of circle] ABCD. Afterwards you divide quarter AD as quarter AB, and quarter CB just as the division of CD as we made in dividing the circle of signs, and likewise you

universum circulum hemisperii scilicet per 10 et 10 vel per 20 et 20, vel per gradus et

- 18 universum] *om.* Bγ Cη Σκ circulum] *add.* signorum Dγ scilicet] *om.* Γα Wι
 scilicet ... 20₂] per 30 vel 30 Vε; scilicet per 10 vel 20 vel 30 Mν; scilicet per 10 vel per
 20 vel per 30 Vι; scilicet vel per 10 vel per 20 vel 30 Mφ scilicet per 10 et 10] *om.* Cθ
 Eν; et per 10(*interlin.*) Cδ; per 10 Pδ(*add. in marg. et 10*) Σκ; per 10 et 10 Cε Eδ Pθ Pq Vβ
 Vν; per 10 et per 10 Bγ Cη Eτ Wβ; per 10 et per 10 vel per 12 Dγ; per 10 vel per 10 Bη;
 scilicet per minuta 10 et 10 Mη Qμ; scilicet per 10 Eν Wα; scilicet per decem et decem Qδ;
 scilicet per 20 et 10 Fβ; vel per gradus 10 et 10 circuli equinoctialis Sι; vel per 10 et per 10
 Pο; vel per 10 et 10 Pτ; vel per x et x Mκ; vel per minuta Mν; vel per minuta 10 Bα Mγ;
 vel per minuta 10 et 10 Cζ Eμ Eο Oα Oη Oσ Pφ Vα Vν; vel per minuta x x Oκ Pψ; vel per
 minuta et 10 Bζ; vel per 10 gradus Cβ vel per 20 et 20] *om.* Bα Bζ Cζ Dγ Eμ Eν Eο
 Mγ Mκ Oα Oη Oκ Oσ Pφ Pψ Vν Vν; quantum gradus 20 et 20 Sι; xx Cθ(*add. in marg. vel*
per minuta); aut g^u 20 Mν; et per 20 Eν Pν; vel 20 Aα; vel 20 et 20 Pα; vel per 20 Bι Bκ Cε
 Eδ Eζ Lβ Lζ Mη Mλ Mo Nα Pγ Pδ(*add. in marg. et 20*) Pο Qμ Rα Vκ Wι Xα; vel per 20
 gradus Cβ Sβ; vel per 30 Bθ Vπ et₃] *add.* per Fζ
- 18 *add. in marg.* al' vel per 10 gradus vel per 20 gradus vel per gradus et gradus aut per
 minutia et minutia aut secundum quod volueris ut in hac figura Oφ
- 18-19 scilicet ... minuta₂] ut per minuta aut gradus Sλ; vel per g^a xx aut gradus Mθ; vel per g^a 20
 aut 10 gradus Qα; vel per minuta xx aut gradus gradus Sθ; vel per x et x gradus Vσ; per 9
 vel per 10 gradus Vχ; vel per gradus *corr. to* vel per 10 id est 20 gradus Cδ; vel per 20
 gradus Oφ 20₂ ... hac] *illeg.* Γα vel per gradus et gradus] *om.* Cβ Mν Sβ Sι; aut
 gradus Oκ; aut gradus aut gradus Vε; aut gradus gradus Cθ Eμ Mκ Oα Pψ; aut gradus et
 gradus Cζ Eο Mγ Oη Oσ Pφ Vα Vν Vν; aut gradus aut(*corr. to et*) gradus Bζ; aut per
 gradu et g^u Bη; aut per g^u et g^u Lε; aut per gradum et gradum Σκ Wβ; aut per gradum et
 gradus Bγ Cη Eτ; aut per gradus et gradus Pδ Qδ; et per gradus et gradus Eν; per gradus
 Eν; per gradus et gradus Bθ Vπ; vel gradus et gradus Cε Dη Nα; vel per gradus Mη Rα
 Xα; vel per gradus et g^u Pο; vel per g^u et g^u Bε Dγ Eβ Lβ Lγ Lη Mφ Mν Oζ Oξ Oτ Oυ Pλ
 Pμ Pν Qγ Qλ Sδ Tδ Vι Wα; vel per gra et gra Fα; vel per gradum et gradum Eα Fβ Pα Qβ

each horizon circle by 10 and 10 or by 20 and 20 or by degree and

gradus, aut per minuta et minuta aut secundum quod volueris ut patet in hac figura.

- 19 aut per minuta et minuta] *om.* Bα Bζ Cβ Cδ Cζ Cθ Eμ Eο Mγ Mκ Mν Oα Oη Oκ Oσ Pγ Pψ Sι Vα Vν Vυ Xβ; aut minuta Ev Pq; aut minuta et minuta Ea; aut per minuta Cε Nα; aut per minuta aut minuta Mη; aut per minuta et minuta Fα; aut per minuta minuta Bε; aut per minuta et per minuta Rα; aut per 4 gradus et 4 gradus aut per minuta et minuta Qδ; et cetera per minuta et minuta Vι; per minuta et minuta Dη; per minuta vel minuta Vε; vel per minuta et minuta Dγ Qβ aut₂] *om.* Bη; ac/et *some* aut₂ ... volueris] alii quantum volueris Oκ; aut quantum volueris Bζ Cβ Cδ Cθ Eμ Ev Eο Mγ(*om.* aut) Mκ Mν Oα Oφ Pψ Qα Sθ Sι Sλ Vα Vε(*om.* aut) Vν Vσ Vχ; aut quem volueris Oη; aut quemadmodum volueris Oσ; aut quod volueris Dγ; autem quem volueris Cζ; et sic de aliis multas Bα; quod volueris Qδ; sicut placet Vυ ut] *om.* Qδ ut ... figura] *om.* Bα Mκ Oη Vσ Vυ; et hec est figura Cβ Cδ(*marg.*) Cζ Cθ Eμ Ev Eο Mγ Mθ Mν Oα Oκ Oσ Oφ Pφ Pψ Qα Sθ Sι Sλ Vα Vε Vν Vχ; in hac figura Eζ; sicut patet in figura inferiore Bζ; sicut patet in hac figura Fα Pq; ut in figura apparet Dη Nα; ut in hac figura Bι Bγ(*ut corr. from* aut) Bκ Cη Eδ Eτ Lζ Mη Mλ Mo Pγ Po Qμ Rα Sβ Tδ Vκ Wι Xα; ut in hac figura appareat Pυ Vβ; ut in presenti figura patet Sκ; ut in hac figura patet Cε; ut patet in figura Aα Bθ Ev Vι(*ut*3) Vπ; ut patet in figura sequenti Pτ; ut [pat]3 in sua figura Bε patet] [pat]3 Mυ Pλ hac] *illeg.* Eη figura] *add. interlin.* que ibi ponetur Eμ; *add. interlin.* scilicet immediate antecedens Vβ; *add. 2-line gloss* Cζ; *add. in marg.* Capitulo nunc sequenti scilicet 15° Bε; *add.* Expositio. Cum arcus HM sit similis arcui que designat latitudinem regionis. Arcus vero ZMH cum sit quarta circumferencia est similis arcui circuli maioris qui est a cenith capitis per equinoxialem usque ad orizonta que similiter est quarta circuli. Erit arcus ZM similis elevatam capitis Arietis in regione tua erit. Patet quod dicta linea HM quousque concurrat cum linea EA protracta terminabitur semidiameter circuli equidistantis recto contingentis circulum emisperii residua patent ex planisperio. Oη⁴; *add. Addendum 14: most*

⁴ Gunther added this to his text although he did comment on it (p. 210): “This explanatory paragraph containing the words “circumferencia” and “semidiameter”, which do not occur in the rest of the text, is perhaps a thirteenth-century addition.” In fact, it only appears in the one manuscript.

degrees, or by minute and minute, or however much you wish, as is shown in this diagram.

[ADDENDUM 14]

After line 19: Aα Bγ Bε Bη Bθ Cη Cι Dη Eα Eβ Eδ Eη Eτ Eυ Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη
Mo Mu Mφ Oζ Oξ Oτ Ou Pα Pδ Pθ Pλ Pμ Pρ Pτ Pφ Qβ Qγ Qλ Qμ Sδ Sκ Tδ Vβ Vι Vπ Vψ Wα
Wβ Wι Xα Xβ

In marg.: Eμ Mκ

At line 5: Qδ

- 20 Dividitur etiam melius orizon per lineas rectas transeuntes per totam
altitudinem Arietis id est per punctum cenith et gradus equinoctialis et hoc utimur.
- 20 etiam] et Wι per] *om.* Pφ melius] *om.* Dη
- 21 altitudinem] *add.* in marg. scilicet per latitudinem regionis factus est in almucantarat et
idem Qμ id est] *om.* Pν; et Bε Pθ Vβ punctum] totam Mη; *add.* per Sκ
cenith] cenit Fβ Lβ Oξ Ou Wα Xα; cinich Xβ; zenith Bε Pρ; camitch Cε; *add.* capitum
Qβ et] *add.* per Sκ gradus] gradu Vβ; per gradus Eμ Eτ equinoctialis]
equinoctiales Sκ et hoc utimur] *om.* Bη; *add.* in marg. Ego Iohannes de Calomonte:⁵
Hec lettera scilicet “Dividitur” usque ad litteram exclusive “Cum autem divideris
circulum” [*i.e.*, *Capitulum 15*] raret in multis exemplaribus. Tamen non est sperrenda. Et
hoc presens figura est secundum ipsius doctrinam scilicet per lineas rectas transeuntes.
Vβ
- 20-21 *add.* in marg., partly cut off [Dividitur etiam] melius orizon per [lineas recta]s transeuntes
per totam altitudinem [Arietis id est] per punctum ce[nith et g]radus equinoctialis [et hoc
ut]imur Vχ

⁵ See note to Cap. 7 line 9.

[ADDENDUM 14]

Actually, the horizon is better divided by straight lines passing through the whole altitude [of the circle] of Aries, that is, through the zenith point and the degree of the equator; and we use this [method].

.

[FIGURA 14]

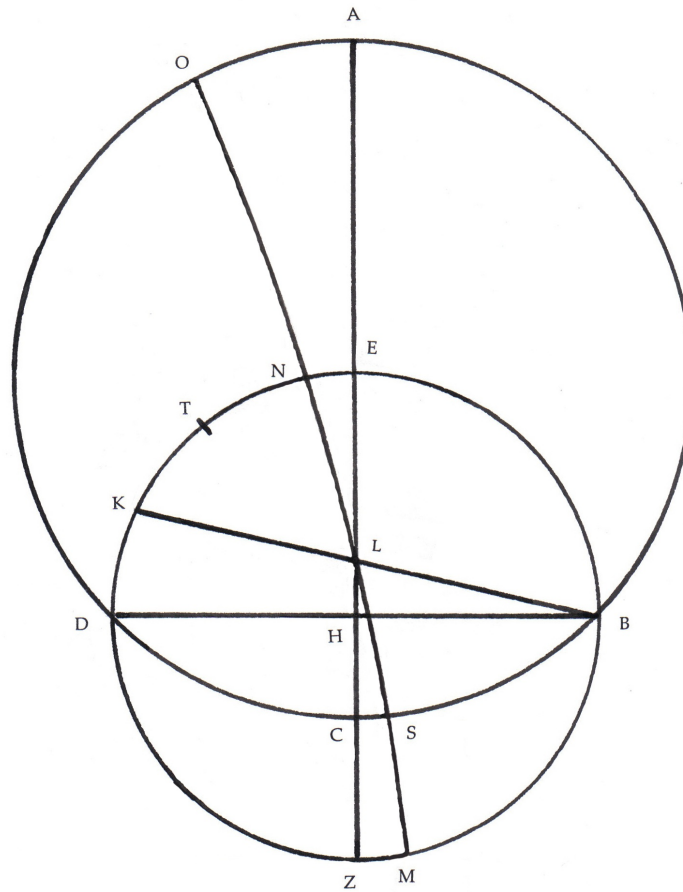


Figura divisionis orientis per arcus super medium altitudinis Arietis et Libre

[Complete diagram] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ
 Lη Mγ(upside down) Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ
 Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ(sideways) Sδ Sκ Tδ Vα Vε Vi(fol. 333r) Vκ Wβ Xβ
 [Partial diagram] Ev Eo Eυ Mκ Mθ⁶ Pq⁷ Vβ Wι

⁶ The diagram in Mθ has many errors; e.g., parts are upside down.

⁷ The diagram in Pq is completely different from the others and seems unrelated to the text.

[*Outline or space only*] Aα Bζ Bθ Cε Dγ Dη Eδ⁸ Eζ Lβ Mφ Oα Pν Pφ Qα Sι⁹ Vν Vπ Vσ Vυ
Vψ

[*No space*] Cζ Gα Nα Oη Sθ Sλ Vχ Wα Xα
Pθ: "N"

[*Caption*]

Figura ... Libre] Fα(supra) Lγ Lε(supra) Pτ Qβ Qγ Qλ Sδ(supra) Tδ Xβ; *om.* Bα Bη Bκ Cβ Cδ Cθ Eμ Lζ Mγ Oσ Pψ Vα Vε; Figura divisionis circuli orizontis Pγ; Figura divisionis emisperii ad azimuth Mλ; Figura divisionis hemisperii per azimuth Pμ; Figura divisionis emisperii per azimuth super medium altitudinis regionis Eτ; Figura divisionis emisperii per azimuth super mediam latitudinem regionis Mο Pο Pυ; Figura divisionis hemisperii prima per azimuth Rα Sβ; Figura divisionis hemisperii prima per azimuth super medium altitudinem Bι Oφ(*add.* regionis); Figura divisionis emisperii super medium altitudinis Arietis in regionis Bγ; Figura divisionis emisperii super medium altitudinem regionis Mη Mν; Figura divisionis orizontis per arcus super medium declinationis Cη Qδ; Figura divisionis orizontis per arcus super medium altitudinis Arietis et Libre vel super totam altitudinem eius Bε Eη; Figura divisionis orizontis per azimuth(asimuth Wβ) per arcus super polum medie altitudinis euntes vel(*om.* Sκ) per rectas lineas exeuntes super(a Sκ) cenith Wβ; Figura divisionis orizontis prime per azimuth super mediam altitudinem regionis Vκ; Figura inscriptionis almuchantarar super latitudinem regionis Fβ; Figura inscriptionis azimuth super primum azmut et Figura divisionis hemisperii de azimuth super mediam(*add.* longitudinis Mυ) latitudinis regionis Mυ Vι; Hec figura est pro divisione emisperii sed non pro pertractione arcuum, tamen arcus hic azimuth protracti sunt Oκ(*later hand*); Tabula divisionis orizonis per arcus super medium altitudinis arietis et libra Cι Eα Eβ Lη Mδ Oζ Oξ Oτ Oυ Pα Pδ Pλ; *add.* Figura capituli 14° Bε; *add.* Primus modus inscribendi azimuth Bε; *add.* Questio super tota altitudine Arietis Bε; *add.* Questio inscriptionis azimuth super medium altitudinem Arietis Bε

Arietis] *om.* Fζ Libra] *add.* vel super totam altitudinem per lineas rectas Qμ

[*Lettering on the diagram*]

A] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qλ Qμ Rα Sβ Sδ Tδ Vα Vε Vι Vκ Wβ Xβ; *om.* Qδ; C Sκ B] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vε Vι Vκ Wβ Xβ; *om.* Eα; D Sκ C] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vα Vε Vκ Wβ Xβ; *om.* Eα Mυ Sβ; A Sκ; Z Vι
D] Bα Bγ Bε Bη Bι Bκ Cβ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vα Vε Vι Vκ Wβ Xβ; *om.* Eα; *cut off* Cδ; B Sκ; C Sβ E] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vι Vκ Wβ Xβ; *om.* Vε; A' Sκ H] Bα Bγ Bε Bη

⁸ The diagrams in this space are unrelated to this text.

⁹ The diagram/outline in ms Sι seems to be for a different capitulum.

Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ
 Lη Mγ Mδ Mη Mλ Mν Mo Mu Oζ Oξ Oσ Oτ Ou Oφ
 Πα Πγ Πδ Πλ Πμ Πτ Πυ Πψ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ
 Vα Vε Vι Wβ Xβ; *om.* Po Ra Vκ K] Bα Bγ Be Bη Bι
 Bκ Cβ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ
 Mδ Mη Mλ Mν Mo Mu Oζ Oξ Oσ Oτ Ou Oφ Πα Πγ Πδ
 Πλ Πμ Po Πτ Πυ Πψ Qβ Qγ Qλ Qμ Ra Sβ Sδ Sκ Tδ Vα Vε
 Vι Vκ Wβ Xβ; *om.* Ea Ok Qδ; *cut off* Cδ L] Bα Bγ Be
 Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ
 Lη Mγ Mδ Mη Mλ Mν Mo Mu Oζ Oξ Oσ Oτ Ou Oφ Πα Πγ Πδ
 Πλ Πμ Po Πτ Πυ Πψ Qβ Qγ Qλ Qμ Ra Sβ Sδ Sκ Tδ Vα Vε
 Vι Vκ Wβ Xβ; *om.* Ea Ok Va; P Sκ M] *right of Z:*
 Bα Bγ Bι Bκ Cδ Cθ Eμ Eτ Lζ Mγ Mη Mλ Mν Mo Ok Oσ
 Oφ Πγ Πμ Po Πυ Πψ Ra Sβ Va Vε Vκ M] *left of Z:* Be
 Bη Cβ Cη Cι Eα Eβ Eη Fa Fβ Fζ Lγ Lε Lη Mδ Mu Oζ Oξ
 Oτ Ou Πα Πδ Πλ Πμ Πτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vι Wβ Xβ;
om. Sκ N] *left of E:* Bα Bγ Bι Bκ Cδ Cθ Eμ Eτ Lζ Mγ
 Mη Mλ Mν Mo Ok Oσ Oφ Πγ Πμ Po Πυ Πψ Sβ Vε Vκ; *om.* Ra Va
 N] *right of E:* Be Bη Cβ Cη
 Cι Eα Eβ Eη Fa Fβ Fζ Lγ Lε Lη Mδ Mu Oζ Oξ Oτ Ou Πα Πδ Πλ Πμ
 Qβ Qγ Qδ Qλ Qμ Sδ Sκ Tδ Vι
 Wβ Xβ; U Πτ O] *left of A:* Bα Bγ Bι Bκ Cθ Eμ Eτ Lζ Mγ Mη Mλ Mν Mo
 Oσ Oφ Πμ Po Πυ Πψ
 Ra Sβ Va Vε Vι; *om.* Vκ; *cut off* Cδ; S Ok Πγ O] *right of A:* Bη Cβ Cι Eα
 Πδ Πμ; S Πτ Wβ; x Be
 Fζ Mδ Oζ Oξ Oτ Ou Πα Qγ Qμ Xβ; *om.* Cη Eβ Fa Fβ Lγ Lε Lη Mu Πα Qβ Qδ Qλ
 Sδ Sκ Tδ Vι; *illeg.*
 Eη s] *right of c:* Bα Bγ Bι Bκ Cδ Cθ Eμ Eτ Lζ Mη Mλ Mν Mo Oσ Oφ Πμ Po Πυ
 Πψ Ra Sβ Vκ;
om. Va Vε; E' Mγ; O Ok Πγ s] *left of c:* Cβ Ea; *om.* Mu Vι; I Cι; O Be Bη Cη Eβ Eη
 Fa Fβ Fζ Lγ Lε Lη Mδ Oζ Oξ Oτ Ou Πα Πα Πτ Qβ Qγ Qδ Qλ Qμ Sδ Sκ Tδ Wβ Xβ;
 x Πμ; z Πδ T Bα Bγ Be
 Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fa Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mu Oζ
 Oξ Oσ Oτ Ou Oφ Πα Πγ Πδ Πλ Πμ Po Πτ Πυ Πψ Qβ Qγ Qλ Qμ Ra Sβ Sδ Sκ Tδ Va Vε Vι Vκ Wβ
 Xβ; *om.* Ok Qδ z Bα Bγ Be Bη Bι Bκ Cβ Cη Cθ Cι Eα Eβ Eη Eμ Eτ Fa Fβ Fζ Lγ Lε Lζ Lη Mγ
 Mδ Mη Mλ Mν Mo Mu Oζ Ok Oξ Oσ Oτ Ou Oφ Πα Πγ Πδ Πλ Πμ Po Πτ Πυ Πψ Qβ Qγ Qλ Qμ Ra
 Sδ Sκ Tδ Va Vε Vκ Wβ Xβ; *om.* Sβ; C Qδ Vι; *cut off* Cδ

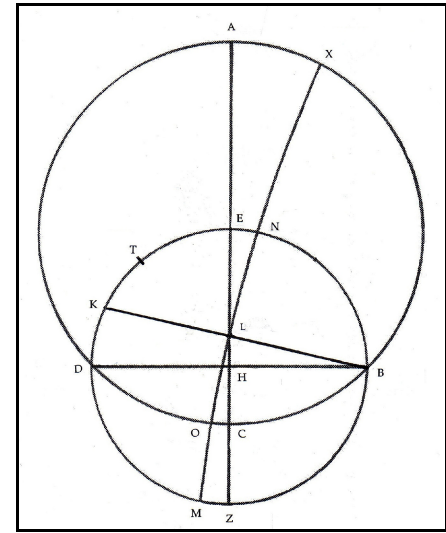


Figura 14A: Alternative Diagram

[Other information]

L] *add.* medium altitudinis Arietis Bγ

P] *add.* tot altitudo Arietis Qμ

add. line BT] Bγ Be Bη Eα Eη Fa Fβ Fζ Lε Lη Mδ Mu Oζ Oξ Oτ Πα Πδ Πλ Πμ Πτ Qβ Qγ Qλ Qμ Tδ Vι

intersection of BT and ZE] *add.* cenit Bγ; *add.* zenith Ok; *add.* O Mu Vι; *add.* P Bη Eβ Fa Fβ Fζ Lε Lη Mδ Oζ Oτ Πα Πα Πτ Qβ Qγ Qλ Qμ Tδ Vι Wβ

arc ZM] *add.* 30 graduum Ok

arc EM] *add.* 30 graduum Ok

arc ZB] *add.* 15 | 30 | 45 | 60 | 75 | 90 Ra Sβ

Circle of Capricorn] *add.* C, D, T, K Eα; *add.* circulus Capricorni Bι Lζ Oσ(later hand) Ra Sβ; *add.* circulum emisperii Oφ

circle ABCD] *add.* circulus emisperii Bι Lζ Πτ Sβ

Circle of Cancer] *add.* Cancri B₁ Lζ Rα Sβ

Circle of Aries] *add.* Arietis B₁ Lζ Rα(*twice*) Sβ(*twice*); *add.* latitudo regionis altitudo Arietis Pv

[CAPITULUM 15.] DE INSCRIPTIONE CIRCULORUM AZIMUTH SUPER CENITH

Cum autem divideris circulum emisperii, constitues in eo azimuth ut sequitur:

- 1 De ... cenith] *om.* Aα Bα Bζ Bκ Cβ Cδ Cε Cθ Dγ Eα Ev Eu Gα Lζ Nα Oα Oη Oσ Pγ Pτ Pψ Qα Rα Sβ Sθ St Sλ Vα Vβ Vε Vv; De azimuth secundo Vκ; De complemento azymuth Oφ; De constitutione azimuth Bθ Vπ(*add.* Rubrica); De constitutione azimuth in tabulis Cζ Eμ(*marg.*) Mκ Vσ; De descriptione circulorum azimuth super cenith Qγ; De divisione emisperii Mθ Oκ; De figuractione azimuth Eo; De figuracione azimuth in orizontem Mγ Vv; De protractione linearum vel arcuum azimuth super primum circulum cenith Bι(*add. in marg.* Inscriptione azimuth super cenith); Dividitur etiam melius orizon per lineas rectas transeuntes per totam altitudinem Arietis id est per punctum cenit et gradus equinocialis et hoc va[lere]tur(?) Xα; Sequitur de inscripcione azimuth Dη; [...]mentis orizontis per [...]s transeuntis per [...] totam altitudinem [...] per punctum ce[nith ...g]radus equinoctialis [...]amur Vχ(*marg.*)
- 1 *before* De] *add.* Capitulum Qλ; *add.* Capuitulum *and add. interlin.* 15^m Bε De inscriptione] Inscriptio Pλ Pρ Qβ Xβ; *add.* almucantarath Qδ circulorum] *om.* Eδ Et Fβ Mλ Mv Pv azimuth] *cut off* Bη; asimuth Mv; asmuth Vi; azim^t Fζ Lγ Oζ Oξ Ou Wα; azimuth Ev Mo Pμ Qβ Qγ Qλ Vψ Wι; azimuz Pα; azimuth Eμ; *add.* Alio modo et uenus(?) Mv; *add.* Capitulum Mλ super cenith] *om.* BηCη Eτ Mλ Mv Wβ Wι; *add. in marg.* Capitulum de inscriptione azimuth super cenith Fβ cenith] cēn Po; cen^t Lη Oζ Sδ; cenich Fζ; cenit Ou Pλ; ceum Eζ; zenith Bε Pρ Qδ; planum Pα; *add.* Rubricam Qβ; *add.* Capitulum Mv
- 2 autem] *om.* Cζ divideris] dividimus Bε Bζ Fβ Lβ Lε Ou Qλ Tδ Vi Vv; dividerimus Fζ Mγ Qβ circulum] eius Aα emisperii] *interlin.* Cδ constitues] constituat Bε; constituemus Mγ Vv; constituemus constituemus Bζ; constituet Cβ eo] ea *some*; *add. interlin.* id est circulo altitudinis Oα; *add. interlin.* tabula scilicet Eμ azimuth] atimuth Pφ Vv; azim^t Fζ Lβ Oζ Oξ Ou Pv Wα; azimich Mγ; azimuc Oη; azimuht Oκ; azimuth Bα Bη Bι Bκ Cβ Cζ Cθ Cι Dγ Eδ Eμ Eo Lη Mκ Oσ Pα Pμ Pρ Pτ Pψ Qγ Qλ Sδ Sθ Sλ Vv Vσ; azimuz Cδ; azinmuth Ev; azmuth Vi; azsumut *corr. to* azumut Vχ; azum^t Vε; azumuth Nα; azymut Oα ut] *om.* Fβ Lε Nα Ou Pα ut sequitur] sic quia Bα; sicut narrabo Bζ Eo Mγ Oη Qα Vv; sicut narrabo tibi Cβ Cδ Cζ Cθ Eμ Ev Mθ Mκ Mv Oα Oκ Oσ Oφ Pφ Pψ Sθ St Sλ Vα Vε Vσ Vv Vχ; ut Vi; *add. interlin.* in alium sicut narrabo tibi Vβ

[CHAPTER 15.] ON THE INSCRIBING OF THE CIRCLES OF AZIMUTH ON THE ZENITH

After you have divided the circle of the hemisphere [i.e., horizon], you will locate the azimuths on it as follows:

Fac circulum Capricorni ABCD, circulum Arietis et Libre ZLYM, et circulum Cancrī HTGS, et circulum emisperii perfectum ELVM.

- 5 Deinde dividemus eum per aliquem modum predictum. Et sint eius divisiones
- 3 Fac] facies Bα Pτ Sλ; facimus Bε Vπ; Nam facies Cβ Cζ Cθ Vε; Nam faciemus Bζ Eμ Ev Eo Mγ Mθ Mκ Mν Oα Oη Oκ Oσ Oφ Pφ Pψ Qα Sθ St Vv Vσ Vυ Vχ; *add.* ergo Dη
 Fac ... ABCD] *marg.* Bθ Capricorni] *add.* super quem erit Bα Bζ(erunt) Bθ(*marg.*) Cβ(erint) Cδ Cζ(erunt) Cθ Eμ(erunt) Ev Eo Mγ Mθ Mκ Mν Oα Oη(erunt) Oκ Oσ Oφ Pφ Pψ Qα Sθ St Sλ Vα Vv(erunt) Vπ Vσ Vυ(est) Vχ; *add.* sunt que ei Vε ABCD] AB^{CD} Bζ; *add.* fac Vπ circulum₂] item Qδ; *add.* *interlin.* ZQZH Pq circulum₂ ... ZLFM] *marg.* Fβ Libre] *add.* super quem erit Bα Cβ(erint) Cδ Cζ(erunt) Cθ Eμ(erunt) Ev Mγ(erunt) Mθ Mκ Mν Oα Oη(erunt) Oκ Oσ Oφ Pφ Pψ Qα Sθ St Sλ Vα Vβ Vε Vv(erunt) Vσ Vυ(est) Vχ ZLYM] *lacuna* Pq; LIM Cε; SLKM Mν Oα Oη Oσ Pψ Qα Sλ; TLKM Vυ; YLZM Vβ; ZFYM Eτ; ZHON Vε; ZHYM Eζ; ZKML Mκ; ZLFM Fβ; ZLKM Bα Cδ Ev Oφ Vα; ZLVM Qβ; ZLXM Gα; ZMKL Cζ Eμ Mθ Oκ; ZMYL Eα; *add.* super erunt ZLKM Bζ et ... Cancrī] *marg.* Sλ Cancrī] *om.* Ev; *add.* super quem Bζ Eo; *add.* super quem erit Bα Cδ Cζ(erunt) Cθ Eμ(erunt) Ev Mγ Mθ Mκ Mν Oα Oη(erunt) Oκ Oσ Oφ Pφ Pψ Sθ St Sλ Vα Vε Vσ Vυ(est) Vχ HTGS] *illeg.* Oζ; GSHT Vβ; HCGHS Pτ; HCGS Aα Bι Cβ Cε Eη Lη; HDGS Qδ; HFGS Bα Bζ Cδ Eμ Eo Fa Mγ Mθ Mν Oα Oσ Pφ Pψ Oη Oκ Qα Sθ Sλ Vκ Vv Vσ Vυ Vχ; HFGY Oφ; HFOS Ev HFSG Cζ Lβ; HGTS Dγ; HSGP Sβ; HTGF Vψ; HZOC Vε; *add.* SLKM et circulum Cancrī super quem erit Mν
- 3-4 et₂ ... ELVM] *om.* Mλ HTGS ... ELVM] *fcinet(?)* Nα
- 4 et₂] *add.* *interlin.* fac Bθ emisperii] *add.* vero/non(?) Bη perfectum] *om.* Mφ; *add.* super quem erit Bα Bζ Cβ(erint) Cδ Cζ Cθ Eμ(erunt) Ev Eo Mγ Mθ Mκ Oα Oη(erunt) Oκ Oσ Oφ Pφ Pψ Qα Sθ St Sλ Vα Vε Vκ Vv Vσ Vυ Vχ; ELVM] *illeg.* Pq; EBOM Dγ; EHOM Bα; ELBM Ev Oσ Vυ; ELBM *corr.* to ELVM Oα; ELGM Vε; ELMM *corr.* to ELNM Tδ; ELMN Bζ Bη Qβ Sδ Vψ; ELMV Wβ; ELNM Eβ Fβ Lε Lη Mδ Oζ Pδ Pθ Pv Qγ Qδ Qλ Xβ; ELRM Aα Bθ Pψ; ELYM Xα; EMBL Mθ Oκ; EMVL Cζ Eμ Mκ Oη Vσ; ESVM Bε; LVM Cη Eτ Mο Mν Sκ; LVM *corr.* to ELVM Bγ; LVNR Eδ; *add.* et fac circulum signorum ALGM Bθ(*marg.*) Vπ
- 5 Deinde] *om.* Vπ dividemus] divides Aα Dη Vπ Vψ Wι eum] *om.* Xα; *add.* *interlin.* circulum emisperii Oα; *add.* id est orizontem Cζ; *add.* *interlin.* orizontem Eμ; *add.* *interlin.* scilicet orizontem Mκ per ... predictum/diximus] *om.* Bα aliquem] *om.* Nα modum predictum] modorum quos diximus Bζ Cβ Cδ Cζ Cθ Dγ Dη Eμ Ev Eo Mγ(*add.* in finem proximi capituli) Mθ Mκ Mν Mυ Oα Oκ Oσ Oφ Pθ Pv Pφ Pψ Qα Sθ St Sλ Vα Vε Vι Vv Vπ Vυ Vσ Vχ; modorum (unus modus est dividere equinoxialem; alius modus est sume[re] medietatem declinacionis solis; tercius per illam medietatem in diametro signatum et predictus divisionis equinoxialis arcus dividentes zodiacum querere; et eodem modo facies hic) quos diximus Oη; *add.* dividendo circulum Arietis et Libre per divisionem ex 10 vel 20 etiam ut diximus Qα; *add.* in fine proximi capituli Bζ Eo Vv; *add.* in *marg.* hoc est sicut diximus in primo capitulo precedente Eμ; *add.* in *marg.* scilicet doctum in capitulo precedente Mκ; *add.* *interlin.* al' modorum quos diximus Vβ predictum] *om.* Wα Xβ Et] *add.* in *marg.* 15 line note concerning azimuths Eμ

Make the circle of Capricorn A, B, C, D, the circle of Aries and Libra Z, L, Y, M, and the circle of Cancer H, T, G, S, and the complete circle of the horizon E, L, V, M.

Next we will divide it [the horizon] by any aforementioned method. And let its divisions be

EN, NS', S'M, MH', H'T', T'V, VR, RC', C'L, LQ, QO, et OE. Et extrahemus punctum cenith capitum, sitque punctus K. Postea queremus arcum circuli qui vadit per punctum N et

- 6 EN ... OE] EN et NS' et S'M et ... *some*; EN, NG, GH, HS, SM, MP, PV, VR, RG, GT, TQ, QL, ¹⁰et OE PQ; EN, NS, SL, LH, HO, OV, VR, RT, TM, MQ, QX, et XE Vψ; EN, NS, SL, LM, MO, OV, VY, YC, OM, MQ, QO, OE Vπ; ON, AN, SM, MH, HE, EV, EM, BOR, EPO Vε EN] CN Eτ; EV Dγ Oτ Wα; SN Cβ NS'] VE Dγ; VS Lβ Oτ Wα Wβ S'M] *om.* Mu Pγ; CM Nα; SL Bθ Cβ; STX *corr.* to SM Pλ MH'] *om.* Wι; HO Mν; LH Cβ; LM Bθ; MHO Eμ Mθ Oα Oη Ok Oσ Pψ Qα Vν; MK Aα; MLP Vα; MT Cζ; MX Pτ; MY Sβ; SMH Mν; TXH *corr.* to MH Pλ H'T'] *om.* Xα; CT Nα; HC Pφ Vν Vσ; HO Mθ; HOT/H^oT Cδ Eμ Mν Oα Oη Ok Oσ Pψ Qα Sθ Vα Vν; KHT Aα; MO Bθ; TH Vχ; TI Cζ; XT Pτ; YT Sβ T'V] *om.* Ok; CB Pφ; CV Vν; IV Cζ; OK Mθ; OR Bθ; TN Vσ; UV Nα VR] KR Mθ; NR Wι; RY Bθ; VI Fβ Vν; VK Ok; VT Cβ Si; VZ Tδ RC'] *om.* Eo Eu Pγ; ET Bζ; IC Fβ Vν; IP Fβ Vσ; IT Nα; PC Cζ; RC *corr.* to RP Mκ; RF Cβ; RP Sβ Sκ; RT Aα Eδ Mη Mθ Mλ Ok Po Pv Pφ Rα Si Xα; RP Bγ Cη Eτ Mo Pt Vβ Vκ Vχ Wι; YC Bθ; ZR Tδ C'L] CL *corr.* to PL Mκ; CM Bθ; FM Cβ; IL Mη; PL Bγ Cη Eτ Mo Pt Sβ Sκ Vβ Vκ Vσ Vχ; RL Eu Pγ Tδ; TB Bζ; TL Aα Eδ Mθ Mλ Ok Po Pv Pφ Si Wι LQ] BQ Bζ; LA Vσ; MQ Bθ Cβ QO] PO Cβ OE] OC Ok extrahemus] extrahes Cδ punctum] *om.* Cε cenith] cenich Fζ; cenih Tψ; cenit Bα Bη Cβ Cθ Dγ Eδ Ev Oα Oσ Pλ Vν Vχ; zenith Bε Nα Pq Vα
- 7 capitum] *om.* Bα Bε Eα Eη Fβ Fζ Lβ Lγ Lη Mδ Mν Pv Wα Mφ Oζ Oζ Oτ Ov Pα Pλ Pμ Pq Qβ Qγ Sδ Tδ; *add.* nostrum(?) Bζ sitque] sit autem Bζ Eo Mγ Vν; eritque Dη Nα punctus] *om.* Bα κ] F Nα; LC Vν; LZ *corr.* to κ; Wβ *add.* cenit Bα; *add.* Nota quod divisiones orizontis primo debet fieri in lamina plumbea bene polita et postea ipse divisiones sumantur per circulum ex plumbo et in tua lamina erea. Opus azimuth per divisionem circuli emisperii similem divisioni zodiaci et per altitudinem Arietis in eadam regione et post per divisionem dimidie [*illeg.*] Cζ queremus] ponemus Dη; pones Cε, queres Cδ arcum] *om.* Pv punctum] *om.* Gα Sκ N] *om.* Bα; M Mv Si Wι; R Cε Pφ; V Wα; R et punctum κN Pq et] *add.* per Bα; *add. interlin.* per Mκ
- 7-8 per ... nadair] *om.* Mv; *marg.* Rα

EN, NS', S'M, MH', HT', T'V, VR, RC', C'L, LQ, QO, and OE.¹ And we will draw the overhead zenith point, and it would be point K. Afterwards we will seek the arc of the circle which goes through point N and

¹ Because of the large number of letters needed to define these divisions, some of the letters are repeated. Scribes often substituted other letters for the duplications, or added a second letter to the first to distinguish between them. I have added primes in my Latin text, the diagram, and the English translation.

eius nadir, punctum R, et punctum K, punctum cenith caputum. Et sit arcus NKR,
et abscondet motum Arietis super punctum X, et motum Capricorni super punctum I,

- 8 eius] *om.* Cη Ετ Σκ; *interlin.* Βγ Μν nadir] Βα Βε Βζ Βη Cζ Cι Εα Εη Εμ Εο Γα Λη Μθ Μλ Να Οη Οκ Οφ Πλ Ρο Ρφ Qα Qγ Σι Vα Vι Vν Vσ Vυ Vχ Wβ Xβ; gnadair Cε; naadayr Vψ; nadair Αα Βθ Βι Cβ Dγ Dη Εβ Εδ Εν Ετ Fα Fβ Fζ Lβ Lγ Lε Lζ Mη Μν Μο Οζ Οξ Οτ Ου Ρα Ργ Ρδ Ρμ Ρο Ρτ Ρυ Ρψ Qβ Rα Sβ Sδ Sθ Σκ Tδ Vβ Vε Vπ Xα; nadanr Pθ; nadayr Βγ Cθ Ευ Οα Οσ Qδ Vκ; nadii Εζ; nadit Mφ; nadir *corr.* to nadair Wι; nadyr Cδ Mδ Sλ; vadair Qλ; vadayr Cη; vadir Wα; vadit Mγ; videtur Pν; *add.* id est oppositum Cζ Εμ(*interlin.*) Mκ(*interlin.*) Οη; *add.* in marg. nadair id est punctum oppositum Oα; *add.* per Nα punctum₁] *om.* Βα; per punctum Qδ; qui est Βζ; qui est punctum Cβ Cδ Cε Cζ Cθ Dη Εμ Εν Εο Μγ Μθ Μκ Μν Οα Οη Οκ Οσ Οφ Ρψ Qα Sθ Σι Sλ Vα Vε Vν Vσ Vυ Vχ; *add.* vadit Vι punctum₁ ... punctum₃] qui est punctus Ρφ R] H Nα; K Oκ Vα Vε; K *corr.* to R Oσ; K *corr.* to T Mθ; T Cη; Z Ρο punctum₂] per Οη; punctus Vχ; per punctum Cβ Cδ Cε Cζ Cθ Dη Εμ Εν Εο Μγ Μθ Μκ Μν Οα Οκ Οσ Οφ Ρψ Qα Σι Vα Vβ Vε Vν Vσ Vυ punctum κ] *om.* Cη Γα κ] D Vα; V Vε; LZ *corr.* to K Wβ; N Oκ; N *corr.* to K Mθ; K qui est Βγ(*marg.*) Sθ Sλ; *add.* et Αα Ευ punctum₃] *om.* Βγ Qμ Vβ; per Βα; qui punctus Βζ; qui est punctus Cβ Cδ Cε Cζ Cθ Dη Εμ Εν Εο Μγ Μθ Μκ Μν Οα Οη Οκ Οσ Οφ Πλ(*interlin.*) Ρψ Qα Σι Vα Vε Vν Vσ Vυ Vχ; *add.* prius Πλ; *add.* scilicet Βι Βκ Dγ Lζ Μλ Να Ρυ Rα Sβ Vβ(*interlin.*) cenith] cenit Βα Βη Cθ Dγ Εν Οα Οσ Ου Πλ Ρφ Sδ Vβ Vυ Vχ Wα; enith Αα; zenith Βε Να Ρο Qδ Vα caputum] *om.* Βα Εζ Εο Qα; *add.* id est(*om.* Cζ) qui transire per illa tria puncta Cζ Εμ(*interlin.*) ηκr] KNR Oξ; KR Qλ Wα; KVT EV; NKI Fα Vα; NKK Oκ; NKK *corr.* to NKR Mθ; NKTR Nα; NKV Bθ; NRK Bζ Vχ; UKR Dγ
- 9 motum₁] capud/caput Fα Fζ Lγ Ρμ Ρν Ου Qλ Wα; capud/caput vel motum Fβ Qβ Sδ; motum vel caput Lε Ρα Tδ; *add.* capud/caput Μν Μφ Ρο(*marg.*) Vι; *add.* *interlin.* id est circulum Oα Oτ; *add.* *interlin.* id est circulum equinoctialem Vχ; *add.* sive circulum capitis Xβ Arietis] *om.* Βζ punctum₁] *add.* A et motum Cancrī Ρν x] *om.* Fζ Mη Nα Ρμ; C Μν; et H Βζ; I *corr.* to Z Ργ; K Βε; R Ρφ; T Vυ; Z Αα Βγ Βη Βθ Βι Βκ Cβ Cδ Cε Cζ Cη Cθ Cι Dγ Εδ Εζ Εη Εν Εο Ετ Ευ Fα Fβ Γα Lζ Μγ Μθ(*add.* *interlin.* id est punctum X) Μκ Μλ Μο Οα Οη Οκ Οσ Οφ Ρδ Ρθ Ρο Ρυ Qα Qλ Rα Sβ Sθ Σι Σκ Sλ Vα Vβ Vε Vκ Vν Vπ Vσ Vχ Vψ Wα Wβ Wι Xα; Z *corr.* to X Ρτ; *add.* in marg. al' X Ρο x ... punctum₂] *om.* Εη et₂] *add.* per Vε motum₂] *add.* *interlin.* id est circulum Vχ punctum₂] punctu Σι I] *om.* Mη; A Βζ Βη Βθ Βι Βκ Cδ Cε Cζ Cθ Cι Dγ Εα Εμ Εν Fβ Fζ Lε Lζ Μγ Μθ Μλ Μν Οα Οη Οκ Οσ Οφ Ρα Ρδ Ρθ Ρμ Ρν Ρφ Ρψ Qα Qβ Qδ Qλ Sδ Sθ Σι Sλ Tδ Vα Vε Vκ Vν Vπ Vυ Vχ Vψ Wα Wβ Xα; DX Nα; IT Vσ; K Ετ Fα; R(?) Γα; S Sβ; Y Αα; *add.* et circulum Arietis super punctum F Nα; *add.* in marg. Z Ρο

9-10 et₁ ... F] *om.* Βα motum₂ ... et₂] *marg.* Βε

its nadir,² point R, and point K, the overhead zenith point. And let this be arc NKR, and it will divide the path of Aries on point X,³ and the path of Capricorn on point I,⁴

² This is not the normal meaning of “nadir”, i.e., the point of the celestial sphere vertically opposite the overhead zenith; here the “nadir” of a point or position means the opposite point 180° across (or around) the sphere.

³ The lettering of the intersections of arc NKR with various circles as Z, A, and H reflects a conflation of two different uses of these letters in Figura 15. In line 3 Z, A, and H are part of the definition of the circles of Cancer, of the equator, and of Capricorn. As shown in the figure, these letters are normally found along the north/south (or vertical) diameter. But in many manuscripts (with or without Figura 15), these letters seem to have migrated over to arc NKR and are used to define both the three circles and their points of intersection with the arc. Other manuscripts use other letters (usually X, I, and F) to mark the intersection of the three circles with the arc, and retain the letters Z, A, and H to define just the three circles.

⁴ See previous note.

10 et motum Cancrī super punctum F'. Et faciemus arcum similem predicto et erit arcus qui vadit per punctum O, et T' oppositum puncto O; et abscindet hic arcus circulum Capricorni super punctum D', et circulum Arietis super punctum F, et circulum Cancrī

- 10 et₁] *add.* circulum Cancrī I et Nα; *add.* per Vε et₁ ... F'] *margin.* Bθ Cancrī] Tauri Cη F'] *om.* Pγ; B Eδ Mη; F *corr.* to H Sδ; H Aα Bγ Bη Bζ Bθ Bι Bκ Cβ Cδ Cε Cζ Cη Cθ Cι Dγ Eζ Eμ Ev Eo Eτ Ev Fβ Gα Lζ Mγ Mθ(*add. interlin.* F) Mκ Mλ Mν Mo Nα Oα Oη Ok Oσ Oφ Pδ Pθ Po(*add. interlin.* F) Pτ Pv Pφ Pψ Qα Qλ Rα Sβ Sθ Si Sκ Sλ Vα Vβ Vε Vκ Vν Vπ Vσ Vυ Vχ Vψ Wα Wβ Wι Xα faciemus] facies Bε Bκ Cδ Cι Eα Eζ Fα Fβ Fζ Lβ Lε Lη Mδ Mη Mυ Mφ Oζ Oσ Oτ Ou Pα Pδ Pθ Pλ Pν Po Pq Pτ Qβ Qγ Qλ Qμ Sδ Sλ Tδ Vι Vυ Wα Xα; *add.* A Nα similem] *om.* Xα; *add. in marg.* ex alio parte Oα predicto] predictum Cη Sκ; puncto Mγ Mθ Ok Vσ; *add.* arcui NKR Cζ Oη; *add. interlin. illeg.* Eμ; *add. in marg.* qui est similem arcui NKR Cζ et₃ ... arcus] *om.* Bα et₃] *add.* hic Bζ Eo; *add.* hic arcus Cβ Cδ Cζ Cθ Eμ Ev Mγ Mθ Mκ Mν Oα Oη Ok Oσ Oφ Pφ Pψ Qα Sθ Si Sλ Vα Vε Vν Vσ Vυ Vχ; *add. interlin.* qui est arcus circuli NKR Eμ arcus] *om.* Eζ Mγ Mν Qα Vε; *add.* predictus Cε
- 11 qui vadit] *om.* Oη; vadens Aα Bγ Bε Bη Bθ Bι Bκ Cδ Cε Cη Cι Dγ Dη Eα Eβ Eδ Eζ Eη Eτ Ev Fα Fβ Fζ Lβ Lγ Lζ Lε Lη Nα Mδ Mη Mθ Mλ Mo Mυ Oζ Oξ Oτ Ou Pα Pγ Pδ Pθ Pλ Pμ Pν Po Pτ Qγ Qβ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Vπ Vψ Wα Wβ Wι Xα Xβ per] *om.* Pμ; super Xβ punctum] *om.* Bα O₁] *om.* Bθ Mυ Mφ Sκ Vι Vπ; *add. interlin.* et punctum κ Sλ; *add.* et TO Xα; *add. in marg.* et per punctum κ Mκ O₁ et] *margin.* O et per punctum κ et per punctum Cβ et₁] *add.* per Bα; *add.* per punctum Bζ Cζ Cθ Eμ Ev Eo Mθ Mκ Mν Oα Oη Ok Oσ Oφ Pφ Pψ Qα Sθ Si Vα Vε Vν Vυ Vχ; *add.* per punctum κ et per punctum Vσ; *add.* punctum Sλ; *add.* punctum κ et punctum Cδ et₁ ... O₂] *om.* Bγ Cη Ev Mγ; *add. in marg.* et T oppositum Bγ T'] C Mν Pμ Si; I Vν; P Pq; X Cθ Oφ(*add. interlin.* al' T); T *corr.* to κ Mθ oppositum] opposito Cε; ei oppositum Qα; qui est oppositus Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mθ Mκ Mν Oα Oη Ok Oφ Si Sλ Vα Vε Vν Vσ Vυ Vχ; qui est punctus oppositus Sθ puncto] *om.* Bα Gα O₂] *om.* Eζ Qα; OR Nα; *add.* D fit Vχ; *add.* et erit arcus ORX Oφ; *add.* qui similiter transire per κ qui est cenith Cζ Eμ(*interlin.*) hic arcus₂] *om.* Qα
- 11-12 circulum ... et₁] *om.* Bθ Vπ
- 11-13 et₂ ... I'] *om.* Bα; *margin.* Oφ(al' et abscindat ...) abscindet ... I'] *margin.* Vχ
- 12 Capricorni] *add.* supricorni Aα punctum₁] *om.* Mθ Ok et₁ ... F] *om.* Vε Arietis] *om.* Bκ F] *om.* Xα; A Aα Bθ Eδ Ev Mη Po(*add. interlin.* F) Vπ; FE Cδ Cζ Cθ Eμ Mθ Mν Oα Oη Ok Oσ Pψ Qα Sθ Vυ Wι; FE *corr.* to F Mκ; FM Bζ; FT Cβ; M Mγ Vν circulum₂] *om.* Bε
- 12-13 D' ... I'] *om.* Eη F ... punctum] *om.* Mo Nα Pγ Po et₂ ... I'] *om.* Eδ Pq Wι
- 12-14 super₂ ... similiter] *margin.* Bε

and the path of Cancer at point F' .⁵ And we will construct an arc similar to the aforesaid [arc NKR] and it will be the arc which passes through point O, and T' opposite point O; and this arc will cut the circle of Capricorn at point D' , and the circle of Aries at point F, and the circle of Cancer

⁵ See above, note to Cap. 15, line 9.

super punctum I'.

Similiter facies in arcu s'KC' et QKH' et MKL. Perficies quoque positionem horum

- 13 I'] A Bγ Cη Eζ Mo Nα Pα Pγ Po Pτ Pv Sκ Vβ Wα; A *corr.* to s Mθ; C Si; EI Mv Pφ; N Bθ Bi Cβ Cδ Cε Cθ Mκ Qλ Sλ Vε Vi Vπ Vv; s Mγ Vv; si Bζ; T Sθ Vα; TI Cζ Eμ Mη Oη Oσ Pψ Qα Vσ; TN Oα; TS Ev; v Oκ; *add.* *Addendum 15* Aα Bε Bθ Cε Ci Dη Eα Eβ Eη Ev Fa Fβ Fζ Lβ Lγ Lε Lζ(*marg.*) Lη Mδ Mv Mφ Oζ Oξ Oτ Ou Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qδ Qλ Qμ(*marg.*) Sδ Tδ Vi Vπ Vψ Wα Xβ
- 14 Similiter] *om.* Si; Super Aα; *add.* etiam Vσ facies] fac Aα Bε Bκ Ci Eα Eβ Eζ Lβ Lε Lη Mλ Mφ Oζ Ou Pγ Pδ Pθ Pλ Pν Pτ Qλ Sβ Tδ Vi Vπ Vψ Wi; *add.* etiam Cβ Cζ Cθ Eμ Ev Eo Mθ Mκ Mv Oα Oσ Pψ Sθ Si Vv in₁] *om.* Mκ Xβ in arcu] *om.* Cθ Vε; arcum Oφ Vχ; *add.* scilicet Pγ in ... s'KC'] *om.* Bα arcu] *interlin.* Cβ s'KC'] et OKP Bζ; KP Pγ; OCH Mγ; OKT Pφ Si; OLK Vv; PFK Eo; PKS Vχ; SCK Vi; SKCP Qδ; SKE Cθ Xα; SKEC *corr.* to SKP Mκ; SKF Cβ Lγ; SKO Fβ Vε; SKP Aα Bγ Bθ Bi Bκ Cε Cη Dγ Eδ Eτ Ev Gα Lζ Mη Mλ Mo Nα Po Pτ Pv Rα Sβ Sκ Vβ Vκ Vπ Vσ Wi; SK.PA Eζ; SKT Cδ Ev Fζ Lβ Mθ Oκ Pρ Vv; TKS Oφ et₁] R Nα; *add.* arcum Oφ Vχ; *add.* in arcu Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mγ Mθ Mκ Mv Oα Oκ Oσ Pφ Pψ Qα Sθ Si Sλ Vα Vε Vv Vσ Vv et₁ ... MKL] *marg.* Rα et₁ QKH] *om.* Vκ QKH'] AKHO] Vv; HKQ Oφ Vχ; QBH Vε; QHK Bζ Nα; QHO Qα; QK Mη; QKHO Cδ Mθ Mv Oα Oκ Oσ Pψ Si Vα; QKL Cβ Pγ; QKO *corr.* to QKHO Eμ; QKP Aα Pτ; QKQ Bθ Ev Vπ; QKT Cζ; QLHO Sθ et₂] *om.* Nα; *add.* in arcu Bα Bζ Cβ Cδ Cζ Cθ Eμ Ev Eo Mγ Mθ Mκ Mv Oα Oη(*om.* in) Oκ Oσ Pφ Pψ Qα Sθ Si Sλ Vα Vε Vv Vσ Vv; *add.* item quoque arcum Vχ; *add.* *interlin.* similiter Vβ et MKL] et de MKL et XHZ *marked* "val cat" Vβ; itemque arcus MKL Oφ MKL] MKH Qλ; MKLN Sθ; MKS Bε Ev; MKTR Cθ Perficies quoque] Perficies Bη Eζ Pδ Qλ Wβ; Perficiesque Aα Bγ Bκ Cη Ci Dγ Dη Ev Lζ Mη Mλ Mo Nα Pγ Pθ Po Pτ Pv Qδ Qμ Rα Vβ Vκ Vπ Vψ Wi Xα Xβ; Et perficies Bα; Erisque perficiens Bζ Cβ Cδ Cζ Cθ Eμ Eo Mθ Mκ Oα Oη Oκ Oσ Oφ Pφ Qα Sλ Vα Vv Vσ Vv Vχ; Eritque perficiens Ev Mγ Mv Pψ Sθ Si Vε quoque] *om.* Sκ horum] eorum Cε; istorum Eα

at point I' .

You will do similarly in arc $S'KC'$ and QKH' and MKL . And you will complete the position of these

- 15 azimuth per hanc divisionem sub 30 et 30 gradibus. Similiter divides gradum gradui aut cui volueris. Et scribes in eis numerum secundum quod est in figura, si deus voluerit.
- 15 azimuth] acimuth Vπ; armut Vσ; asimuc Oη; asimut Oκ; asumut *corr. to* azumut Vχ; atimuth Vυ; azimich Mγ; azim^t Eβ Lζ Rα; azimuht Mη; azimut Bα Bζ Bη Cβ Cθ Dγ Eδ Eο Lβ Lε Mθ(*interlin.*) Mκ Oα Oσ Pυ Pψ Sθ Sλ Vκ; azimuz Cδ; azismuth Vα; azsumuth Ev; azum^t Vε; azumuth Nα Xα azimuth ... gradui] *om.* Bκ hanc] *om.* Eο Sβ divisionem] *corr. from* dictionem Pο sub] *om.* Eτ Vσ; et gratia exempli sint Bα; et sint Bζ Cβ Cδ Cζ Cθ Eμ Ev Eο Mγ Mθ Oα Oη Oκ Oσ Oφ(*add. interlin. al' sub*) Pψ Qα Sθ Vα Vυ Vυ Vχ(*add. interlin. sub*); et sunt Pφ; per Oζ Pλ Pρ; que sint sub Mκ; sint Mν; sunt Vε; super Bη sub ... gradibus] et sunt(sint Sλ) 30 gradus Sι Sλ; 30 gradibus Sκ 30 et 30] triginta et triginta Qδ; 30 Cδ Gα Nα Oη Pφ; 30.30 Eμ Ev Mθ Oα Oκ Qα Sθ Vα Vε Vχ; 30 et 30 et 30 Bη 30₂] *interlin.* Pρ gradibus] gradus Bα Eο Mγ Mν; *add. super* Aα; *add. vel ad tuum placitum de 10 in 10 et c[etera]* Bε divides] *add. per* Bε gradum] *om.* Eη Ev Pγ Sθ Vα Vε Vσ Vυ Vχ; *interlin.* Oφ; gradi Oκ; gradui Oη; gradus Bζ Eο Mθ Vυ; *add. interlin. id est secundum quod [illeg.]* Oα gradui] *om.* Mν; in graduum Bε; gradubus Bζ Eο Vυ; gradus Pρ; scilicet gradibus Mγ; *add. id est per quot gradus volueris divide[re] equinoxialem et per equinoxialem horizontem et describes azimuth(azimuc Oη) transeuntes per cenith capitis Cζ Oη*
- 15-16 Similiter ... volueris] vel sicut vis Bα
- 16 aut cui] si Dη cui] quamlibet Bε; cuius Mθ(*add. interlin. quamlibet*) Et scribes] Scribesque *some* in₁] *om.* Vυ numerum] *om.* Cη; *add.* 30.30 Qα secundum] *om.* Sι secundum quod] sicut Cδ Sλ quod] *om.* Cη; quot Lβ est] apparet Cε Dη; patet Bε; ponitur Cη Oη; tibi apperebit Bκ in₂] *add. hac* Bι Cβ Cδ Cθ Dγ Eμ Ev Lζ Mθ Mκ Mλ Mν Oα Oη Oκ Oσ Oφ Pυ Pφ Pψ Qα Qδ Rα Sβ Sθ Vα Vβ Vε Vκ Vσ Vυ Vχ Wβ; *add. presenti* Lε Tδ figura] *add.* 30.30 Cζ Cθ Eμ Mθ Mκ Oα Oκ Oσ Pψ Sθ Vα Vε Vυ Vχ; *add.* 30 et 30 Dγ Gα Lζ Mλ Oφ(xxx et xxx) Pφ Rα(*marg.*) Sβ; *add. [illeg.]* 30 et 30 Eο; *add. est* 30 et 30 Vκ; *add. presenti* Pρ; *add. sequenti* Tδ; *add. subscripta* 30 et 30 Vυ; *add. scripti est* Bκ; *add. subscripta* 20 et 30 Mγ; *add. subscripta* 30 et 40 Bζ; *add. interlin. que ponitur* Eμ
- 16-17 si deus voluerit] *om.* Bγ Bζ Bη Bθ Bι Bκ Cδ Cη Dη Ev Eο Eτ Mγ Mθ Mν Oκ Pρ Qα Sι Sκ Sλ Tδ Vε Vυ Vπ Vυ Wβ Xα; si deus Lζ; *ms* Gα ends

azimuths through this division of 30 and 30 degrees. Similarly you will divide degree by degree, or what you wish. And you write in them [i.e., the divisions] the number in accordance with what is in the figure (God willing).

[ADDENDUM 15]

Line 13: γ] *add.* Aα Bε Bθ Cε Cι Dη Eα Eβ Eη Ev Fα Fβ Fζ Lβ Lγ Lε Lζ(*margin.*) Lη Mδ Mu Mφ Oζ Oξ Oτ Ov Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qγ Qδ Qλ Qμ(*margin.*) Sδ Tδ Vι Vπ Vψ Wα Xβ

Et nota quod invenies circulum transeuntem per cenith et principium Arietis et Libre et erit primum azimuth, et secundum quod deprimitur vel elevatur cenith.
 20 Secundum hoc oportet querere centrum illius in diversis locis in dyametro ita quod primum azimuth semper transeat per cenith et principium Arietis et Libre.

- 18 Et [no]ta] *om.* Eη; *margin.* Bε nota] notando Fβ circulum] *add. interlin.* scilicet alium apdeīs(?) Pα per cenith et] *om.* Eβ Lη Pμ cenith] cenich Xβ; cenit Fβ Pθ Qμ; chenith Cε; zenith Bε Ev Pρ Qδ cenith et principium] *om.* Pμ et₂] *om.* Oξ; *add.* per Aα Bε Bθ Dη Eβ Eη Ev Fβ Lη Mδ Qμ Vπ Wα
- 19 erit] *superscr.* Bε primum] *add. and expunged* vel elevatur Aα azimuth] acimuth Vπ; azim^t Dη Eβ Qμ secundum] *om.* Ev quod] *om.* Aα elevatur] *add.* a Lγ cenith] cenich Xβ; cenit Qμ Sδ; cen^t Cι Lβ Lη Oξ Ov Qλ; zenith Bε Pρ Qδ: centrum Pv
- 20 Secundum hoc] *om.* Qμ hoc] *interlin* Cε; *om.* Vπ in₁] *om.* Fζ in₂] *om.* Qδ
- 21 azimuth] acimuth Vπ; azim^t Eβ Lβ; azimut Fβ Pα Qμ semper] *om.* Vφ; super Bθ Vπ Xβ cenith] cenich Xβ; cenit Fβ Qμ Vι; cen^t Qγ; chenith Cε; zenith Bε Pρ Qδ et₁] *add.* per Fβ

[ADDENDUM 15]

And note that you will find the circle passing through the zenith and the beginnings of Aries and Libra and it will be the first azimuth, and the second [azimuth], because the zenith is depressed or raised. In pursuing this, it is proper to seek the centre of that in various places on the diameter so that the first azimuth always passes through the zenith and the beginnings of Aries and Libra.

[FIGURA 15]

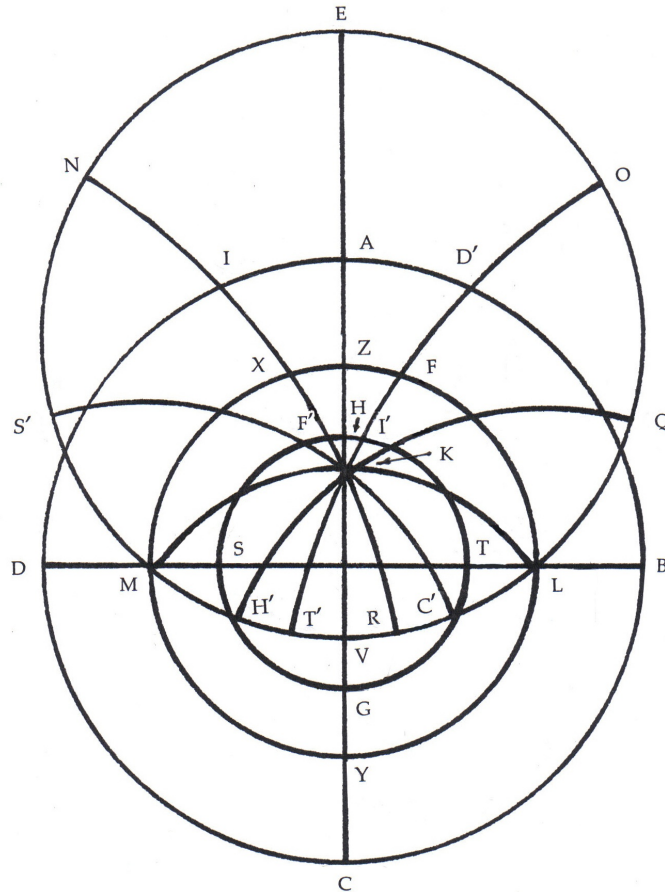


Figura inscriptionis azimuth super cenith

Complete: Bα(upside down) Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα(upside down)
 Fβ Fζ Lγ Lε Lζ Lη Mγ(upside down) Mδ⁶ Mη Mλ Mν Mο Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ⁷ Pδ
 Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ(sideways) Sδ Sκ Tδ Vα Vβ Vι Vκ Wβ Xβ

Incomplete: Mθ⁸ Mκ Pλ Vε Wι

Outline or Space Only: Aα Bθ Cε Dγ Dη Eδ Eζ Eο Eυ Lβ Mφ Oα Pν Pφ Qα Sθ Vπ Vσ Vν

⁶ In ms Mδ, Figura 15 is combined with Figura 16.

⁷ In ms Pγ, Figura 15 is combined with Figura 16.

⁸ The diagram in ms Mθ is very confused.

Vυ Vψ Wα

No Space: Bζ Cζ Eα Ev Gα Nα Oη St SA Vχ Xα

Pθ: “O”

Note: the letters are reversed left/right in these manuscripts:⁹ Bκ Cβ Cδ Eμ Eτ Lζ Mη Mλ Mν Mo Oσ Pμ Po Pv Pψ Rα Sβ Vα Vκ

[Caption]

Figura ... cenith] Bε Cη Cι Eβ Eη Fα Fζ Lγ Lε Lη Mδ Mη Oζ Oτ Oυ Pα Pδ Pμ Pρ Pτ Qδ Qλ Qμ Sδ Tδ Xβ; om. Bα Bι Bκ Cβ Cδ Cθ Eμ Lζ Mγ Oκ Oσ Pψ Vα; Figura descriptionis ipsorum azimuth Bγ; Figura dispositionis azimuth Bη(azimut) Wβ; Figura divisionis azimuth per [illeg.] Rα Sβ; Figura divisionis orizontis per azimuth per arcus super polum medie altitudinis euntes vel per rectas lineas exeuntes a cenith Fβ;¹⁰ Figura inscriptionis azimuth secunda super totam altitudinem regionis sive cenith quod idem est Oφ; add. Figura capituli 15 Bε

azimuth] admuch Cι Mν; azim^t Lγ Oξ Qγ; azimut Oυ Pρ Qμ Vι; azymuth Eη Mλ Mν Sδ; add. secunda Vβ Vκ super] add. ipsum Eτ Mν Mo Mυ Po Vι super cenith] om. Mλ Pγ; primo modo Sκ cenith] cen^t Oξ; cenich Cι Xβ; cenit Mη; zenit Eη; zenith Bε Mυ Pρ Vι; add. regionalis Vκ; add. cum figura 12 horarum naturalium Mδ; add. in tabule Mυ; add. nostram. Et est doctrina bona Pv Vβ; add. secundis inscribendi azimuth Bε

[Lettering on the diagram]

A] Bα Bγ Bε Bη Cη Cι Eβ Eη Eτ Fα Fβ Lγ Lε Lη Mγ Mδ Mυ Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pμ Po Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sβ Sδ Sκ Tδ Vα Vβ Vι Wβ Xβ; om. Bι Bκ Cδ Cθ Eμ Fζ Lζ Mη Mλ Mν Mo Pv Pψ Rα Vκ B] Bα Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mυ Oζ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pμ Po Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Wβ Xβ; D Oκ C] Bγ Bε Bη Bι Bκ Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mυ Oζ Oκ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pμ Po Pρ Pv Pψ Qβ Qγ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι Wβ Xβ; om. Bα Qδ; cut off Oξ Pτ Vκ C'] Bα Bε Cδ Cη Cθ Cι Eβ Eη Eμ Fα Fβ Fζ Lγ Lε Lη Mγ Oζ Oξ Oσ Oτ Oυ Pα Pδ Pψ Qδ Xβ; om. Bη Qβ Vα; F Bκ Lζ; G Pρ; H Oφ; P Bγ Bι Eτ Mη Mλ Mν Mo Pμ Po Pτ Pv Qγ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Wβ; R Mδ; T Mυ Oκ Pγ; X Cβ D] Bα Bγ Bε Bη Bι Bκ Cη Cθ Cι Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mυ Oζ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pμ Pρ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι Wβ Xβ; om. Po Vκ; cut off Cβ Cδ; B Oκ D'] Bγ Bε Bι Cβ Cδ Cη Cθ Cι Eβ Eη Eμ Fα Fβ Fζ Lγ Lε Lζ Lη Mυ Oζ Oξ Oσ Oτ Oφ Pα Pγ Pδ Pρ Pτ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Wβ Xβ; om. Bα Bη Bκ Eτ Mγ Mδ Mη Mλ Mν Mo Oκ Oυ Pμ Po Pv Vα E] Bα Bγ Bε Bη Bκ Cβ Cδ Cη Cθ Cι Eβ Eμ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mν Mo Oζ Oκ Oξ Oσ Oτ Oυ Oφ Pα Pγ Pδ Pμ Po Pρ Pτ Pψ Qβ Qγ Qλ Qμ Sβ Sδ Sκ Vα Vβ Vι Wβ Xβ; om. Eη Eτ Mυ Qδ Tδ; A Bι Mη Mλ Pv Rα; add. A Vκ F] Bγ Bε Bι Cβ Cη Eβ Eη Eμ Fα Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mυ Oζ Oξ Oτ Oυ Pα Pδ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Wβ Xβ; om. Bα Bη Bκ Eτ Fβ Mγ Mν Oκ Pγ Vα; FA Cθ; FE Cδ Oσ Pψ; S Cι; Z Oφ F'] Bε Cη Eβ Eη

⁹ Letters B and D, however, remain in their normal positions.

¹⁰ This is actually the caption for Figure 14.

Fa Fβ Fζ Λγ Λε Λη Μδ Οζ Οξ Οτ Ου Πα Qβ Qγ Qλ Qμ Tδ Xβ; *om.* Ba Bκ Eτ Mγ Mν Mu Ok Oφ
 Pρ Qδ Va Vi; H Bγ Bi Cβ Cδ Cθ Ci Eμ Λζ Μλ Mo Oσ Pγ Pδ Pμ Po Pτ Pυ Pψ Ra Sβ Sδ Sk Vβ Vκ
 Wβ; Z Bη Mη G] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ
 Mδ Mη Μλ Mν Mo Mu Oζ Ok Oξ Oσ Oτ Ου Oφ Pa Pδ Pμ Po Pρ Pτ Pψ Qβ Qγ Qδ Qλ Qμ Ra Sδ
 Sk Tδ Va Vi Vκ Wβ Xβ; *om.* Pv; H Pγ Vβ; s(?) Sβ H] Ba Bγ Be Bη Cη Ci Eη Eτ Fa Fβ Fζ Λγ
 Λε Λη Mγ Mδ Oζ Ok Oξ Oτ Ου Pa Pδ Pρ Qβ Qγ Qδ Qλ Qμ Tδ Va Xβ; *om.* Bi Bκ Cβ Cδ Cθ Eβ Eμ
 Λζ Mη Μλ Mν Mo Mu Oσ Oφ Pμ Po Pτ Pυ Pψ Ra Sβ Sδ Sk Vi Vκ Wβ; G Vβ; Z Pγ H'] Ba Bγ
 Be Cβ Cη Cθ Ci Eβ Eη Fa Fβ Fζ Λγ Λε Λη Mγ Mδ Mν Mo Oζ Ok Oξ Oτ Ου Pa Pγ Pδ Pτ Qβ Qγ
 Qδ Qλ Qμ Sδ Sk Tδ Vβ Vκ Wβ Xβ; *om.* Bη Pψ Va; H° Cδ Eμ Oσ; M Pρ; T Mη Oφ; X Bi Bκ Eτ Λζ Μλ
 Mu Pμ Po Pυ Ra Vi; Y Sβ I] Bγ Be Cη Fa Fβ Fζ Λγ Λη Mδ Oζ Oξ Oτ Pa Pτ Qγ Qδ Sδ Vβ Wβ
 Xβ; *illeg.* Eβ Eη; *om.* Ba Bη Bκ Eτ Mγ Mη Μλ Mν Mo Ok Ou Oφ Pμ Po Pυ Qβ Qμ Sk Va Vi Vκ; A
 Cβ Cδ Cθ Ci Eμ Λζ Pδ Qλ; D Oσ Pψ; G Ra; L Pγ; N Le Tδ; S Bi Mu Sβ; X Pρ I'] Be Bi Cη Ci Eτ
 Fa Fβ Fζ Λγ Λε Λη Mδ Mη Mo Oζ Oξ Oτ Ου Pa Pδ Pμ Po Pυ Qβ Qγ Qλ Qμ Ra Sβ Tδ Vκ Xβ; *illeg.*
 Eβ; *om.* Ba Bη Bκ Eη Mγ Μλ Mν Mu Ok Oφ Pγ Pρ Qδ Va Vi; A Bγ Pτ Sk Vβ Wβ; A, X Sδ; N Cβ Cδ
 Oσ Pψ; T Eμ; TI Cθ; Z Λζ K] Ba Bγ Be Bi Bκ Cβ Cδ Cη Ci Eμ Eτ Fa Fζ Λγ Λζ Λη Mγ Mδ Mη
 Mo Mu Oζ Ok Oξ Oσ Oτ Ου Pδ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Ra Sδ Sk Va Vβ Vi Vκ; *illeg.*
 Eβ Pψ; *om.* Bη Cθ Eη Fβ Le Μλ Mν Oφ Pa Pγ Sβ Tδ Wβ Xβ L] Ba Bγ Be Bη Bi Bκ Cδ Cη Cθ
 Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ Mν Mo Mu Oζ Ok Oξ Oσ Oτ Ου Oφ Pa Pγ
 Pδ Po Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Wβ Xβ; M Cβ; Q Pμ Pρ; X Vκ M]
 Ba Bγ Be Bη Bi Bκ Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ Mν Mo Mu
 Oζ Ok Oξ Oσ Oτ Ου Oφ Pa Pγ Pδ Pμ Po Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi
 Vκ Wβ Xβ; H Pρ; L Cβ N] Ba Bγ Be Bη Bi Bκ Cβ Cδ Cη Cθ Ci Eβ Eμ Fa Fβ Fζ Λγ Λε Λζ Λη
 Mγ Mδ Mη Μλ Mν Mo Mu Oζ Ok Oξ Oτ Ου Pa Pγ Pδ Po Pρ Pτ Pυ Pψ Qγ Qδ Qλ Qμ Sβ Sδ Sk Tδ
 Vβ Vi Vκ Wβ Xβ; *om.* Eη Eτ Oσ Pμ Qβ Ra Va; X Oφ O] Ba Bγ Be Bi Bκ Cβ Cδ Cη Cθ Ci Eβ
 Eμ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ Mν Mo Mu Oζ Ok Oξ Oτ Ου Pa Pγ Pδ Po Pρ Pτ Pυ Pψ
 Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Vβ Vi Vκ Wβ Xβ; *cut off* Bη; *om.* Eη Eτ Oσ Pμ Va; N Oφ Q]
 Ba Bγ Be Bi Bκ Cβ Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ Mν Mo Mu
 Oζ Ok Oξ Oσ Oτ Ου Pa Pγ Pδ Po Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ
 Xβ; *cut off* Bη; L Pμ Pρ; S Oφ R] Ba Bγ Be Bi Bκ Cβ Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε
 Λζ Λη Mγ Mδ Mη Μλ Mν Mo Mu Oζ Oξ Oτ Ου Pa Pγ Pδ Pμ Po Pρ Pτ Pυ Pψ Qγ Qδ Qλ Qμ Ra
 Sβ Sδ Sk Tδ Vβ Vi Vκ Wβ; *om.* Bη Ok Qβ Va Xβ; O Oφ; T Oσ S] Bγ Be Bη Cη Ci Eη Eτ Fa Fζ
 Λγ Λε Λη Mγ Mδ Mo Oζ Oξ Oτ Ου Pa Pδ Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sk Tδ Wβ; *om.* Bi Bκ Cβ Eβ Fβ
 Λζ Mη Μλ Mν Mu Pγ Pμ Po Pυ Ra Sβ Sδ Vi Vκ Xβ; C Ba; F Cδ Cθ Eμ Ok Oσ Pψ Vβ; T φ Va; Y Oφ
 S'] Ba Bγ Be Bi Bκ Cβ Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ Mν
 Mo Mu Oζ Ok Oξ Oσ Oτ Ου Pa Pγ Pδ Po Pρ Pτ Pυ Pψ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi
 Vκ Wβ Xβ; *om.* Bη Pμ; F Qβ; Q Oφ T] Bγ Be Bη Cη Ci Eη Eτ Fa Fβ Fζ Λγ Λε Mδ Mo Oζ Oξ
 Oτ Ου Pa Pδ Pρ Pτ Qβ Qγ Qλ Qμ Sk Tδ Wβ; *om.* Bi Bκ Cβ Eβ Λζ Λη Mη Μλ Mν Mu Pγ Pμ Po Pυ
 Qδ Ra Sβ Sδ Vi Vκ Xβ; F Ba Mγ Oφ; S Cδ Eμ Ok Oσ Pψ Va Vβ; SE Cθ T'] Ba Bγ Be Bi Bκ Cβ
 Cδ Cη Cθ Ci Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Μλ Mν Mo Mu Oζ Oξ Oσ Oτ Ου Pa Pγ
 Pδ Pμ Po Pτ Pυ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Vβ Vi Vκ Wβ Xβ; *om.* Bη Ok Pψ Va; H Mη; P Pρ;
 R Oφ V] Ba Bγ Be Bi Bκ Cβ Cδ Cη Cθ Eβ Eη Eμ Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mγ Mδ Mη Μλ
 Mν Mo Oζ Oξ Oσ Oτ Ου Oφ Pa Pγ Pμ Po Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ
 Vκ Wβ Xβ; *om.* Mu Vi; B Ok; M Bη; N Ci Pδ X] Cη Eβ Eη Fa Fβ Fζ Λγ Λε Λζ Λη Mδ Μλ Oζ Oτ
 Ου Pa Pτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Wβ Xβ; *om.* Ba Bη Bκ Mγ Mu Ok Oφ Pψ Va Vi; F Pρ; I Cβ; K
 Be; KZ Cθ; P Sk; T Eμ; Z Bγ Bi Cδ Ci Eτ Mη Mν Mo Oξ Oσ Pγ Pδ Pμ Po Pυ Ra Sβ Vβ Vκ Y]
 Ba Bγ Be Bη Bi Bκ Cβ Cη Cθ Ci Eβ Eη Eτ Fa Fβ Fζ Λγ Λε Λζ Λη Mδ Μλ Mν Mo Oζ Oξ Oσ Oτ Ου

Οφ Ρα Ργ Ρδ Ρμ Ρο Ρτ Ρυ Qβ Qγ Qλ Qμ Ρα Sβ Sδ Sκ Tδ Vκ Wβ Xβ; *om.* Mυ Vι; κ Cδ Eμ Mγ Oκ
 Pψ Qδ Vα; x Mη Pq; z Vβ z] Bα Bγ Bε Bη Cι Eβ Eη Eτ Fα Lγ Lη Mγ Mδ Mν Mυ Oζ Oκ Oξ
 Oτ Oυ Oφ Ρα Ργ Ρδ Ρq Ρτ Pψ Qβ Qγ Qλ Qμ Sδ; *om.* Bι Bκ Cβ Cδ Cη Cθ Eμ Fβ Fζ Lε Lζ Mη Mλ
 Mo Oσ Pμ Po Qδ Pυ Ρα Sβ Sκ Tδ Vι Vα Vκ Wβ Xβ; v Vβ

[*Other information*]

T' and R] transferred to the circle of Cancer Oκ(O and R)

H', O, R, T repeated on circle of Aries Oκ

arc KX [= KN] add. 80, 60, 40, 20 Oφ

arc KNEKO add. 80, 60, 40, 20 Oφ

add at centre E Cη Eβ Eη Fα Fζ Lγ Lε Lη Mδ Oζ Pα Pμ Qβ Qλ Sδ Tδ

add. circuli Capricorni Pτ; add. Capricorni Pq(*thrice*)

add. Cancri Pq(*twice*)

add. Arietis et Libre Pq(*twice*)

add. circuli emisperii Pτ

add. cenith Cι Pδ; add. zenith capitis Pq

add. divisio 30 graduum Oκ(*later hand*)

add numbers: 30, 60, 90 | 90, 60, 30 | 30, 60, 90 | 90, 60, 30 Cβ Eμ Mν Mo Mυ Po Pτ Vι Vκ; 10, 20 ...

80, 90 | 90 ... 10 | 10 ... 90 | 90 ... 10 Mλ Oφ Vβ; 15, 30 ... 75, 90 | 90 ... 15 | 15 ... 90 | 90 ...

15 Bι Mη Pυ Qγ Sβ; 30, 30, ... 30 Cθ; 30, 60, 75, 90 | 90 ... 30 | 30 ... 90 | 90, 75, 60, 30 Eτ;

arc MZL add 10, 20, 30 ... 90 | 90 ... 10 Bη

add arcs every 15° with each marked "15" and each pair marked "30" Bκ

[CAPITULUM 16.] DE HORIS PONENDIS

Et post positionem azimuth oportet ponere horas ut sequitur: Pones circulum

- 1 De ... ponendis] *om.* Aα Bα Bζ Bκ Cβ Cδ Cε Cθ Dγ¹ Eα Ev Ev Lζ Nα Oα Pγ Pφ Pψ Qα Rα Sβ Sθ Sι Sλ Vα Vε Vυ Vχ Xα; *illeg.* Oσ; Capitulum 16^m Bε(*marg.*); Capitulum de inscriptione horarium Fβ(*marg.*); Capitulum de ponende horarum Qβ; De constitutione horarum Cζ Eμ(*marg.*) Mθ Mκ Oη Oκ Vσ; De constitutione horarum allilacaz Cδ(*marg.*); De horis inscribendis Mo; De horis ponendis in astrolabio Bθ Mη; De impositione linearum (*add.* et Mγ) horarum Mγ Pτ Vυ; De inscriptione horarum Bγ Eζ Eτ Oφ Pμ Po Qμ Wι; De inscriptione horarum artificialium Dη; De inscriptione horarum naturalium Mν Vβ; De inscriptione horarum 12^{am} naturalium diei et noctis Mν Vι(*add.* Capitem); De inscriptione linearum horarum Mλ²; Descriptio horarum 12 naturalium Bη; Descriptio horarum 12^{am} naturalium diei et noctis Wβ; [*illeg.*] horarum Eο; De lineis horarum Vκ; Modus inscribendi lineas horarias Bι; Modus inscribendi lineas horarum Eδ(*faint*); Sequitur de modo ponendi horas Rubrica Cη; *add. in marg.* In hac 3^a et ultima particula docet situare horas Lζ horis] horarum Pν ponendis] *add.* Capitulum Mδ; *add.* in astrolabio. Rubrica Vπ
- 2 et ... azimuth] *om.* Bα positionem] divisionem Vκ; punctum Lε Tδ azimuth] acimuth Vπ; atimuth Pφ; azim^t Fα; azimich Mγ; azimuc Oη; azimut Bζ Bη Cβ Cδ Eμ Eο Fβ Mκ Mo Mν Oκ Oσ Pυ Sθ Sλ Vυ Xα Xβ; azimutt Vχ; azismut Vα; azsimut Pψ; azsumt Cθ; azsumuth Ev; azum^t Vε; azumuth Nα; azymut Oα oportet] *add.* igitur Bα; *add.* te Bζ Cβ Cθ Eμ Ev Eο Mγ Mθ Mκ Mν Oα Oη Oκ Oσ Oφ Pδ Pφ Pψ Qα Sι Sλ Vυ Vσ Vυ Vχ oportet ... horas] *marg.* Ou ponere] pones Nα horas] hortis Mγ; hortum Vυ; *add.* et earum positionem Cε Qα; *add.* et earum positionem est Bζ Cβ Ev Mγ Vυ Vσ; *add.* et eius positionem est Cζ Cθ Eμ Mκ (*eius deleted*) Mν Oα Oη Oκ Oσ Oφ Pφ Pψ Sθ Sι Vε Vχ; *add.* et hic potest esse Mθ; *add.* et positionem est Vυ; *add.* eius positio Vα; *add.* [*illeg.*] opus est Eο ut sequitur] *om.* Bα; secundum quod narrabo tibi Bζ Cβ Cε Cζ Cθ Dη Eμ Ev Eο Mγ(*om.* quod) Mθ Mκ Mν Oα Oη Oκ Oσ Oφ Pφ Pψ Sθ Sι Vα Vε Vυ Vσ Vυ Vχ; sic Qα; sicut Vκ; sicut narrabo tibi Cδ Sλ; *add. interlin.* al' secundum quod tibi narrabimus Vβ Pones] Ponamus Eα Fα Fβ; Ponas *some*; Pone *some*; Positio sit Mζ; Positione Wι

¹ In ms Dγ, Capitulum 21 intervenes (fols. 155^v-156^r).

² In ms Mλ, several capitula intervene (fols. 84^r-90^r).

[CHAPTER 16.] ON PLACING THE HOURS³

And after placing the azimuths, you must situate the hours as follows: You will mark the circle of

³ The hours referred to here are the “natural” hours, also known as the “unequal” hours, i.e., the night and the day each divided into 12 equal parts. Since the length of night and day varies through the year, so do the length of these hours. They are “unequal” in the sense that a daytime hour is different from a nighttime hour (except at the equinoxes), and an hour of one day (or night) is not the same as an hour of the next (or previous) day (or night).

5 Capricorni ABC, et circulum Arietis et Libre DEZ, et circulum Cancri HTQ, et quod
 ceciderit in eo ex circulo emisperii habeat sub se A, D, H, L, Q, Z, C; et linea LTEB ipsa vadit
 per allidadath et per punctum tabule, id est centrum, et ipsa est linea recessionis.

- 3 Capricorni] *add.* circulum Cε Cζ Eμ Ev Eo Mθ Oα Oη Ok Oσ Pψ SA Vv Vv Vχ ABC]
 ABCD Aα Bγ Bε Bζ Bθ Cε Cζ Eδ Eζ Eμ Eo Ev Mλ Mo Oη Pγ Pθ Po Pτ Pv Pφ Qδ Rα Sβ St
 Vε Vκ Vν Vπ Wι Xα Xβ; ABCD *corr.* to ABC Bη Mκ Vψ; ABCDIS Ou circulum₁] *om.* Bι
 Bκ Lζ Qα Vκ et₂] *add.* circulum Cθ Oφ Vχ Libre] *add.* circulum Ev DEZ]
 DEC *corr.* to DEZ Oσ; DEI Mν; DER Nα Pφ; DEX Bη; DEZ *corr.* to DEX Wβ; diei Dγ; DOZ Vε; DTE
 Bζ; DZ Eδ Pv Wι; DZ *corr.* to DEZ Po; MKL Qα circulum₂] *om.* Aα Bγ Bη Bθ Bι Bκ Cη
 Eδ Eζ Eτ Ev Lζ Mo Pγ Pτ Nα Pv Rα Vκ Sκ Vπ Wι; *interlin.* Po Vβ Cancri] *add.*
 circulum Cθ Eμ Ev Eo Mγ Mθ Mν Oα Ok Oσ Oφ Pψ Sθ St Vv Vv Vχ HTQ] FGD Qα;
 HCQ Qγ Vν; HCQR Nα; HTA Pφ; *add.* circulum Ev et₄] circulum Bθ Vπ; circulum
 etiam Aα
- 4 ceciderit] asiderit Xβ; cederit Mγ; deciderit Bζ Lε Tδ; ocaderit Sκ; reciderit Wβ; *corr. from*
 occiderit Rα in] ex Mν ex] *om.* Bη Vπ Wβ; *add.* g Eα sub] super Bζ Cβ Cδ
 Cζ Cθ Ev Mγ Mκ Oα Oη Ok Oφ Pψ Qα SA Vα Vβ Vv Vσ Vχ; super *corr.* to sub Eμ; supra
 Mν Pφ Sι; *add. interlin.* al' sub Oφ; *add. interlin.* al' super Vβ ADHLQZC] *illeg.* Et Qα;
 ... H,V,Q ... Wα; ... Q,X,C Wβ; ... Q,Z,O Pφ; ... Q,Z,T Vα; ADH Sκ; ADHKRC Nα; ADHLEZC *corr.* to
 ADHLQZC SA; ADHLQ et C Bζ; ADHQ C Dη; ADHQEC Vκ; ADHQTC Fζ; ADHQZC Bκ; ADQZC Dγ;
 ADHQ et C Bθ Vπ; ADHQTC Pα Vv; ADHQZC Aα Bγ Bε Cε Cη Cι Eδ Eζ Eη Ev Fa Fβ Lβ Lγ
 Lε Lζ Lη Mλ Mo Mν Mφ Oα Oζ Oξ Oτ Ou Oφ Pγ Pδ Pθ Pλ Pμ Pν Po Pρ Pv Qβ Qγ Qδ
 QA Rα Sδ Tδ Vβ Vι Wι Xα Xβ; ADHQZD Mδ; ADHQZT Sβ Vψ; ADLQZC Oσ; ADVLQZCY Sθ;
 BLZE Vε; *add.* id est armilla Vψ et] *add.* sint Bα; *add.* sit Bζ Mγ St linea] L,M,E,A
 Pθ linea LTEB] sit EB Cε LTEB] BCEB Nα; BCEL Sθ; BETL Cζ Eμ Mθ Mκ Oη Ok Vσ;
 BTEB Mν; BTEB *corr. from* BXEB Pψ; BTEB *corr.* to LTEB Oα; EAKC Qα; EB Eα Eζ; LBTEB *corr.* to
 LTEB Eδ; LCB Dη; LCEB Mγ Pφ Vε; LEB Lη; LETB Bζ Bε Bη Eo; LT et EB Eη; LTEB *corr.* to LTEV
 SA; LTEV *corr.* to LTEB Cδ; TEB Oξ Ou Qγ; *add. interlin.* BETL Bη ipsa] hac Bη; ipsos Sθ;
 per ea Vε; *add.* quoque Bα Bζ Eo; *add.* que Mγ Pφ Vv
- 4-5 ipsa ... per] *om.* Nα
- 5 per] super Qα allidadath] *lacuna* Wι; aldadit Bα; alidadā Eα; alidadath Lγ;
 alihathaht Cε; alilacath Eμ Ev Oα Oσ Pψ; alilachat Vv; alilarath Vv; alilatath Cθ Mθ Mv
 Oη Vα; alilatath Sθ; alilath Oφ; alilathat Cβ Ok; allelacach Wβ; allidada Mδ; allidadach
 Eτ Lη Oζ Vβ; allidadam Dη; allidadat Fζ Vκ; allidadth Qδ; allilacath Mκ Pθ Pφ St Vσ;
 allilachrath Pγ; alliladat Dγ Qα; alliladath Bη Mλ Nα; allilarach Mγ; allilatath Cζ Eζ Mη
 Pτ Pv; allilatath Cδ Lζ Pδ Po Sβ Vχ Vψ Xα; allilathah Cι; allilathat Rα SA; allidarath Bζ;
 alzarath Vε; [*illeg.*]arach Eo; *add. in marg.* al' per allilathaha Oφ; *add.* id est per armillam
 reflexam Oα; *add.* id est lineam meridiei Oτ; *add.* que est armilla reflexa Eμ(*interlin.*)
 Mκ(*marg.*) Oη; *add. in marg.* armilla [re]flexa Bη et₁ ... centrum] *om.* Sθ
 punctum] oppotionem St per₂] *om.* Eζ id est centrum] *om.* Bα Cδ Cζ Cθ
 Eμ Ev Eo Mγ Mθ Mκ Mv Oα Oη Ok Oσ Pψ Qα St SA Vα Vε Vv Vv Vχ; *interlin.* Cβ Oφ; id
 est per punctum Eδ; recte Mδ; scilicet centrum Wα; *add.* mundi Lβ Xβ est₂] *om.* Eζ;
 erit Vε recessionis] *add. in marg.* id est meridiei Bγ; *add. in marg.* id est
 septentrionalis Cβ; *add.* in qua sol recedit a meridiei Pδ

Capricorn ABC, and the circle of Aries and Libra DEZ, and the circle of Cancer HTQ, and what in it falls from the circle of the hemisphere should have under it A, D, H, L, Q, Z, C; and this very line LTEB passes through the ring [i.e., alidadath⁴] and through the point of the plate, that is, the centre, and this is the line of recession.⁵

⁴ See note to Cap. 4 line 27 (English).

⁵ See note to Cap. 12 line 8.

Eritque linea LB finis 6^{te} hore, et initium 7^{me}. Et postea divides arcum HT per 6 divisiones equales, et sint divisiones HM, MN, NS, SO, OF et FT; et divides etiam arcum DE per 6 divisiones equales, sintque partes DK, KR, RX, XY, YP, et PE. Divides etiam arcum AB per 6

- 6 Eritque] Erit etiam Bη LB] LB *corr.* to LV Sλ; LV *corr.* to LB Cδ; AB Mv Pψ Sθ; FE Vε
6^{te}] sexte / 6 / 6^e *many*; *interlin.* Cθ; tertie Vε 7^{me}] septime / 7 / 7^e *many*; A *corr.* to
7 Bγ; n^e or 12^e Sβ; *add.* hore Nα Et postea] Post hec Sι divides] divide Bε Wι
HT] *illeg.* Pτ; *corr.* from HDT Qδ; BC Qα; HC Bα Nα Vv; HE Vε; TH Vκ 6] sex *some*;
interlin. Qλ divisiones] partes Bα Bζ Cβ Cδ Cε Cζ Cθ Dη Eμ Ev Eo Mγ Mθ Mκ Mv
Oα Oη Ok Oσ Pφ Pψ Sθ Sι Sλ Vα Vv Vv Vx
- 7 equales ... divisiones] *om.* Sβ equales] *om.* Bα et sint divisiones] *om.* Bγ Cη Eδ
Eζ Eτ Mη Pρ Pυ Qμ; et Ev et₁ ... FT] HMNSOFT *corr.* in *margin.* to sint divisiones HM ... FT
Po; huius OFT Wι sint] sunt *some* divisiones] *om.* Bη; partes Oη; *add.* equales Pλ
HM, MN, NS, SO, OF, FT] HM et MN et NS ... *many*; H, M, N, S, O, F, T Aα Bγ Bκ Cη Eδ Eζ
Eτ Ev Lζ Mη Mλ Mo Pγ Pτ Pυ Qμ Sκ Vκ Xα; HM, NS, OFT Rα Sβ; HM, VS, SO, AF, FC Vε; H',
O, F, T Dγ; HN, NM, MS, SO, OF, FT Sι; L, M, N, S, O, F, T Bθ Vπ; LM, MN, NS, SO, OF, FT Bε; HM,
NN, SS, OO, FT, FT Bζ MN *om.* Mv NS] S Fζ; VS Mγ Wβ divides] divisiones
Qδ etiam] *om.* Bγ Bη Bθ Bι Cβ Cη Eα Eδ Eη Eτ Fζ Lγ Lε Mδ Mλ Mφ Pα Pγ Pδ Pθ
Pμ Qβ Qμ Rα Sβ Sθ Sκ Vβ Vε Vπ Wα Wι Xβ; in Sι DE] CD Qα' DC Vε; D Pθ 6]
sex some
- 7-8 et₁ ... equales] *om.* Nα
- 8 divisiones] *om.* Mγ Pα Pφ; partes Bα Cδ Cε Cζ Dη Eμ Mθ Mκ Mv Oη Ok Pψ Qα Sβ Sλ
Vα Vv equales] *om.* Bα; *add.* ^{va} et sint AHC et HE ^{cat} Vπ sintque] suntque / et sunt
some; sicut et Pα partes] divisiones Bα Mγ Sι Xβ; divisiones eius Bζ DK ... PE]
DK et KR et RX ... *some*; AB, KR, RX, XY, YP, AX Vε; H, M, M, N, S, SO, OF et FT Bζ; DC, NC, RX, NY,
YP, PE Ev; DH, KR, RX, XY, YP, PE Vα; D, K, T, X, Y, P, E, Vκ; D, K, R, RX, XY, YP, PE Sκ; DK, KA, VX,
XN, NP, PE Pφ; DK, KR, RR, RV, YP, PE Nα; DK, RT, XY, YP, PC Mv; DLK, KR, IR, XY, YP, Wβ; DQ,
QR, RC, CT, OP, PE Cδ; DQ, Q,R RX, XY, YP, PE Cε; DR, KR, KX, XY, ZY, PZ, PE Sι; *corr.* to DQ et QR et
RC et CT et TP et PE Sλ; *add.* Et postea Cζ KR] KV) Eη RX] *interlin.* Cβ; KX Mθ Ok;
TX Bα XY, YP] XV, VP Vπ YP] *om.* Eζ PE] PE Pγ Divides] *om.* Sκ
etiam] *om.* Bα Ev AB] PAB Nα 6] sex *some*

And line LB will be the end of the 6th hour, and the beginning of the 7th. And afterwards you will divide arc HT into 6 equal divisions, and let the divisions be HM, MN, NS, SO, OF, and FT; and you will also divide arc DE into 6 equal divisions, and let the parts be DK, KR, RX, XY, YP, and PE. You will also divide arc AB into 6

divisiones equales, et sint divisiones AH^E, H^ED^E, D^ET^E, T^ET^O, T^OH^O et H^OB.

- 10 Postea queres arcum qui vadit per puncta H^E, K, M, et queres etiam arcum qui
- 9 divisiones₁... H^OB] f. Bα; partes Dη et₁] ut Nα divisiones₂] *om.* Aα Bε Bη Bθ Bι Cη Dγ Eα Eδ Eτ Fα Lε Lζ Lη Mδ Mη Mu Mφ Nα Oξ Oτ Ou Pα Pρ Pγ Pδ Pφ Rα Vβ Vπ Vψ Wι Xα; *add.* eius Eo Mγ Vv; *add.* equales Vε AH^E ... H^OB] AH^E et H^ED^E et D^ET^E... *some*; A et H^E et H^E et D^E et D^E et T^E ... *some*; A.H.E.H.E et T.E.T.E et T.O.T.O et H.O.H.O et E.P Sκ; A, H^E, D^E, T^E, T^O, H^O, EP Mo Vκ; AE, ED, DT, TO, OC, CB Cδ; AH et HE et DE et TE et TO et HO et OF Sβ; AH HE ED DT TE [*lacuna*] Vψ; AHE.DTE et TE.TO et TH.HO et HO.EP Wι; ALH^E, D^E, T^E et T^O Ev; *blank*, EH, HL, LT, TQ, IB Sι; *corr.* to AE et ED et DT et TO et OC et CB Sλ AH^E] A Bε Eη; AH Eα Nα Oρ Qα Vβ; DK(*expunged*)^{AH^E} Bζ; HAE Vχ; H^E Dγ H^ED^E] *om.* Eδ Eζ Mη Pγ Po Qμ Rα Vσ; DE Xα; D^E Pφ Vε; HD^E Nα Qα; H^E Cι Vπ; HD Pρ; HE Vβ; H^ET^E Bγ Cη Eτ D^ET^E] *om.* Bγ Bη Cη Eτ Vα Xα; D^E Pφ; D^ED^E Ou; D^EN^{ME} Vε; D^ER^E Mθ; D^ET Mφ Vι; D^ET^E Mδ; DT Nα; DT^E Eδ Eζ Pγ Po; ED Vβ; T^E Bθ Qλ T^ET^O] *om.* Nα Vε Vσ; D^ET^O Mγ; T^EC^D Bε Oη; DT Vβ; P^ET^O Oφ; T^EC^O Qα; TD^ET^O Vι; T^E Vα; T^ED^O Bθ Vπ; T^EH^O Pλ; T^EO Pρ; T^ET^C Mδ; T^ET^D Oα Oσ; T^ET^E Ou; T^O(*expunged*)^{R^E}T^O Mθ T^OH^O] C^OH^O Qα; D^OH^O Bθ Vπ; H^O Fβ Fζ Xα; H^OT^O Pλ; MH^O Vε; T^CH^O Mδ; TO Nα Vβ; T^OH^A Oφ H^OB] B Eα Pρ; H^OBEF Bζ; H^OBL Tδ; H^OBP Cε Mλ Pτ; H^OEP Bγ Bι Bκ Cη Eδ Eζ Eτ Lζ Mη Pγ Po Pv Rα Xα; H^OEP *corr.* to H^OB Qμ; H^OEP et EP Dγ; H^OPE Aα Bθ Bη Ev Vπ; OB Nα; TB Vβ; T^OB Pλ; *add.* qui sint 6 arcus divisionis predictae Nα
- 10 Postea ... H^E, K, M] *marg.* Sλ; *follows line 11* queres ... D^E, R, N Mv queres] queras queras Tδ; pones Mu arcum₁] *add.* circuli Sδ queres ... M] *om.* Cε Mv qui₁ vadit] *om.* Mu Vε; eundem Bη Cη Eη Eτ Fα Oξ Wβ; euntem Bε Bγ Cι Eα Eβ Eζ Fβ Fζ Lγ Lε Lη Mδ Mη Mφ Oζ Oτ Ou Pα Pδ Pθ Pλ Pv Pρ Qβ Qγ Qλ Qμ Sδ Vι Vψ Wα Xβ qui₁ vadit per] eundem Sκ; per emitoni Lβ H^E, K, M] *marg.* Po; C, R, N, Z Sι; E, Q, M Cδ Sλ; EI, K, M Ev; H, K, M Qα Pρ; H^E, C, V Vε; H^E, L, M Eo; H^E, L, Z Pφ; H^E, R, M Vχ; H^E, T, M Sθ; H^O, K, M Vσ; M, H Nα; M, K, H Vβ; M, K, H^E Aα Bγ Bθ Bι Bκ Cη Dγ Eτ Ev Lζ Mλ Pv Qδ Rα Sβ Sκ; Vκ Vπ Xα; *add.* et NR Qδ et] *add.* post hoc Cδ Sλ et queres] *repeated* Qλ Wα; et queras Qδ Tδ et ... arcum₂] et alium Qα etiam] *om.* Bε Bη Cδ Cε Dη Eβ Eη Fβ Lβ Lε Lη Mδ Mv Mu Mφ Oζ Oτ Pδ Pθ Pλ Pv Pρ Qβ Qδ Qμ Sδ Sι Sλ Vι Wα Wβ Xβ
- 10-11 et ... D^ERN₁] *om.* Eo Mu Po Pφ Qγ Vε; et arcum M, C quere Nα; et arcum N, R, D^E Aα Bι Bθ Bκ Dγ Ev Lζ Mλ Pv Rα Sβ Vπ; et arcum N, R, E Vβ; et arcum N, T, D^E Vκ; et arcum V, R, D^E Xα qui₂ vadit] *rep.* and *expunged* Ou qui₂ ... puncta] *om.* Pρ
- 10-12 H^E, K, M ... puncta] *om.* Eζ Mη Mo Pγ Pτ H^E, K, M ... T^O, Y, O] *marg.* Qμ
- 10-13 Postea ... H^O, P, F] Postea queres arcum euntem per punctum M, X et arcum FPH^O Eδ(*marg.*) et ... H^O, P, F] *om.* Bγ Cη Eτ Sκ
- 10-17 Postea ... ibidem] Et fac arcus per illas divisiones Bα

equal divisions, and let the divisions be AH^E , $H^E D^E$, $D^E T^E$, $T^E T^O$, $T^O H^O$ and $H^O B$.

Afterwards you will find the arc which passes through the points H^E , K , M ; and you will also seek the arc which

vadit per puncta D^E , R, N, et est arcus D^ERN ; et queres quoque arcum qui vadit per puncta T^E , X, S; et queres arcum qui vadit per puncta T^O , Y, O; et queres arcum qui vadit per puncta H^O , P, F.

- 11 D^ERN_1] D, R, N Cδ; D^ER Ev; D^E , R, U Fβ Lβ Mφ; D^E , K, N Oκ; D^E , T, N Vv; *blank*, K, M Sι et₁ ... D^ERN_2] *om.* Aα Bζ Bθ Bι Bκ Cβ Cζ Eβ Eο Ev Lζ Mγ Mu Nα Po Pq Pv Pφ Qμ Sβ Si Vβ Vκ Vv Vπ Vυ Vχ Xα est] erit Cδ Sλ D^ERN_2] D^EKN Oκ; $D^ENR.RN$ Cε; DRN Cδ; D^ERU Fβ Mφ Vε queres] querens Lβ; *om.* Pq quoque] *om.* Bε Bη Cε Dη Eβ Eο Fα Fβ Fζ Lε Lγ Mu Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Po Pφ Qα Qβ Qγ Qλ Qμ Sδ Vψ Wβ Xβ; etiam Cβ Ev Rα Sβ Si arcum] alium Qα qui vadit] euntem Rα Sβ puncta₂] punctum Cθ Rα
- 11-12 D^E , R, N₁ ... T^O , Y, O] ET.EX.G est arcus .TES.Y.G. Oφ; ET.EX.G et arcus .RES.X.G. Vχ
- 11-12 et₂ ... T^E , X, S] *om.* Aα Cι Mλ Mv Tδ Vε Vι; *marg.* Po; et arcum euntem per puncta S, C, D Nα; et queres etiam arcum eundem S, X, T^E Bθ; et quere etiam arcum euntem per puncta S, X, T^E Bι Bκ Dγ Lζ Pv Qδ Vβ(S, X, D) Vκ (S, X, D^E) Vπ Xα
- 11-13 qui ... H^O , P, F] euntem per punctum OY TO et arcum SP HO Wι
- 12 T^E , X, S] E , X, S PQ; L, X, S Sι; S, T Ev; S, X, T^E Bκ Qδ Rα Sβ; T^E , S, X Cδ Sλ; T^E , X, C Cζ; T^O , Y, O Mu; *add.* et est arcus T^ES Bη(*interlin.*) Cδ(T^ESX) Ev Mθ Mκ Oα Oη(T^OYO) Oκ Oσ Pψ Sθ Si(L, X, S) Sλ(T^ESX) Vα Vσ T^E , X, S ... T^O] T^E , X, S et arcus qui vadet per *marg.* Eα et₁] postea Qμ et₁ ... T^O , Y, O] *om.* Bζ Mγ Oζ Oκ Pλ Vψ; *marg.* Po Sλ; et arcum euntem per punctum O, Y, T^O Bθ(O,Y, D^O) Bκ Bι Dγ Eο Ev Lζ Nα(M,T) Pv Qδ Vβ(O,Y,T) Vκ(O,Y, D^O) Xα; queresque arcum eundem per punctum O, Y, T^O Aα Vπ(O,V, D^O) queres₁] *om.* Rα Sβ; queras Tδ; *add.* etiam Mλ; *add.* quoque Vε queres arcum₁] alium Qα arcum₁] *interlin.* Cθ; *om.* Pμ qui₁] *om.* Qγ qui vadit₁] euntem Mo Qμ Rα Sβ vadit₁] *interlin.* Cζ puncta] punctos Cβ; punctum Cθ Vε T^O , Y, O] C^o, Y, O Qα; H^O Y, O Mu; M, X, O Vε; O, Y, T^O Eζ Mo Pγ Rα Sβ; T^O , I, O Ev; T^O , X, S Cθ; T, Y, O PQ; T^O , Y, S Vv; *add.* et est arcus T^OYO Mκ Mv(*om.* est) Oα Oσ Pψ Qα(C^oYO) Sθ Vσ queres₂] *om.* Sβ; queras Tδ; *add.* etiam Cδ Qα Sλ
- 12-13 et₂ ... H^O , P, F] *marg.* Po; et O, P, F PQ; et arcum H^O Mo; et arcum euntem per F, P, H^O Pv Qδ Vβ(F, P, O); et arcum euntem per punctum F, P, O Nα; et arcum F, P, H^O Bι Bκ Dγ Lζ Mλ Qμ Rα Vκ Vπ; et arcum F, T, H^O Xα; et arcum H, P, F Mη; et arcum S, P, H^O Aα Bθ Eζ Ev Pγ Pτ Sβ per puncta] *om.* Bζ
- 13 puncta] *om.* Si H^O , P, F] H^O , P, R Vα; H^O , P, S Oφ; H^O , T, F Ev; H, Q, P, F Sι; T^E , P, F Eα; *add.* perficiens Bθ

passes through points D^E , R, N, and it is arc $D^E R N$; and you will also seek the arc which passes through points T^E , X, S; and you will search for the arc which passes through points T^O , Y, O; and you will try to find the arc which passes through points H^O , P, F.

- 15 Perficiesque horam primam, scribesque super eam “primam”; deinde
 “secundam,” “terciam,” “quartam,” “quintam,” et “sextam,” ut est in hac figura. Postea
 divides reliquas horas secundum primam divisionem, et scribes super eas “7,” “8,” “9,”
- 14 Perficiesque] Erisque perficiens Bζ Bθ Cβ Cδ Cε Cζ Cθ Eδ Eμ Ev Eo Mγ Mθ Mκ Mν Oα
 Oη Oκ Oσ Oφ Pφ Pψ Qα Sθ St Sl Vα Vν Vv Vχ; Perficies Vσ; Usque perficiens Vε; *add.*
 eam Wβ Perficies ... primum] *repeat in marg.* Po horam] eorum Nα
 horam primam] horas sex Vv primam₁] i^{am} *some; corr. to xii Cδ; add.* id est
 primas horas qui scilicet transiunt ante meridiem Cζ; *add.* secundam et ceteram Mγ; *add.*
 secundam et ceteram usque ad initium septime hore Qα; *add.* secundam et terciam Eo Bζ
 Vν; *add. in marg.* id est primas horas qui scilicet sunt ante meridiem Eμ scribesque
 ... deinde] *om.* Mv Vε super] sub Qα eam] eas Mγ Vv Vv; eis Qα; *illeg.* Pτ
 deinde] *om.* Bζ Cζ Eo Oη Sθ Vv Vv; et Cβ Ev Mθ Mκ Oα Oσ Oκ Oφ Pψ Qα Sθ St Sl
 Vχ
- 15 secundam] 2 / 2^{am} *some*; 3^{am} Lβ Pv terciam] 3 / 3^{am} / iii^{am} *some* terciam ... sextam]
 et ceteras Qα quartam] 4 / 4^{am} / iii^{am} *some* quartam ... sextam] et ceteras Tδ
 quintam] 5 / 5^{am} / v^{am} *some; om.* Bη sextam] 6 / 6^{am} / vi^{am} *some; om.* Cι Vε
 ut ... figura] *om.* Oη Vv; ut vides in alia parte Qα ut est] et est Vκ; sicut patet
 Dη; sicut vides Cβ Cδ Cε C ζ Cθ Eμ Ev Mθ Mκ Mν Oα Oκ Oσ Oφ Pφ Pψ Sθ St Sl Vα Vε
 Vσ Vv Vχ; ut Eδ; ut patet Eα Eβ Eη Fζ Mv Oξ Oτ Ov Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι
 Wα Xβ; ut patet est Qδ ut ... hac] *om.* Eζ ut ... figura] *om.* Bζ Eo Mγ in
 hac] *om.* Ev hac] *om.* Aα Bε Eζ Lη Mφ Oζ Pν Mν Nα Pλ Pτ Vι Vπ Wα; precedenti
 Fβ; presenti Lε Tδ; sequenti Dη; *add.* secunda Bκ figura] *add.* Explicit Bι⁶; *add.*
 immediate(?) Fβ; *add. interlin.* id est prefigurata Cζ; *add.* prescripta Pν
- 15-17 Postea ... ibidem] *om.* Mv Postea ... primam] *om.* Oφ
- 16 divides] *om.* Vψ; *add.* per Vκ horas] *om.* Vε; *add.* primam Dγ secundum] per
 Sθ primam] *add. interlin.* id est prior est Eμ divisionem] *om.* Eo scribes]
 scribas Bγ eas] *om.* Eα; ea Pφ; eam Cδ Cζ Cθ Eμ Ev Mθ Oα Oη Oκ Oσ Oφ Pψ Sθ Sl
 Vα Vε Vχ; eam *corr. to* eas Mκ 7] *om.* Aα Bγ Bθ Cη Dγ Eδ Eζ Ev Lζ Mλ Mo Pγ Pν
 Rα Sκ Vε Vπ Wβ Wι Xα; 7^{am} / septimam *some; interlin.* Po 8] 8^{am} / octavam *some*
 9] 9^{am} / nonam *some* super] sub Qα
- 16-17 9 ... 12] et cetera Qα Tδ

⁶ In fact the text in ms Bι continues on the next folio.

And you will complete the first hour, and you will write “first” on it; then “second,” “third,” “fourth,” “fifth,” and “sixth,” as it is in this diagram. After that you will divide the remaining hours in conformity with the first dividing, and you will write on them “7,” “8,” “9,”

“10,” “11” et “12,” ut est ibidem. Et scribas apud horam primam “occidens”, et apud horam 12^{am} “oriens”. Deinde scribes in ea latitudinem regionis in loco descripto. Postea cum feceris horas, perficietur ipsa facies illius tabule; et hoc modo facies ceteras

- 17 10] 10^{am} / decimam *some* 11] 11^{am} / undecimam *some* 12] 12^{am} / duodecimam *some*; 21 Lγ ut ... ibidem] *om.* Oη; et est ibidem Bη; sicut vides in hac figura Cβ Cδ Cζ(*om.* hac) Cθ Eμ Ev Mθ(*om.* figura) Mκ Oα Oκ(*om.* figura) Oσ Oφ Pφ Pψ Sθ Si Sλ(*om.* hac) Vα Vε Wσ Vυ Vχ; sicut vides in subscripta(sub Eo; scripta Bζ) figura Bζ Eo Mγ; sicut vides in scripta figura Bζ; sicut vides in prescripta(*expunged*) figura subscripta Vυ; ut vides in figura Qα ibidem] *add.* in figura Bε; *add.* et apud 12^a occidens Pτ Et₂] Deinde Pτ Et₂ scribas] *om.* Vσ scribas] scribe Bα; scribes Bζ Cδ Eα Eη Ev Fβ Lγ Lε Lζ Lη Mδ Qβ primum] *marg.* Pτ occidens] occidentis Qδ; oriens Qμ occidens et apud] *om.* Mo
- 18 horam] *om.* Bε Bη Bι Bκ Cδ Cε Cη Dγ Dη Eα Eδ Eη Et Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mυ Mφ Nα Oζ Oξ Oτ Pθ Pα Pλ Pμ Pν Pρ Pυ Qβ Qγ Qμ Rα Sβ Sδ Sλ Vβ Vι Vκ Vψ Wι Xα Xβ; regulam Wα horam 12^{am}] abam Wβ 12^{am}] 12 / duodecimam / xii *some*; *om.* Cε; 2 Eζ; 2^{am}/secundam Mv Po; a^{am} Bη; terciam Dγ scribes] *twice* Bκ; scribe Fα Lε Lη Mυ Qγ; scribas Cη in ea] *om.* Bζ Cβ Cδ Vσ; eadem Pρ ea] eadem Bε Eα Eβ Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mυ Mφ Oζ Pα Pλ Pμ Pν Qγ Vι Wα Xβ; esse Vα latitudinem] altitudinem Oφ descripto] inscripto Bζ; predicto Nα; scripto Qδ; non (= vero?) scripto Aα Bθ Eo Ev Mγ Oτ Pγ Vυ Vπ; *add. interlin.* scilicet inter per communi(?) circuli Capricorni et per communi(?) circuli emisperii Cβ Postea] et Oφ; *add.* ares Oξ
- 18-19 Postea cum] Et Bζ; Et cum Cβ Cδ Cε Cζ Cθ Eμ Ev Eo Mγ Mθ Mκ Mν Oα Oη Oκ Oσ Pψ Sθ Si Sλ Vα Vυ Dη Pφ Vσ Vυ Vχ; Et eum Vε Postea ... horas] Et sic Qα
- 18-20 latitudinem ... voluerit] *om.* Dγ
- 19 feceris] perfeceris Bζ Cε Dη Eμ Mν Oη Tδ Vε; ceteris *corr. to* faceteris Po; fecit Sκ perficietur] per[*cut off*] Eo; perficies Mv Pφ ipsa] *om.* Dη Eδ; illa Eη facies₁] *om.* Eη Oζ Pρ; *interlin.* Bε illius] *om.* Eα; eius Ev; ipsius Cβ Cε Mo; istius Cδ Sλ; regionis Mυ hoc] *om.* Bε hoc modo facies] hoc facies et(*expunged*) hoc facies Pλ facies₂] *om.* Qδ; *add.* ipsas Mδ hoc modo] sit Vψ ceteras] *om.* Nα; *add.* regionis Xα

“10,” “11” and “12,” as it is in the place already mentioned. And you should write “west” near the first hour and “east” near the 12th hour. Then you will write on it [i.e., the plate] the latitude of the region in the place described. Afterwards when you have drawn the hours, this face of that plate will be completed; and in this way you will make other

20 latitudines alterius regionis in alia tabula, si deus voluerit.

20 latitudines alterius] altitudines Oφ; latitudines Cβ Cδ Cζ Cθ Cι Eμ Ev Mη Mθ Mκ Mν Mv Oα Oη Oκ Oσ Pδ Pθ Pφ Pψ Qα Sθ St Sκ Sλ Vα Vβ Vε Vσ Vυ Vψ Vχ; latitudines aliarum Eα; latitudines eiusdem Fβ Mφ Vι Wα; latitudines vel longitudes Cε Dη Qλ; longitudes Bγ Bη Bι Bκ Cη Eδ Eζ Eτ Lζ Mλ Mo Nα Pγ Pτ Pυ Qδ Rα Sβ Vκ Wβ(marg.) Wι Xα; longitudes *corr. to* latitudines Po; longitudes eiusdem Aα Bζ Bθ Eo Ev Mγ Vv Vπ latitudines ... tabula] gradum eundem tbule regionis latitudines Qμ regionis] *om.* Cε Dη Mo Pδ Pθ Vψ in alia tabula] eiusdem Vε; eiusdem tabule Aα Bγ Bζ Bη Bθ Bι Bκ Cβ Cδ Cζ Cη Cι Cθ Eδ Eζ Eμ Ev Eo Eτ Ev Lζ Mγ Mη Mθ Mκ Mλ Mv Mo Nα Oα Oη Oκ Oσ Oφ Pγ Pδ Po(*corr. in marg. to* aliam tabulam) Pτ Pυ Pφ Pψ Qα Rα Sβ Sθ St Sκ Sλ Vα Vβ Vκ Vυ Vπ Vσ Vχ Wβ Wι Xα; in alia tabula tabule Qδ; in aliis tabulis] Eα; in ceteris tabula Vυ; in eadem tabula Cε Dη Fβ Mφ Qλ Vι Vψ Wα; in eadem tabulla Pθ; in illa tabula Oζ Oτ Pλ Pq; in nulla tabula Eη; q̄ eadem tabula Mυ; ut in eadem tabule si[ve] ex alio latere vel in alia tabula vel in dorso illius Xβ; *add. interlin.* id est in eadem tabula Mκ si deus voluerit] *marg. Po; om.* Bα Bγ Bη Bι Bκ Cη Eδ Eζ Eτ Fβ Lζ Mλ Mo Nα Pγ Pq Pτ Pυ Rα Sβ Sκ Tδ Vα Vβ Vι Vκ Vυ Wβ Wι Xα voluerit] *add.* Explicit Bκ Cδ Lζ Rα Sβ; *add.* Explicit astrolabium Eδ Eζ Mη Mλ Pδ Sκ Vψ Xα; *add.* Explicit astrolabium et figura sequens convenit ei Cι; *add.* Explicit astrolabium et sequitur(*om.* Qμ) ymaginatio projectionis spere in planum per visum Pθ Qμ; *add.* Explicit compositio Mγ; *add.* Explicit compositio astrolabii Bι Oφ Vυ; *add.* Explicit opus astrolabii Sι; *add.* Explicit opus astrolabii secundum Messahalath. Rubrica Mθ Oκ(Messeallath); *add.* Explicit practica astrolabii in qua ostenditur qua sr(?) debeat fieri astrolabium; sequitur lectura Sθ; *add.* Explicit tractatus de compositione astrolabii Bα; *add.* Finit opus astrolabii secundum Macellama(Marcellania Cζ Oη), benedictus Deus Eμ Mκ(*add.* Amen) Oη(*add.* Amen); *mss* Bα Bζ Bη Bι Cβ Cδ Cζ Cθ Eμ Ev Eo Mθ Mκ Oα Oη Oκ Oσ Pφ Pψ Qα Vα Vε Vκ Vυ Vσ Vυ *end; mss* Dy Lζ *end, continue with Cap. 18; mss* Rα *ends, continues with Cap. 19; mss* Oφ Vχ *end, continue with Cap. 20*

latitudes of a different region on another plate (God willing).

[FIGURA 16]

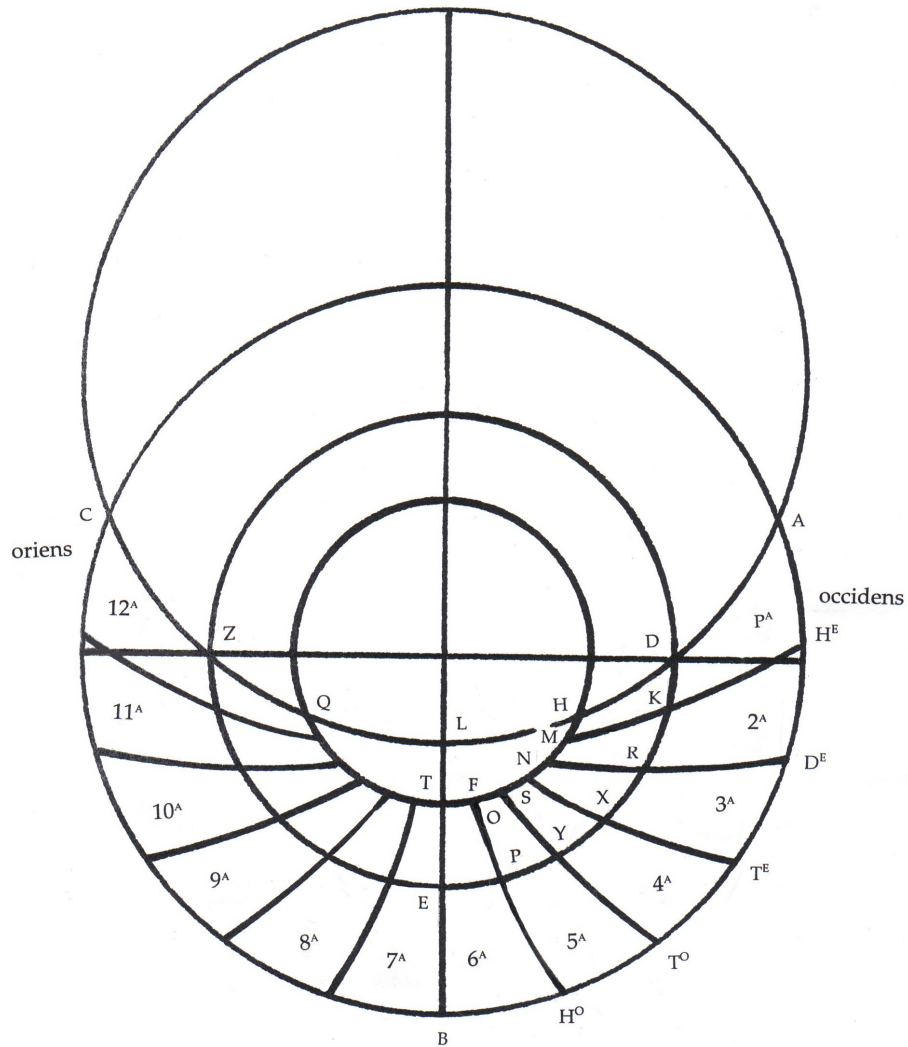


Figura inscriptionis 12 horarum naturalium

Complete: Bγ Bε Bι Cβ Cδ(upside down) Cη Cθ Cι Eα₁(fol. 7' left)⁷ Eα₂(fol. 7' right) Eβ Eη Eμ Eτ Fα Fβ
 Fζ Lγ Lε Lζ Lη Mγ(upside down) Mδ⁸ Mη Mλ Mν Mο Mυ Oζ Oκ⁹ Oξ Oσ Oτ Oυ Oφ Pα Pδ
 Pλ Pμ Pο Pρ Pτ Pυ Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι(fol. 333') Vκ Wβ Wι Xβ

⁷ In ms Ea there are two diagrams, side by side.

⁸ In ms Mδ Figura 16 is combined with Figura15.

⁹ In ms Oκ the figure is reversed left/right.

Incomplete: Bκ Mθ¹⁰ Mκ Pγ¹¹ Vε

Outline or space only: Aα Bα Bθ Cε Dγ Dη Eδ Eζ Eο Ev Lβ Mφ Oα Pν Pφ Qα Sθ Sι Vν Vπ Vσ Vυ
Wα

No space: Bη Bζ Cζ Ev Nα Oη SA Vχ Xα

Pθ: "P"

[Caption]

Figura ... naturalium] Cι Eα₁; *om.* Bκ Cβ Cδ Cθ Eα₂ Eμ Lζ Mγ Oκ Oσ Pψ Sβ Vα; Figura descriptionis horarum Mλ Mo Po Pv(*add.* naturalium) Wι; Figura 12 horarum naturalium Sκ; Figura duodecim horarum inequalium Pφ; Figura horarum ultima Rα; Figura inscriptionis azimuth super cenith cum figura 12 horarum naturalium Mδ; Tabula horarum Bι Oφ

inscriptionis] *om.* Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mη Mν Mu Oζ Oξ Oτ Ou Pα Pγ Pλ Pφ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vι Wβ Xβ 12] *om.* Eβ Mν Mu Oξ Pμ Qλ Vβ Vι Vκ; duodecim Pφ naturalium] *om.* Bγ Fβ Pδ Pμ Sδ Vκ; inequalium Pφ; *add.* sive inequalium Bε; *add.* Figura capituli 16 Bε; *add.* Figura inscriptionis azimuth super cenith¹² Fβ

[Lettering]

A] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vι Vκ Wβ Wι Xβ; *om.* Sκ; Q Mν B] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vι Vκ Wβ Xβ; *om.* Sκ Wι; *add.* C Mν; *add.* Eφ Bι Bκ Lζ Mλ Mo Pμ Po Pv Rα Vκ; *add.* Oφ Oφ C] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vι Vκ Wβ Wι Xβ; *om.* Mν Pλ Sκ Xβ D] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mλ Mν Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Wβ Wι Xβ; *om.* Eη D^E] Bε Bι Bκ Cβ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mo Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vκ Xβ; *om.* Sκ Wι; *cut off* Mλ; D Cδ; E Vβ; T^E Bγ Eτ Mη Mν Pτ Wβ; T^O Mu Vι E] Bγ Bε Bκ Bι Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mη Mλ Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vβ Vι Vκ Wβ Wι Xβ; *om.* Eη Mν Sκ; T Vα; γ^E Mδ F] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mν Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vα Vβ Vι Vκ Wβ Wι Xβ; *om.* Mγ Xβ H] Bγ Bε Bι Bκ Cβ Cδ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mν Mo Mu Oζ Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pφ Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Rα Sβ Sδ Tδ Vα Vβ Vι Vκ Wβ Wι Xβ; *om.* Mλ Sκ H^E] Bγ Bε Bι Bκ Cβ Cη Cθ Cι Eα₁ Eα₂ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mγ Mδ Mη Mν Mo Oκ Oξ Oσ Oτ Ou Oφ Pα Pδ Pλ Pμ

¹⁰ The diagram in ms Mθ is confused.

¹¹ In ms Pγ Figura 16 is combined with Figura 15 but omits all the lettering associated with Figura 16.

¹² Actually the caption for Figura 15.

Po Pq Pv Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vκ Wβ; *om.* Sk Wi Xβ; *cut off* Mλ; AH^e Oζ; E Cδ; H Pψ Vβ; H^o Pτ; T^e Mu Vi H^o] Bε Bi Bκ Cβ Cη Cθ Ci Eβ Eη Eμ Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mλ Mo Oζ Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vκ; *om.* Mu Sk Wi Xβ; c Cδ; EP Bγ Et Mη Mv Pτ Vi Wβ; H^oFP Sδ; o Pq Vβ; T^o Ea₁ Ea₂ Ok K] Bγ Bε Bi Bκ Cβ Cη Cθ Ci Ea₁ Ea₂ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vi Wβ Wi Xβ; *om.* Eη Mv Sk; *illeg.* Eβ; Q Cδ; *add.* R Vκ L] Bγ Bi Cβ Cδ Cθ Ea₁ Ea₂ Eμ Lζ Mγ Mo Oσ Oφ Pμ Po Pτ Pv Pψ Ra Sβ Vβ Vκ; *om.* Bε Bκ Cη Ci Eβ Eη Et Fa Fβ Fζ Lγ Le Lη Mδ Mη Mλ Mv Mu Oζ Ok Oξ Ot Ou Pa Pδ Pλ Pq Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Va Vi Wβ Wi Xβ M] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Mγ Xβ n] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Mγ Xβ; v Mu o] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Mγ Xβ p] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Eη Mv Sk Xβ q] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mη Mo Mu Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vi Vκ Wβ Wi Xβ; *om.* Mδ Mλ Mv Oζ Sk r] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mη Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Vβ Vκ Wβ Wi Xβ; *om.* Eη Mv Sk; *illeg.* Eβ; E Va; x Vi s] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Mγ Xβ t] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eη Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Sk Tδ Va Vβ Vi Vκ Wβ Xβ; *om.* Mγ Wi t^e] Bε Bi Bκ Cβ Cη Ci Eβ Eη Eμ Fa Fζ Lγ Le Lζ Lη Mγ Mδ Mλ Mo Oζ Oξ Oσ Ot Ou Oφ Pa Pδ Pμ Po Pv Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vκ Xβ; *om.* Sk Vi Wi; c^e Cθ; d Vβ; d^e Fβ Ok Pλ Pψ; d^o Ea₁ Ea₂; e Pq; H^o Mu; t Cδ; t^o Bγ Et Mη Mv Pτ Wβ t^o] Bε Bi Bκ Cβ Cη Cθ Ci Eβ Eη Eμ Fa Fζ Lγ Le Lζ Lη Mγ Mδ Mλ Mo Oζ Oξ Oσ Ot Ou Oφ Pa Pδ Pμ Po Pv Qβ Qγ Qδ Qλ Qμ Ra Sβ Tδ Va Vκ; *om.* Fβ Sk Wi; d^e Pλ; d^o Pψ Xβ; EP Mu; H^o Bγ Et Mη Mv Pτ Vi Wβ; o Cδ; t Pq Vβ; t^e Ea₁ Ea₂ Ok; TH^o Sδ x] Bγ Bε Bi Bκ Cβ Cθ Ci Ea₁ Ea₂ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vκ Wβ Wi Xβ; *om.* Eη Mv Sk; *illeg.* Eβ; c Cδ; H Cη; v Mη Vi y] Bγ Bε Bi Bκ Cβ Cη Ci Ea₁ Ea₂ Eβ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mδ Mλ Mo Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vκ Wβ Wi; *om.* Eη Mv Sk Xβ; n Cθ; p Cδ Vi; v Mu; x Mη z] Bγ Bε Bi Bκ Cβ Cδ Cη Cθ Ci Ea₁ Ea₂ Eβ Eμ Et Fa Fβ Fζ Lγ Le Lζ Lη Mγ Mλ Mo Mu Oζ Ok Oξ Oσ Ot Ou Oφ Pa Pδ Pλ Pμ Po Pq Pτ Pv Pψ Qβ Qγ Qδ Qλ Qμ Ra Sβ Sδ Tδ Va Vβ Vi Vκ Wβ Wi; *om.* Eη Mδ Mη Mv Sk Xβ; x Wβ

[Numbers]

1, 2 ... 12 Ea₁ Ea₂ Eμ Mγ Va 1^a, 2^a ... 12^a Cβ Bi Cδ Fζ Le Lζ Mη Mλ Mv Oξ Oσ Ot Oφ Pμ Po Pτ Pv Pψ Qδ Qλ Qμ Ra Sβ Sk Tδ Vκ Wβ Wi Xβ; *om.* Bκ p^a, 2^a ... 12^a Bε Cθ Eβ Eη Fa Fβ Mδ Oζ Ok Pa Pλ Qγ Sδ p^a hora, 2^a ... 12^a Cη Ci Lγ Lη Ou Pδ Qβ Vβ prima, secunda ... undecima, duodecima Bγ Et 12 | prima hora, 11 | secunda hora, 10 | 3, 9 | 4, 8 | 5, 7 | 6, 6 |

7, 5 | 8, 4 | 9, 3 | 10, 2 | 11, 1 | 12 P_Q

[*Other information*]

occidens Bε Bι Cβ Cδ Cη Cθ Cι Eα₁ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mν Mo Mυ Oζ Oξ Oσ Oτ Oυ Oφ Pα Pδ Pλ Pο Pρ Pτ Pυ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Wβ Wι Xβ; *om.* Bγ Bκ Eα₂ Mλ Oκ Pμ Pψ Qβ Vα oriens Bε Bι Cβ Cδ Cη Cθ Cι Eα₁ Eβ Eη Eμ Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mλ Mν Mo Mυ Oζ Oξ Oσ Oτ Oυ Oφ Pα Pδ Pλ Pο Pρ Pτ Pυ Qγ Qδ Qλ Qμ Rα Sβ Sδ Sκ Tδ Vβ Vι Vκ Wβ Wι Xβ; *om.* Bγ Bκ Eα₂ Oκ Pμ Pψ Qβ Vα *add. melior quam alia* Eα₂

at top of circle of Capricorn] *add.* A Sβ; *add.* D Bγ Mγ Pτ; *add.* L Eβ Eη Fβ Fζ Lγ Lε Lη Pλ Oζ Oτ Oυ Pα Pρ Qβ Qγ Qλ Qμ Sδ Tδ Xβ BL] *add. linea recessionis* Oφ *at centre*] *add.* I Sβ; *add.* L Cι Oκ Pδ *add. circulum Capricorni* Pτ; Capricorni Pρ *add. Arietis et Libre* Pρ *add. Cancri* Pρ *add. septentrio* Fβ Pρ Qγ *add. meridiens* Pρ Qγ *add. latitudo regionis* Bε; *add. latitudo regionis 36 gradus* Cβ Cθ; *add. 42 gradus* Oξ; *add. 48 Cδ*; *add. 48 lati* Vα; *add. latitudo 48 Oσ*; *add. latitudo 50 graduum* Eτ Mν Pτ Sκ Wβ; *add. latitudo 50 graduum | 48 Qλ* *add. [illeg.] horarum* Lζ *add. [illeg.] sunt linee horarum* Lζ

horizontal diameter] *add.* Q, L, H Mλ; *add.* Q, H Oκ(*repeated*); *add. (left)* C Sβ; *add. (right)* A Sβ *arc* TQ] *add.* F, O, S, N, M Oκ *arc* EZ] *add.* P, Y, X, R, K Oκ *arc* BC] *add.* O, T, D, E, H

[Construction, Section III]

[CAPITULUM 17.] PROIECTIO SPERE IN PLANUM

Concussio sive extensio immo verius proiectio spere in planum per visum fit hoc modo. Sit planum linea MBN, axis spere linea AB stans orthogonaliter super planum MBN ita quod polus septentrionalis contingat planum MBN in puncto B. Alter vero scilicet

- 1 Proiectio ... planum] *om.* Aα Cε Eα Ev Mχ Nα Pγ Qμ; Capitulum Messahalath de proiectione sphere in planum Wε₂; Concussio sive extensio immo verius proiectio spere in planum per visum Mλ¹; De ymaginatione proiectionis spere in planum per visum Pδ Pθ; Ymaginatio proiectionis spere in planum per visum Cι Eδ Eζ Mη Po Vψ Xα; Ymag[inati]o spere in planum per visum Sκ; *add. in marg.* Capitulum 17^m Bε; *add. in marg.* Capitulum de scientia proiectionis spere in planum Fβ
- before* Proiectio] *add.* Capitulum Bε Fβ Proiectio] De proiectione Bε Bθ Cη Dη Fβ Mv Mo Mq Mψ Vβ Vπ; *mss* Mq Mσ Mχ Mψ Vθ Wε₁₂ *start* planum] *add.* Capitulum Cη; *add.* per visum Wι; *add.* per visum vel per lineas rectas Bθ Pv Vπ; *add.* per visum vel per lineas erectas ex polo australi super septentrionalem Vβ; *add.* ex polo australi super; septentrionale Pτ; *add.* Rubrica Vπ
- 2 Concussio] *add.* spere Cε Dη; *ms* Mχ *starts* sive] seu *some* verius] potius Mχ Mψ Vθ Wε₁ Wε₂ proiectio] *add.* per Aα Mψ spere] vere Pγ planum] plano Cε per] pro Sκ fit] sit Bθ Eζ Mη Mv Mφ Po Vι Vβ Wα Wε₁ Xα Xβ; *add.* 9^a(?) Pv
- 2-3 fit ... planum] *om.* Pδ
- 3 Sit] Si Eτ; *add.* hic Pγ planum₁] *om.* Mσ Vθ planum₁ linea MBN] *om.* Bε linea₁] linee a p Eζ; lineas Pδ MBN₁] in BA Nα; MVN Tδ; ROBN Mδ; *add.* presentans(?) planum et circulus ACBD presentans(?) spera, cumque Mσ Wε₁; *add.* representans planum et circulus ACBD representans sphaera cuius Vθ MBN₁ ... planum₂] *om.* Eδ Eη spere] *om.* Mφ Qλ Vι Wα; sit Mσ Wε₁; *add.* sit Pγ linea₂] *om.* Aα Lγ Vψ; *add.* *interlin* Wε₂ stans] status Qδ orthogonaliter] *add.* id est Pδ planum₂] lineam Xβ MBN₂] MB Cε; *add.* quod est planum Xβ
- 4 ita] *om.* Wε₂ ita ... MBN] *om.* Bε Eη Ev Mψ quod] *om.* Fβ septentrionalis] axis Eα planum] *interlin.* Pτ MBN] MB Pα in] super Qδ in puncto B] *om.* Qβ; mipō or inipō(?) Sκ B] *om.* Cη Eτ; P Mη; *add.* polo septentrionali Bε Alter vero] *om.* Wα Wε₂ vero] *om.* Mλ; *add.* in 10 Mo; *add.* polo Mσ; *add.* polus Mχ Vθ scilicet] *om.* Mχ Mψ Pθ Pq Qδ Wε₁; sit Cη Eτ Pγ Sκ Wβ Wι

¹ Mλ repeats the first line of the text as the rubric.

² There are two versions of this capitulum in ms Wε, beginning on fol. 110^v (Wε₁) and 115^v (Wε₂); Wε₂ is closer to the standard version.

[*Construction, Section III*]

THE PROJECTION OF A SPHERE ONTO A PLANE

The flattening or extension, or more correctly the projection by sight,³ of a sphere onto a plane is effected in this manner. Let the plane be line MBN, the axis of the sphere, line AB, standing perpendicular on the plane MBN so that the north pole touches plane MBN at point B. However, let the other one, that is

³ This specific projection is known as “stereographic projection.” See Ron B. Thomson, *Jordanus de Nemore and the Mathematics of Astrolabes: De plana spere* (Toronto: PIMS, 1978).

- 5 meridionalis maxime distet a plano in puncto A qui est oculus videntis. Sit⁴ colurus transiens per maximas solis declinationes; sit ACBD. Linea quoque CD equidistans plano est equator diei, EH tropicus Cancrici, GF tropicus Capricorni et hii duo etiam equidistant plano. Linea vero EF est ecliptica.
- 5 meridionalis] australis Mχ; *add.* scilicet Bε Eτ Pθ; *add.* et⁵ Aα Cη Eυ Pγ Vβ(*interlin.*) Wβ Wε₂ maxime] *illeg.* Wα distet] distat Qλ Sκ Wι; distant Eη; *add.* ayfano(?) Mυ a plano] *rep.* Wε₂ puncto] *add. and del.* B alter vero Pγ qui est] in quo sit Mσ Vθ est] *om.* Eδ; et Aα Bγ Bθ Cε Cη Cι Dη Eζ Eτ Eυ Mη Mλ Mν Mο Mψ Nα Pγ Pδ Pθ Pο Pτ Pυ Vβ Vπ Xα sit] et Mσ Wε₁; destsa²(?) arcus ABCD et est Mχ; sitque Qβ colurus] coriusles Eα; corulus Bθ
- 6 transiens] *add.* in spera Mσ Vθ; *add.* per speram Wε₁ maximas] *add. and del.* suas Oυ solis] *om.* Xβ sit] *om.* Xβ; scilicet Bε Eη; ut Mυ Mφ Vι Wα; *add.* productus circulus Mσ Vθ; *add.* productus colurus Wε₁ sit ACBD] *om.* Mχ ACBD] ABCD Aα Bγ Bθ Cη Cι Eα Eβ Eη Eτ Eυ Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Mφ Mψ Nα Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pν Pρ Pτ Pυ Qβ Qγ Qδ Qλ Sδ Tδ Vβ Vι Vπ Vψ Wα Wβ Wε₁ Wε₂ Wι Xα Xβ; ADBC Bε Linea quoque CD] *repeated* Vπ CD] ED Eζ equidistans] *eque distans some; add.* a Aα Bθ Dη Mψ Qδ; *add.* in Fζ plano] *om.* Oξ; planum Cη
- 7 est equator] sit diametrum circuli equinoctialis Mσ Vθ EH] EB Eδ; EF Aα Bθ Cη Sk Vπ; ET Eυ; GF Eτ; *add.* est Qδ EH ... Cancrici] et linea EH sit diametrum circuli seu tropici Cancrici Mσ Vθ Cancrici] ☉ Mχ Wε₂ Cancrici GF tropicus] *om.* Pγ GF] SF (*or* scilicet F) Nα GF ... Capricorni] et linea GF sit diametrum circuli seu tropici Capricorni Mσ Vθ tropicus Capricorni] *om.* Cε Capricorni] ♄ Mχ Wε₂ et hii] et *corr.* to que Mσ; hii *corr.* to et CD, EH, GF sint Pρ; que Vθ Wε₁ hii] H, N Xβ duo] 2 many; *om.* Vθ duo etiam] *om.* Eα etiam] *om.* Bθ Cε Fβ Mρ Vπ Vψ Wε₁; *erased* Pτ; que Aα equidistant] *eque distant or distant eque some; equidistans* Aα Mδ; equidistantes Pρ; equidistent Bε Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mρ Mφ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Qγ Qλ Tδ Vι Wα Xβ; *add.* a Aα Cη Eτ Nα Vβ Wι
- 7-8 Cancrici ... linea] *om.* Qδ
- 8 vero] *om.* Bγ; autem Bε EF] EH Sκ est] *om.* Mυ Qλ Wε₂; sit diameter Mσ Vθ Wε₁ ecliptica] *eccliptica* Xβ; ecliptice Mσ Vθ Wε₁; ecliptica Cη Mδ Mλ Mο Mυ Mφ; edipica Nα; elitica Eα

⁴ In many mss *Sit* forms the end of the previous sentence (especially when the previous *est* is given as *et*) or the sentence division is ambiguous. If *Sit* is the verb of the previous clause, then *colurus* becomes the subject of the *sit* in line 6.

⁵ This variant probably began with a misreading of the abbreviated ending of *meridionalis*.

the southern one, be at the greatest distance from the plane at point A, which is the eye of the observer. Let there be the colure passing through the greatest declinations of the sun;⁶ let it be ACBD. Likewise line CD parallel to the plane, is the daily equator, EH the Tropic of Cancer, GF the Tropic of Capricorn and these two are likewise parallel to the plane. Line EF, however, is the ecliptic.

⁶ I.e., the colure or great circle passing through the solstices.

- 10 Exeant igitur a puncto A polo australi, scilicet ab oculo videntis, due linee per duas extremitates equatoris scilicet C et D ad duo puncta in plano P et X, eritque linea PX diametrum equatoris. Et ab eodem puncto alie due linee scilicet per E, H extremitates tropici Cancri veniant in planum in punctis Z et Y et hec linea ZY erit diameter eiusdem tropici in plano. Similiter et alie due linee per G, F extremitates tropici
- 9 Exeant] *add.* autem Pδ; *add.* vero Eδ Eζ igitur] *om.* Mχ; ergo *few*; ergo igitur Xα
 A] *om.* Eδ; *repeat* Wε₁; id est A Vβ; poli australi ab Cη A polo australi] poli(*add.*
and expunged hoc modo A) australis ab australi polo Pγ; A poli australis ab australi polo Sκ;
add. ab australi Wι polo] puncto Nα; *add.* seu polo Xβ australi] *add.* ab astralo
 polo Eτ; astrealis Vθ ab] A, B Xβ due] 2 / 2^e *some*; et Ev linee] *add.* C Nα
 per] *om.* Mη
- 10 duas] 2 / 2^{as} *some* equatoris] dyametri circuli equinoctialis Mσ Vθ Wε₁; *add.* diei Dη;
add. *and canc.* et ab eodem puncto Wβ scilicet] *om.* Cι; *add.* per puncta Mσ Vθ C
 et D] CD *many*; AC Fα; DC Lβ ad] *om.* Vπ; A, D Xβ duo] 2 *many* plano] *add.*
 equatoris Cε; *add.* scilicet Eα P et X] scilicet PQ Mσ Vθ Wε₁; P et ex Wβ; P et ex *corr.* to
 P et X Sκ; T et X Mχ linea] *om.* Wβ PX] P et V Nα; P et X Mv; PQ Mσ Vθ Wε₁; TX
 Mχ; X Mψ
- 10-11 scilicet ... equatoris] *om.* Aα
- 11 diametrum] diametraliter Ev equatoris] circuli equinoctialis in plano Mσ Vθ; *add.*
 Posito ergo circino in medio eorum scilicet in puncto B, describe circulum transeuntem
 per predicta duo puncta P, Q qui sit circulus PAQO et ille erit circulus equinoctialis in
 plano correspondens circulo in spera cuius diameter est linea CD Mσ Vθ Wε₁ Et]
 Deinde Mσ Vθ Wε₁ eodem] alio Mv puncto] *add.* scilicet A Mχ; *add.* scilicet A
 veniant Mσ Vθ Wε₁ due] 2 / 2^e *some* scilicet] *om.* Dη Mδ Vθ Vψ per] *om.*
 Mo Mψ Pτ E, H] *om.* Mσ Vθ Wε₁; HE *many*; EB Eδ; EY Aα Bθ Ev Vπ; HC Tδ; *add.* et per
 Pv: *add.* per Dη Nα Pτ; *add.* scilicet Mλ extremitates] *add.* dyametri Mσ Vθ; *add.*
 scilicet Cε Dη
- 12 tropici] circuli Mσ Vθ Cancri] ☉ Mχ Wε₂ veniant ... Z et Y] scilicet per puncta
 E, H ad duo puncta in plano qui sunt S, V. Mσ Vθ Wε₁ in punctis] *om.* Tδ Z et]
superscr. Bγ Z et Y] ZY *some*; Y Cη; Z et I Eη; et Y Pμ et hec ... erit] eritque illa
 linea SV Mσ Vθ Wε₁ ZY] Z et Y Mv Sκ Wε₂; ZI Eη erit] *om.* Pγ Sκ
- 12-13 Z et Y ... tropici₂] R et D caput Nα
- 13 eiusdem] *om.* Mσ Vθ Wε₁; eius Pδ; eius eiusdem Pv tropici₁] *add.* Cancri Bε Mσ Vθ
 Wε₁ in ... tropici₂] *om.* Pα Xα plano] *add.* Describe igitur circulum circa
 punctus B transeuntes per hec duo puncto, scilicet S, V, et sit circulus STVR. Et ille
 representabit in plano circulum Cancri correspondentem circulo in spera cuius dyameter
 est linea EH. Mσ Vθ Wε₁ Similiter] *add.* autem Eδ Po et] *om.* Bθ; etiam Pλ; ab
 eodem puncto exeant Mσ due] 2 *some*; *add.* similiter Mq per] scilicet Mo; *corr.*
 to scilicet PQ G, F] F, G *many*; *om.* Mσ Vθ Mψ extremitates] *add.* diametri Mσ Vθ
 Wε₁ tropici₂] *om.* Cε
- 13-14 Similiter ... plano] *om.* Eτ Pγ Sκ tropici₂ ... incidentes] *om.* Mo

Let two lines extend therefore from point A, the south pole, that is from the eye of the viewer, through the two ends of the equator, that is, C and D, to two points in the plane, P and X, and line PX will be the diameter of the equator. And from the same point [A] two other lines, that is, through E and H the ends of the Tropic of Cancer should meet the plane at points Z and Y and this line ZY will be the diameter of the same Tropic [projected] in the plane. And similarly another two lines through G and F, the ends of the Tropic

- 15 Capricorni plano incidentes in punctis M et N; faciunt ex ipsa linea MN diametrum
 Capricorni in plano. Extractis igitur super medietatibus quorumlibet diametrorum in
 linea MBN figuratorum circulis, fient circuli in plano primi ex spera per visum
 proportionaliter proiecti.
- 14 Capricorni] γ_{ρ} M χ V θ W ε_2 ; *add.* in A α B θ D η E ν M μ P ρ Q δ V π ; *add.* scilicet per puncta G,
 F M σ V θ W ε_1 incidentes] *rep.* P α faciunt ex ipse] Eritque hec M σ V θ W ε_1
 faciunt ... MN] faciunt ex ipsa linea M et N, faciunt ex ipsa linea MN W β MN] M
 et N C ε P ν ; que N Q μ diametrum] *add.* tropici M λ M ρ V θ
- 14-15 MN ... plano] vide [*illeg.*]: diametrum tropici Capricorni in plano W ε_1 (*marg.*)
- 15 Capricorni] [sign] M χ V θ W ε_2 in plano] *om.* M ψ plano] *add.* corendes(?)
 circulo in spera cuius diameter est linea GF M σ ; *add.* (??) Potiens linea exenti ρ ab oculo A
 per punctum EF diametrum zodiaci in plano ou δ up na altera linearum qu \circ circuli qu
 tropico \mathfrak{S} in puncto Z aliqua in tropico γ_{ρ} in puncto M M χ ; *add.* Descriptio igitur circulo
 circa punctum B transientem per illa duo puncta, scilicet M, N, qui sit circulo MKNL. Ipse
 erit tropicius Capricorni (γ_{ρ} V θ) in plano correspondens circulo in spera cuius dyameter
 erit linea GF. M σ V θ W ε_1 super] sic E α ; *interlin.* P τ quorumlibet] quarumlibet
 B γ C η D η E δ E ζ M λ M ν M ρ M ψ N α P ρ P τ P ν S κ V β W β X α diametrorum]
 9ioliem P γ
- 15-16 Extractis ... circulis] Postea invento(in W ε_1) puncto medio inter duo puncta (inter ...
 puncta *om.* W ε_1) S, N qui sit punctus X. Describe circulum transeuntem per eadem duo
 puncta scilicet S, N qui necessario transibit per puncta A, O si bene est factum; et erit
 circulus SANO et ipse erit ecliptica in plano correspondens circulo in spere cuius
 dyameter est linea EF. Et sic habes quomodo per circulos in spera descriptos M σ V θ W ε_1
- 16 linea] *om.* D η MBN] BN N α figuratorum] figuratarum M χ P ρ Q δ ; sig^atu ρ iarum
 C η ; signatorum C ι D η M λ M ν M ρ M ψ N α O ξ P δ P θ P τ W β ; signatarum A α B γ B θ E δ
 E ζ E η E ν P ρ P ν V β V π ; signatoriarum M η ; significatarum E τ P γ S κ W ι ; signorum C ε ;
add. in M ν circulis] *om.* M ρ ; circulus P γ fient] fiant M σ V θ ; sicut C η in]
om. M ρ W ε_1 ; ibi M ν ex] in M ν visum] intasum(?) P γ ; vissimi(?) S κ
- 16-17 in ... proportionaliter] *om.* N α
- 17 proportionaliter] *om.* W ε_2 proportionaliter proiecti] proportio S κ proiecti] *ms*
 M χ *ends*; *add.* Et exemplum patet videre in figura precedenti et sequenti. W ε_2 ; *add.* et vide
 in figura sequenti W ε_1 ; *add.* hec est figura V β ; *add.* Pro exemplo vide figuram sequentem
 M σ ; *add.* sicut patet in sequenti figura hac F β ; *add.* ut hic P ν (*fol.* 73^v) [*arrow to image*]; *add.*
 ut in figura N α ; *add.* ut in figura patet P ρ ; *add.* vide in figura V θ ; *add.* vide in folio hoc
 exemplum immediate sequens T δ ; *add.* qui erit in basis(!) sive fundamentum [*illeg.*]
 astrolabii et linea MBN erit orizon [*illeg.*] linea vero AB meridiana linea in planispero sive
 astrolabio locabit M χ

of Capricorn, meeting the plane at points M et N; they make from this line MN the diameter of [the Tropic of] Capricorn [projected] on the plane. When therefore circles are drawn on the centres of whatever diameters represented in line MBN, they will become the first circles in the plane projected proportionally from the sphere by sight [or stereographically].

[FIGURA 17]

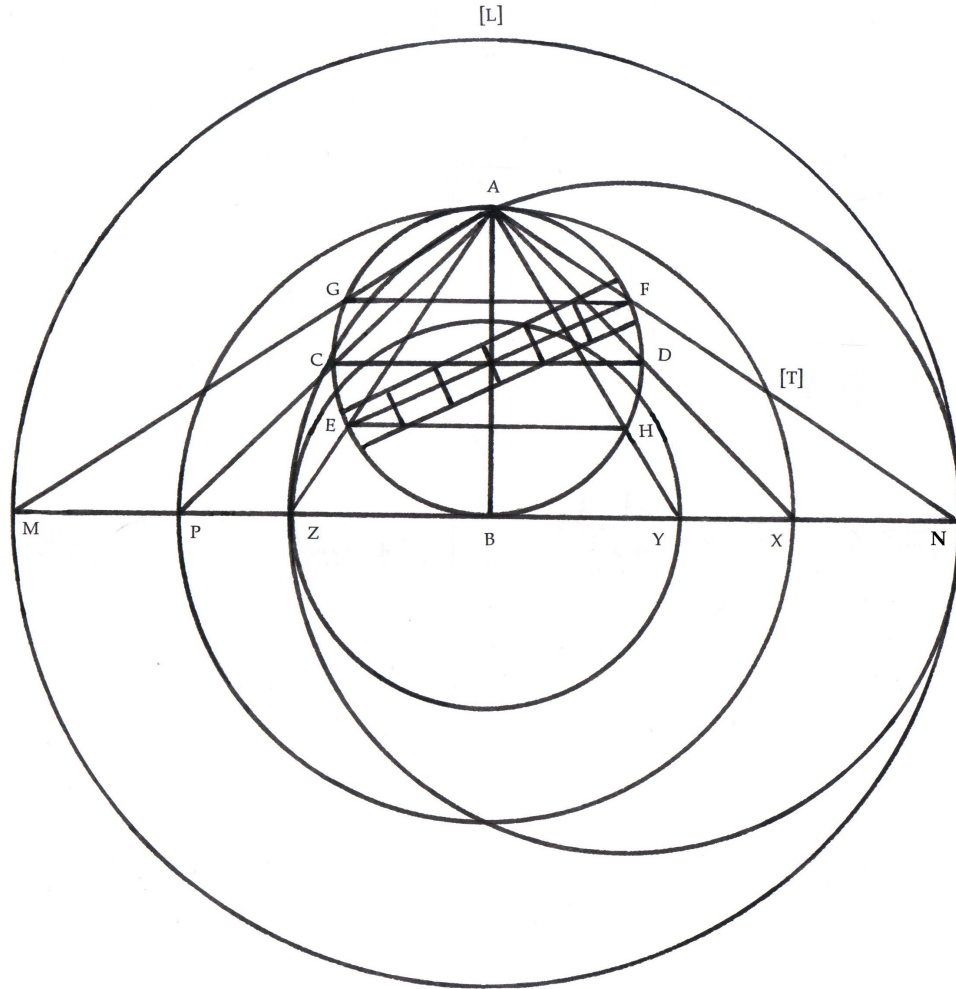


Figura projectionis spere in planum

[Complete diagram]⁷ Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mo Mρ
 Mσ Mυ(fol. 409^v) Oζ Oξ Oτ Ou Pa Pγ Pδ Pl Pμ Po Pρ Pτ Pv₁(fol. 74^v) Pv₂(fol. 75^v) Qβ Qγ Qδ Qλ
 Qμ Sδ Sκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ

[Partial diagram]

[Outline, or space only] Aα Bθ Cε Dη Eζ Ev Lβ Mφ Mχ Pv Vπ Vψ Wα Wε₂

⁷ This diagram is found as stand alone images (i.e., without text) at the end of Cap. 22 in mss Rα(fol. 16^v) and Sβ(fol. 12^{ra}). They are not collated with this diagram.

[No space] Eδ⁸ Mψ Nα Xα
Pθ: “Q”

[Caption]

Figura ... planum] Bγ Bε Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mη Mλ Mν Mο Mρ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Σκ Tδ Vβ Vι Wβ Wε₁ Wι Xβ; *om.* Mσ Mυ Pυ₁; Projectio spere in planum] Eα Mδ Pγ Sδ

sperre] *om.* Qδ plano] *add.* per visum Mλ; *add. interlin.* al' plano Vβ; *add.* Figura capituli 17 Bε

[Lettering on the diagram]

A] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *add.* oculus videntis Eα Eβ Fα Fβ Fζ Oζ Pα Pρ Qλ Sδ; *add.* oculus Lε Lη Mο Tδ; *add.* oculus intuentis Pδ; *add.* occultus videntis existens in polo antartico Pυ₁; *add.* oculus videntis et polus meridionalis Oξ; *add.* polus australis Bε Pμ Pρ; *add.* polus australis vel oculus videntis Pο Wι; *add.* polus meridionalis Vβ; *add.* polus meridionalis vel oculus Pυ₂; *add.* polus meridionalis vel oculus videntis Mλ; *add.* image of head/shoulders looking down through the pole Pυ₁ B] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *om.* Σκ; *add.* polus septentrionalis Bε Eη Oτ(later hand) Pυ₁; *add.* polus septentrionalis contingens planum Mλ Pυ₂; *add.* polus septentrionalis in plano contingens Pμ Pο Vβ Wι; *add.* septentrionalis Pρ; *add.* [illeg.] Mρ C] Bγ Bε Cη Cι Eα Eβ Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *illeg.* Eη D] Bγ Bε Cη Cι Eα Eβ Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *illeg.* Eη E] Bγ Bε Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; H Cι Eα Pδ F] Bγ Bε Cη Eβ Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *om.* Eη; G Cι Eα Pδ Σκ G] Bγ Bε Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; F Cι Eα Pδ H] Bγ Bε Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; E Cι Eα Pδ M] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *add.* diameter Capricorni Pυ₁ N] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *add.* Capricorni Pυ₁ P] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mσ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vθ Vι Wβ Wε₁ Wι Xβ; *add.* diameter equinoctialis Pυ₁ x] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mο Mρ Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Sδ Σκ Tδ Vβ Vι Wβ Wι Xβ; *om.* Qμ; Q Mσ Vθ Wε₁;

⁸ The diagrams in ms Eδ are unrelated to the text.

add. equinocialis Pυ₁ Y] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mo Mρ
 Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Sδ Tδ Vβ Vι Wβ Wι Xβ; *om.* Qμ
 Σκ; v Mσ Vθ Wε₁ Z] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mo Mρ
 Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ₁ Pυ₂ Qβ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vι Wβ Wι Xβ; s
 Mσ Vθ Wε₁; *add. diameter Cancri* Pυ₁ *add. L]* Cη Eβ Eη Fα Lε Lη Mδ Mo Mρ Oζ Oξ Oτ Oυ
 Pα Pρ Qβ Qγ Qμ Tδ; *add. s* Bε *add. T]* Fβ Mλ Mν Mυ Pα Pμ Po Pτ Pυ₂ Qβ Qλ Vι Wβ; c Σκ; E
 Xβ

[Zodiacal bands]⁹

om. Σκ; *add. bands with names of the signs* Bγ Bε Cη Eβ Eη Eτ Fα Fζ Lγ Lε Lη Mδ Mη Mλ Mν Mo
 Mρ Oζ Oτ Oυ Pα Pλ Pμ Po Pρ Pυ₂ Qβ Qγ Qδ Qλ Qμ Tδ Vβ Wβ Wι; *om.* Cι Eα Mσ Oξ Pγ Pδ Pυ₁
 Vθ Wε₁; *add. bands but no names* Mυ Pτ Sδ Vι Xβ; *add. bands with Leo | Libra | Sagittarius only* Fβ

[Other information]

GF] *add. tropicus Capricorni* Bε Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Mη Mν Mo Mρ Oζ Oξ Oτ Pα Pλ Pμ
 Po Pρ Pτ Pυ₂ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vι Wβ Wι Xβ; *add. Capricorni* Lη Mδ Mσ Vθ Wε₁
 EH] *add. tropicus Cancri* Bε Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Mδ Mη Mν Mo Mρ Oζ Oξ Oτ Pα Pλ Pμ
 Po Pρ Pτ Pυ₂ Qγ Qδ Qλ Qμ Sδ Σκ Tδ Vβ Vι Wβ Wι Xβ; *add. Cancri* Lη Mσ Vθ Wε₁ CD] *add.*
equinoctialis Bε Eβ Eτ Fα Fβ Fζ Lγ Lε Mν Mo Mσ Oζ Oξ Oτ Pα Pλ Po Qλ Sδ Vβ Vθ Wε₁ Wι; *add.*
equator diei Pρ EF] *add. ecliptica* Mσ Oξ Wε₁; *add. ecliptica* Pρ; *add. tropicus Arietis* Σκ
 MBN] *add. planum* Cι Pρ Wε₁

[Projected circles in the plane]

add. Cancri Mσ Vθ; *add. circulus Cancri* Wε₁; *add. circulus Cancri in plano* Bγ; *add. tropicus Cancri*
in plano Oξ *add. circulus Capricorni* Mσ Vθ Wε₁; *add. circulus Capricorni in plano* Bγ; *add.*
tropicus Capricorni in plano Oξ *add. circulus equinoctialis* Wε₁; *add. circulus equinoctialis*
vel Arietis et Libre in plano Bγ; *add. equator* Cη; *add. equinoctialis* Mσ Vθ; *add. equinoctialis in*
plano Oξ *add. ecliptica* Mσ Wε₁; *add. eclipticus in plano* Vθ Oξ; *add. zodiacus* Cη; *add.*
zodyacus in plano Bγ

add. on circle of Capricorn: K, L Mσ Wε₁; Z, L Vθ *add. on equator:* O Mσ Vθ Wε₁ *add. on*
circle of Cancer: T, R Mσ Vθ Wε₁ *add. as centre of circle of the ecliptic:* X Mσ Vθ Wε₁

⁹ Note: in most diagrams the zodiacal names, Cancer to Sagittarius, read from left to right along the bottom band, and Capricorn to Gemini read from right to left along the top band and are also written upside down. In a few cases Capricorn to Gemini are written from right to left, but right-side up.

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[CAPITULUM 18.] PUNCTI IN SPERA EQUIDISTANTIS ZODIACO IN PLANUM INSCRIPTIO

Si autem cuiuslibet puncti in spera equidistantis ecliptice in planum proicere velimus, sic fiet. Circulus AB transeat per polos mundi, qui sunt A et B, B autem contingens planum; et linea MBN est communis sectio circuli AB et plani. CD est diameter

- 1 *Cap. 18 follows Cap. 20-22 Bκ* Puncti ... inscriptio¹] *om.* Aα Bκ Cε Eα Eδ Mψ Nα Pγ Xα; Alius modus proiciendi speram in plano Dη; Capitulum. De inscriptione in plano puncti equidistantis zodiaco Fβ(*twice*); Capitulum. De descriptione puncti in spera equidistantis zodiaco in planum Bε; Cuiuslibet puncti in spera equidistantis ecliptice in plano proicere Wι; De alicuius puncti in spera equidistantes ecliptice inscriptione in plano. Cap. Mλ; De projectione puncti in spera equidistantis ecliptice(*add. interlin. al' zodiaco Vβ*) in plano(*add. interlin. al' planum Vβ*) Pτ Vβ; De punctis equidistantibus ecliptice inscribendis hec est ars Mν; De ymaginatione spere in plano Dγ²; Descriptio puncti in spera equidistantis zodiaco in planum Pδ Wβ(*add. Capitulum*); Proiectio cuiuslibet puncti equidistantis equinoctiali in planum Bγ; Proiectio puncti in spera equidistantis ecliptice in planum Bθ Pυ Vπ; Proiectio spere in planum Eυ; Puncta (Punctum Pλ) in sphaera equidistantia (equidistantis Pλ) zodiaci in austrum in planum Pλ Pρ
in ... inscriptio] *om.* Xβ planum] plano Vψ inscriptio] *om.* Pν; descriptio Cι Eζ Mη Pο Pθ Vψ; descripto Qμ; proiectio Cη Eτ; proiectio seu scriptio Mυ Vι
- 2 autem] *om.* Mυ Vι; alicuius Mλ; vero Wε₂ cuiuslibet] cuius Mη puncti] *om.* Mν in₁] *om.* Eη; *interlin.* Bε in spera] *om.* Mρ ecliptice] *om.* Aα Qμ; eclitica Eα; ecliptice Cη Mλ Mφ Sδ planum] *add.* circulum Mο Mρ proicere] eicere Vψ; prohicere Eβ Fβ Lε Oξ Oτ Oυ Pθ Pμ Sδ Tδ Xα; proijcere Pρ; proncere Mδ
- 2-3 si ... fiet] *om.* Bκ Dγ
- 3 velimus] verius Mν; volumus Nα Wε₂ sic] si Xα sic fiet] faciemus hoc modo Eδ fiet] fit Eυ; *add.* Fiat Bε Circulus] *ms* Lζ *restarts* AB] *om.* Sκ transeat] transea Pδ; transiens Vβ Wι; transiens *corr. to* transeat Pτ per] pecto Sδ mundi] *om.* Bκ Dγ B₂] *om.* Bκ Cε Dγ Mη autem] *om.* Bκ Dγ Lζ Mλ Nα
- 4 contingens] continget Pδ contingens ... est₁] *om.* Sκ planum] *interlin.* Vβ et₁] *add.* in Bθ MBN] BMN Bγ Cη Cι Eδ Eζ Eτ Mη Mν Mψ Qμ Vβ Vπ Wβ Wι; BNM Aα Bθ Eυ; BNMBN Nα; MBV Dη; MN Xα est₁] *om.* Dη Eτ Pγ communis] *add.* linea BMN Sκ sectio] centio Pα; sectivo Dγ plani] *om.* Mψ diameter] *and elsewhere* dyametraler Aα Bθ; *and elsewhere* dyametralter Vπ

¹ Ms Wε₂ contains this standard version of the capitulum (beginning fol. 116r) after the alternative versions given at the end of this edition of Capitulum 18.

² Ms Dγ continues: Capitulum 17 is omitted, and the rest of the capitula are out of order. Capitulum 18 is actually the last capitulum in this manuscript; see the manuscript description in the Introduction.

[CHAPTER 18.] THE INSCRIBING ON A PLANE OF A [CIRCLE]³ ON A SPHERE PARALLEL TO THE ZODIAC

However, if we wished to project on a plane [the image]⁴ of any point [i.e., circle] in the sphere parallel to the ecliptic⁵ it will be done thus. Let circle AB pass through the poles of the globe, which are A and B, B, however, touching the plane; and line MBN is the common section of [the plane of] circle AB and the plane [of projection]. CD is the diameter

³ The mss read *puncti*, where they should read *circuli*.

⁴ There must be some understood noun here in order to explain the genitive construction in the Latin. None is obviously suggested but “image” or “projection” might suffice.

⁵ This is also treated in Ptolemy’s *Planisphaerium*; see *Opera Omnia, 2: Opera astronomia minora*, ed. J. L. Heiberg (Leipzig: Teubner, 1907), pp. 252-258. [J.S.]

- 5 equatoris, EF diameter zodiaci, GH diameter unius ex equidistantibus zodiaco eorum
qui sunt ad partem septentrionis, KL diameter alterius equidistantis zodiaco qui est ad
partem meridiei. Unde uterque duorum arcuum CE et DF est declinatio zodiaci ab
equatore; duo autem arcus CG et DH sunt due maxime declinationes circuli cuius
diameter GH ab equatore. Eodemque modo duo arcus CK et DL sunt due maxime
10 declinationes circuli cuius diameter KL ab equatore. Transeant ergo lineae AKOM, ACP,
- 5 equatoris ... diameter₁] *om.* Lβ EF] CF Eτ Sκ EF ... diameter₂] *om.* Bθ
zodiaci] *and elsewhere* zodyaci Bγ Fβ Wι zodiaci GH diameter] *om.* Vπ Wβ
unius] *om.* Dη; huius Nα ex] *om.* Cι Lβ equidistantibus] *add.* a Aα Bθ Eυ
Qδ eorum] *om.* Aα Bγ Bκ Cε Dγ Eδ Eζ Eυ Lζ Mη Mλ Mν Pο Pτ Pυ Qδ Qμ Sκ Vβ Vπ
Wβ Wι
- 5-6 eorum ... zodiaco] *marg.* Mψ
- 6 qui sunt] *marg.* Eζ ad partem] *om.* Vψ equidistantis] distantis Pν; *add.* a Bκ Lζ
- 6-7 septentrionalis ... partem] *om.* Mν
- 7 meridiei] meridionalem Xα Unde] *om.* Vψ duorum] *om.* Aα Vπ; 2 *some*; eorum
Xβ CE] *illeg.* Xβ; C^e Bγ Cη; C Aα Bθ Eτ Eυ Mν Sκ Vπ; CD Eδ Mδ; CT Mυ; ET Mφ; RC Pν
DF] *corr. from* DE Pο; DS Nα; DT Eζ est] *om.* Qμ; et est de Cε; et sunt Xα; ex Bθ
Vπ ab] *om.* Pγ
- 8 duo] 2 *some* CG] GC *some*; EG Cη Qδ; G Wα; GE Bε Fβ Fζ Lβ Lγ Pα Pμ Qβ Sδ; GT
Oυ(*add. in marg.* al' GC); OG Pγ Pτ DH] AG Mν due] 2 *some* maxime] *add.*
solis Mψ circuli] *om.* Nα cuius] cuiuslibet Aα
- 9 diameter] dyametri Aα; *add.* est Dη GH] *om.* Eδ; H Cε; et H est Nα; *add. interlin.* est
Bγ equatore] *add.* diei Dη Mψ; *add.* Eodem modo duo arcus CG et DH sunt due
maxime declinationes circuli cuius dyameter GH ab equatore Xα Eodemque] Eodem
Aα Eυ Mλ Pτ Wα duo] 2 *some*; *om.* Oζ Pλ; et Bε; *add.* autem Xβ CK] *corr. from*
DK Pο; EK Qδ; EL Eδ DL] DS Aα Bθ Eυ; XOL Eδ sunt] est Eδ due] 2 *some*;
om. Bε Eη Oζ Pρ Xα; et Mν maxime] *add.* solis Mψ
- 9-10 GH ... diameter] *om.* Pγ Sκ
- 10 ergo] *add.* due Bθ Vπ cuius] circuli Xα cuiuslibet Aα diameter] diametri Aα
KL] *om.* Bε Eη Qλ Wα; OL Fβ; *add.* est Dη equatore] *add.* diei Pτ AKOM]
ABOM Cε; AKLOM M O A Lβ; AVEM Eδ; NKOM Nα; OM Mν ACP] *rep.* Pδ; *corr. from* AC
Pο; AQV Eδ; ATP Eζ
- 10-11 AKOM ... ALSN] AQOM, ACPA ET QAGRIAH ET Y A D R A F C N A L V F S Aα; AKOM AC PA EZ QA
GIR AB ZY AD YX AP TU AL VS Qδ

of the equator, EF the diameter of the zodiac,⁶ GH the diameter of one [of the circles] parallel to the zodiac of those which are towards the region of the north, KL the diameter of another parallel to the zodiac which is towards the region of the south. Hence each of the two arcs CE and DF is the declination of the zodiac from the equator; moreover the two arcs CG and DH are the two extreme⁷ declinations from the equator of the circle whose diameter [is] GH. Similarly the two arcs CK et DL are the two extreme declinations from the equator of the circle whose diameter [is] KL. Therefore, let the lines AKOM, ACP,

⁶ More correctly (here and throughout), the ecliptic. In these last chapters (17 to 22) the author is less exact in his terminology.

⁷ In this case, and in line 9, *maxime* cannot mean “greatest” since one of the arcs in each case (DH here, and CK in line 9) is actually the minimum declination of the parallel circle. Hence I have read *maxime* as the “extremes” or the points of the greatest and the least declinations.

AEZQ, AGIR, AHZ'Y, ADX, AFTV, ALSN.

15 Eritque PX diameter equatoris qui transibit per A; nam cum sit ei equalis et A, erit quoque PB equalis BA. Iterum ZV erit diameter zodiaci qui etiam transibit per A quoniam ipse dividit equatorem per equalia. Et IZ' erit diameter in plano circuli cuius GH est diameter in spera. At vero MN erit diameter in plano circuli cuius KL est diameter in

- 11 AEZQ] A et Q Bθ Ev Vπ; ACZQ Eδ; AE et Q Nα; AEQ Mq Pq; AERQ Wβ; AE ZQ Pλ; AT ZQ Lβ
 AGIR] ACZI Cε; AG et Pλ; AGI et Nα; AGIT Pγ; AGN Bθ Ev Pq Vπ; AGU Cι; AGZR Dγ Eδ
 Lζ Mλ Mv Mo Pτ Pv; GIR Wε₂ AHZ'Y] ABZY Xα; AH et P Pλ; AHY Bγ; AHYZ Wε₂; AKRI
 Nα ADX] ADR Bθ Ev Vπ Wβ; ADC Nα; ADLX Mq; ADY Lβ AFTV] *illeg.* Mu; AFCB
 Et Pτ; AFCN Bθ Ev; AFCV Bγ Eδ Eζ Mη Mv Mo Pv Vi Vπ Wε₂; AFQV Wι; AFTN Eα; AFTO
 Mλ; AFXV Mψ; ASTV Wα; ECTB Sκ ALSN] *illeg.* Mu; AFSV Eτ; AILV Wβ; AL et N Pq; ALBN
 Nα; ALNS Bθ Ev Vπ; ALSC Vι; ALSTI Mφ; ALSV Lβ Qβ Sκ; ALTV ALSN Pλ; IASV Eζ
- 12 eritque] et erit Mλ PX] *corr. from* punctus Bγ; pars Dγ; PS Bκ Lζ; per x Lβ Xβ;
 punctus Aα Bθ Cε Cη Eδ Eζ Eτ Ev Mη Mv Pγ Po Qμ Sκ Vπ Wι; PVS Pv; PY Wβ; PYS Mo
 diameter] diametri Dγ; *add. interlin.* circuli in plano scilicet Oτ(*later hand*) qui]
om. Qλ; et Qγ transibit] sibi Wα nam] *add. interlin.* prohat hoc Oτ(*later hand*)
 cum ... erit] cumlibet(?) IA Sκ; quolibet CI equalis IA ei Eτ sit] *om.* Cε ei]
 CB Xα et A erit] A ei Cε; A IA Nα; CA or EA erit Mu; CB erit Xα; et A ei Eδ; et IA ei Eδ;
 et IA erit Bγ; ex B scilicet BP et BA est Eα; ex erit Eα; IA ei Bθ Dγ Po Eζ Lζ Mλ Mv Pτ Pv Qμ
 Vβ Wβ; LA ei Aα Ev Vπ; TD et AB erit Xα A] *add.* vel ZA Pδ
- 12-13 cum ... BA] cuiuslibet ei φ equalis KL ei quoque PA equalis KL ei quoque PB equalis NA Pγ
 ei ... PB] *om.* Pq et ... equalis] *om.* Pλ erit quoque] eritque Mφ Wε₂
- 13 quoque] *corr. from* quousque Fζ PB] BA Vπ; PA Bθ Cε Cη Dη Eδ Eζ Ev Mη Mλ Mv
 Mψ Nα Po Pτ Pv Qμ Sκ Vβ Wβ Wι; PH Bκ Dγ Lζ BA] *illeg.* Sκ; BH Dγ; BQ Bε; VA Cη
 Mψ Vβ Wβ; NA Nα; *add.* equalis BA Bθ; *add.* P MN Cι Iterum] Idem *some*; Item *some*
 ZV] AB Cε; et B Ev Vπ; RN Nα; ZB Aα Bθ Pλ Pq Qμ ; ZN Cη Sκ; ZT Eα erit] *om.*
 Wι diameter] *add.* KL Pμ etiam] *om.* Vπ quoniam] qui Nα
- 14 ipse] *om.* Vπ dividit] *add.* per Cη per] *add.* alia Pγ; *add.* aliqua Aα Bγ Bθ Cη Sκ
 Vβ Vπ Wι Et IZ' erit] C E et erit et erit Nα; 7 z 7 erit [= et z et erit?] Qμ IZ'] *om.*
 Tδ; IT] *corr. from* et Bγ; A et z Cε; xz Eδ; yz Mδ Qδ; z Vβ; zz Aα Bθ Bκ Cη Dγ Eτ Ev Mη Mλ
 Mv Pλ Pq Sκ Vπ Wι; zz] *corr. to* zx Lζ erit] est eius Mv; *add.* me Pv plano
 circuli] planas circulus Nα circuli] circulo Mφ cuius] *add.* dyiameter Mδ
 GH] HGH Eδ; KL] *corr. in marg.* to GH Oτ
- 14-15 plano ... in₂] *om.* Pγ cuius ... circuli] *marg.* Bγ GH ... cuius] *om.* Aα Cη Eτ Sκ Wι
- 15 in₁] *add.* ipsa Qδ spera ... in₂] *om.* Pv At] ac *some*; A C Nα; A.T Vψ; et *some*; aut
 Pτ MN] MA Xα erit] eritque Mη KL] HL Eδ in₃] *add.* plano Xβ
- 15-16 At ... spera] *om.* Bθ

AEZQ, AGIR, AHZ'Y,⁸ ADX, AFTV, ALSN cross.

And PX will be the diameter of the equator which will pass through A; for since [the angle] is equal at it [i.e., P] and A, PB will also be equal to BA. Again ZV will be the diameter of the zodiac which will also pass through A since this very one [i.e., the zodiac] divides the equator in half. And IZ' will be the diameter in the plane of the circle whose diameter is GH in the sphere. Whereas on the other hand MN will be the diameter in the plane of the circle whose diameter is KL in

⁸ Two points are labelled "Z" in this chapter. To distinguish between them some manuscripts use two forms of the letter, i.e., the regular "Z" and an earlier form which looks like "Ç". I have chosen to simply label the second one as "Z'", i.e., Z-prime.

spera; eritque etiam arcus PQ similis arcui CE, uterque enim subtenditur angulo PAQ in circumferentia utriusque circuli existente; et PR est similis arcui CG propter eandem causam, et PO similis CK. Eodemque modo et propter eandem causam arcus XS erit similis DL, et XY similis DH.

20 Cum igitur aliquem circulum equidistantem zodiaco velis depingere in plano, si fuerit meridionalis a zodiaco, sume in equatore a puncto X versus A arcum unum

16 eritque] erit Bε Eα Eβ Eζ Fα Fβ Lγ Lε Lη Mδ Oζ Oξ Oτ Oυ Pα Pλ Pμ Pν Pρ Qβ Qγ Qλ Sδ Tδ Vι Wα Wε₂; eruntque Bγ Dγ; que Cε; *illeg.* Mυ etiam] *om.* Aα Bθ Cε Eα Eυ Mν Vπ Vψ; que Qδ arcus] *om.* Eυ Pα PQ] APQ Pτ; CP Wι; PBA or PHA Nα; PG Cε; *add.* per Mρ CE] DE Pγ enim] IZ Aα Bθ Eυ Vπ subtenditur] *corr. from* subtendiatur Bγ; sub cum dicitur Sκ; sub Dicitur Cη; subspenditur Cε angulo] *om.* Aα Bθ Eυ Pρ Vπ Wι; arcui Cε Cη Dγ Eδ Eζ Eτ Lζ Mη Mλ Mν Mo Pγ Pτ Pυ Qμ Sκ Vβ; *corr. from* arcui Bγ PAQ] PACI(?) Cε; PACR Mo; PIQ Pγ Sκ; PLQ Pα

17 utriusque] *om.* Fβ circuli] *om.* Eτ Pγ Sκ; oculi Aα; *add.* in circumferentia utriusque circuli Tδ existente] existens Bε Cι Eα Eβ Eη Fα Fβ Lγ Lε Lβ Lη Mδ Mυ Mφ Mψ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Qβ Qδ Qγ Qλ Tδ Vι Vψ Wα Wε₂ Xα Xβ; existenti Bγ Cη Cε Dγ Eδ Eζ Eτ Lζ Mη Mλ Mν Pγ Pο Pτ Pυ Sδ Sκ Vβ Wβ; existentis Dη Mo Nα et] etiam Qδ PR] per Pγ; PI Sκ; PN Mψ; PR et PV Eδ; PZ Wβ est] *om.* Eξ; ex Dγ arcui] *om.* Aα Bγ Cη Eδ Eζ Eτ Eυ Mλ Mν Pτ Pυ Qμ Sκ Vβ Vπ Wβ Wι; est Bθ CG] GC *some*; GO Fβ; GT Aα Bγ Bε Cε Cη Cι Eβ Eδ Eζ Eη Eτ Eυ Lβ Lγ Mδ Mν Oτ Pλ Pο Pτ Qγ Qμ Wι

17-18 CG ... similis₁] *om.* Nα Pγ

18 et₁ ... causam₂] *om.* Cε PO] *om.* Wβ; PPO Mν CK] EK Pυ Eodemque] *om.* Mυ; Eodem Eα Eβ Eη Lβ Mν Pν Pρ Pτ Qγ Qλ Tδ Wα; Eodem quoque Eζ propter] *om.* Eζ causam₂] *add.* et pone similis Pγ arcus] *om.* Mψ XS] ES Pγ; XB Mψ

19 DL] DQ Wι; DS Eυ; OL Wβ XY] ex Y Mη; GY Eβ; XI Mυ; XV Eυ; XZ Eα; ZY Eδ

19-20 similis ... zodiaco] *om.* Pγ

20 Cum igitur] Si Cε Dη igitur] *om.* Eυ Mν Mo; autem Pθ aliquem] aliud Wβ circulum] *om.* Aα Bγ Bθ Bκ Cη Dγ Eδ Eζ Eτ Eυ Lζ Mλ Mν Nα Pο Pτ Pυ Qμ Vπ Wι equidistantem] distantem Wι velis] vis *many*

21 fuerit] fuit Lβ equatore] *add.* et illius circuli Aα a₂] *om.* Eυ A] *om.* Eζ Fβ Lβ Wε₂; K Mψ A arcum] AR. Cum Pρ arcum] punctum Cε unum] unum unum Cε

21-22 versus ... ex] *om.* Dγ

the sphere; and in addition arc PQ will be similar to arc CE, for each is subtended by angle PAQ standing on the circumference of each circle; and PR is similar to arc CG for the same reason, and PO is similar to CK. And in the same way, and for the same reason,⁹ arc XS will be similar to DL, and XY similar to DH.

When therefore you wish to plot on a plane any circle parallel to the zodiac, if it be south of the zodiac, assume on the equator from point X towards A a single arc

⁹ It is possible, but I think not probable, that “in the same way” and even “for the same reason” could be part of the previous sentence.

25 equalem arcui composito ex declinatione zodiaci ab equatore, et illius circuli pingendi a zodiaco, ut est hic arcus XS qui componitur ex arcu XT, qui est declinatio zodiaci ab equatore, et arcu TS qui est declinatio illius a zodiaco. Postea in parte opposita, subtrahe declinationem zodiaci ab equatore de declinatione huius a zodiaco, si potes, ut hic arcum PQ de arcu OQ et residuum quod est PO sume a puncto P versus A. Quod si non potes subtrahere declinationem zodiaci ab equatore de declinatione huius a zodiaco, fac

- 22 pingendi] *om.* Oζ Pλ PQ; depingendi Qδ; *corr. from* periungenda Wε₂ arcui] *om.* Pλ PQ composito] *add. and del.* equalem Bγ ex] *om.* Vπ declinatione] *corr. from* delectatione Bγ
- 23 ut] et Pρ est,] *add. n* [enim?] Vπ XS] ex s Mη; NL Nα; X Cε Eα; XC Sκ; XG Pγ XI] ET Eη; QT Wβ; XC Mν Nα PQ; XX Bθ; *corr. from* TB Mψ qui] cui Cε
- 24 equatore] *add. et* illius circuli pingendi a zodiaco ut est hic arcus XS componitur ex arcu XT qui est declinatio zodiaci ab equatore Xα TS] BR Mψ; ST Aα Eζ Mη Qμ; TZ Eα qui ... subtrahe] que trahe Xα illius] eius Qδ; *add. in marg.* scilicet circuli equidistantis quem vis pingere Oυ illius a zodiaco] dedinatio zodiaci illius Vπ a] *om.* Bθ Lβ Pδ in] *om.* Pλ in parte opposita] *om.* Aα Bγ Bθ Bκ Cε Dγ Eδ Eζ Eυ Lζ Mη Mλ Mν Mψ Pο Pτ Pυ Qμ Vβ Vπ Wβ subtrahe] *add.* CE Et
- 24-25 et arcu ... equatore] *om.* Cη Eτ Pγ Wι; *marg.* Bγ Postea ... zodiaco] *om.* Nα
- 25 zodiaci] illius Mψ de] *om.* Eα Mδ Mν Pγ Pθ PQ; et Eζ huius] *add. in marg.* scilicet circuli pingendi Oυ a] *om.* Wβ potes] pones *corr. to* potes Bθ; potest Mδ hic] *om.* Mν Mφ Vι Wα Wε₂
- 26 arcum] *om.* Eδ Eζ Eτ Fα Mν Pγ Qμ Wβ Wι; *interlin.* Bγ Pο PQ] APQ Mρ PQ de arcu OQ] PQEL Eα; XQ Mψ OQ] CQ Qβ; EQ Fβ Lγ Lε Mψ Pα Pμ Qδ Qλ Sδ Tδ est] *om.* Nα PO] PEL Eα residuum] siduum Qβ sume] *om.* Eτ P] *om.* Cη Dη Eτ Pγ Wι; *interlin.* Bγ; B Vπ P versus A] *om.* Cε; A Mo
- 26-27 si non potes] *om.* Eτ Pγ; *add. va* ut hic arcum PQ de arcu OQ^{cat} Nα
- 27 subtrahere] extrahere Xβ declinationem] *add. et* Eβ Eη Oξ zodiaci] *add. et* Bε Eη Lβ Lε Lη Mδ Qγ Qδ Qλ Wα ab] *om.* Mν de] *om.* Cι Eη Mδ huius] eius Nα Vβ; *add. circuli* Bε(*interlin.*) Lβ Oζ Oτ Oυ(*marg.*) Pλ Pρ fac] fiat Mo
- 27-28 fac ... subtrahe] si potes, ut hic arcum PQ de arcu OQ et residuum quod est PO sume a puncto P versus A. Quod si non potes subtrahere declinationem zodiaci et ab equatore [*illeg.*] Eη fac ... de] *om.* Pγ fac ... zodiaco] *marg.* Bγ; *om.* Cη Eτ Eυ Mν Wι
- 27-29 fac ... equatore] *marg.* Bε

equal to an arc composed of the declination of the zodiac from the equator, and [the declination]¹⁰ of that circle to be drawn from the zodiac, as here it is arc XS which is composed of arc XT, which is the declination of the zodiac from the equator, and of arc TS which is the declination of that [circle] from the zodiac. Then, on the other side, subtract the declination of the zodiac from the equator from the declination of this [circle] from the zodiac, if you can, as here arc PQ from arc OQ and assume the remainder which is PO from point P towards A. But if you cannot subtract the declination of the zodiac from the equator from the declination of this [circle] from the zodiac, do

¹⁰ When speaking of circles parallel to the zodiac/ecliptic and of their distance from the ecliptic, one should really use the term “latitude” to distinguish it from the modern concept of declination (that is, vis-à-vis the celestial equator). However, I have kept the term “declination” in this chapter, to reflect the Latin.

30 e converso scilicet subtrahe declinationem huius a zodiaco de declinatione zodiaci ab equatore, et residuum sume a puncto P, non versus A sed versus partem oppositam; protrahe itaque AS et AO usque secent diametrum MBN in punctis M et N, eritque MN diameter circuli qui queritur.

Si autem ipse fuerit septentrionalis ab orbe signorum, sume declinationem compositam sub P in parte opposita, et differentiam duarum declinationum sub X si

- 28 e converso] Lβ Mδ Mv Mφ Vι Wψ Wε₂; e 9o *most* scilicet] *om.* Pq; videlicet Bκ Dγ Lζ huius] *om.* Mδ; EQ Mψ; *add.* circuli Lβ Oζ Oτ Ou(*marg.*) Pλ Pq zodiaco] Z Mψ de] *om.* Aα Eζ Mη Pθ Sκ; *interlin.* Mδ; a Mλ
- 29 residuum] *om.* Mv Mφ Qλ Vι Wα Wε₂ sume] *om.* Mδ; *add.* non Eα puncto] *add.* versus Pq p] *om.* Xα; x Mψ P non] P Mv Mφ Qδ Vι Wε₂; PV Eβ Fα Fβ Fζ Lε Lγ Lη Oξ Ou Pα Pμ Pν Qβ Qγ Qλ Sδ Tδ Wα; PV *corr.* to P non Oτ; PV non Pλ; per v Lβ; v Mδ non ... sed] *om.* Xβ sed versus] *om.* Bε Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mq Mv Mφ Oξ Ou Pα Pμ Pν Pq Qβ Qγ Qδ Qλ Sδ Tδ Vι Wα Wε₂; *add.* *interlin.* Oτ(*later hand*) oppositum] *add.* A Xβ
- 30 protrahe] PRHT Mq; subtrahe Xα; *add.* partem Eζ protrahe itaque] *om.* Mδ AS] AB or AL Mψ; AC Nα; has Pq AO] AC Pγ; OO Mψ usque] *add.* quo Bκ Dγ Eα Mλ Mo Mq Mψ Nα Pv Xα; *add.* quoque Vψ secent] recent Ev Pγ; sescent Eζ MBN] ZNBN Vψ in] a Mη punctis] puncto Aα Bγ Dη Ev Qμ Vπ M] *om.* Cε; CO Wβ eritque MN] *om.* Mδ; que OM Pγ MN] in N Wβ; OM Bθ Bκ Cε Dγ Eα Eζ Eτ Lζ Mη Mv Mo Pτ Pv Vπ Wι; OMN Qδ; ON Ev
- 31 qui] quod Cη Pq Wι
- 32 ipse] *om.* Cε Dη fuerit] *om.* Eα septentrionalis] at¹ol' Qλ signorum] *add.* *interlin.* id est zodiaco Oτ(*later hand*); *add.* tunc Pq sume] summe Aα; *add.* de Mv
- 33 compositam] *om.* Mv; oppositam Bθ Eα Nα Wι; postpositam Pγ compositam ... declinationum] *om.* Ev sub P] *om.* Mδ in parte opposita] *om.* Aα Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Lζ Mη Mλ Mv Mo Mψ Nα Pγ Pτ Pv Qμ Vπ Wβ Wι; *interlin.* Po opposita] oppositam or opposita M Cι et] secundum Wε₂ et differentiam] A et DM Xβ differentiam] *om.* Xα; *illeg.* Mψ duarum] 2 *some*; duarum duarum Cε Pq declinationum] *om.* Eα; *add.* duarum Xα X] decem Mη; R Wβ si] et Nα; *add.* in *marg.* Huic littere que dicit “sub decem si” continuat littera qui est in principio columne secundi folii quo littera sic incipit “declinatio zodiaci ab equatore” et est ibi consimilis crux. ✕ Mη¹¹

¹¹ In ms Mη folios 43v-44r contain a star list; the text continues on fol. 44v, marked with ✕. In the ms, *littere* and *littera* are written as *lictere* and *lictera*.

the opposite, that is, subtract the declination of this [circle] from the zodiac from the declination of the zodiac from the equator, and assume the remainder from point P, not toward A but toward the opposite direction; and so extend AS and AO until they cut diameter MBN at points M and N, and MN will be the diameter of the circle which is sought.

If however this were to be north from the circle of signs, assume the combined declination below P on the opposite side, and the difference of the two declinations below χ if

35 declinatio zodiaci ab equatore est minor, aut super si est maior, et protrahe lineas ab A ex diametro MBN et scindent diametrum IZ' circuli qui queritur, ut patet in hac figura.

- 34 zodiaci] *om.* M ρ ab equatore] *om.* W ϵ_2 minor] *bor* M ψ super] supra B κ L ϵ si] eum E α X α ; sei S δ ; *add. interlin.* scilicet declinatio V β protrahe] subtrahe C η E δ E ζ E τ M η M ν P γ Q μ W ι ; *corr. from* subtrahe B γ P θ lineas] linea E ν ab A] AB et KL V ψ A] equatore C ϵ ; *add. id est* F β ; *add. que* A α B κ L ζ M λ V β ; *add. que est* N α
- 35 ex diametro] *corr. from* que est diametro P θ ; que est diametrum C η E τ P γ ; que est diametro B θ D γ E α E δ E ζ E ν M η M ν P τ P ν Q μ V π W ι X α ; *add. tabii* P μ MBN] BMN M ψ ; in BN F β ; in MBN P λ ; MMBN P ρ et scindent] et cindent L β L ϵ L η O ξ P μ P ν Q β Q γ Q λ S δ ; descindent M θ ; rescindent B γ C η E α E τ P γ B θ D γ E δ E ζ E ν E ζ M λ M ν P θ P τ P ν Q μ V β V π W ι ; recindet A α Q δ X α ; rescindit M η ; scindet C ϵ IZ'] *om.* A α B θ B κ C ϵ E ν L ζ M η M ν M ϕ V ι V π W ϵ_2 ; duo / 2 M δ P α ; et etiam P ν ; et Z E δ M ν ; IT B γ ; RI N α ; secundum Q δ ; XZ P τ ; Z F α F β L β L η V β ; ZIZ M ψ ; ZZ / ZZ / ZZ C η E τ M λ P γ ; *add. interlin.* [illeg.] P θ qui ... figura] *illeg.* M ψ ut patet] utque P λ V π ; ut sufficient W ϵ_2 patet] *illeg.* W ϵ_2 ; satis B γ C η E τ ; satis patet P γ V β W ι patet ... figura] est hic D γ L ζ ; in figura apparet ue sequitur B κ ; supra patet M λ ; utque figura V ι hac] *om.* B γ C ϵ C η E α E δ E ζ E τ M ν M ν M ϕ N α O ζ P γ P ρ Q λ V β W α W β W ϵ_2 W ι X α X β ; sequenti D η ; subscripta P τ ; suprascripta P ν ; *add. presenti* F β figura]¹² *ms* L ζ *skips to Cap. 20*; in *ms* B κ *Cap. 18 is preceded by Cap. 20-22 and Cap. 19 is omitted*; *mss* M ψ W ι *end*; *add. et sequenti* P β ; *add. precedenti* P θ Q δ V β ; *add. presenti* E ν P ρ ; *add. sequenti* E α E η E τ Q γ ; *add. Explicit* A α (*ms* A α *ends*); *add. Explicit tractatus de compositione astrolabii secundum Messahalach* D η ¹³

¹² Ms W ϵ_2 continues with additional repetitive material.

¹³ Because of the non-standard order of the capitula in D η , this is the last capitulum of the *Compositio* and hence the explicit is written here.

the declination of the zodiac from the equator is less, or above if it is greater, and draw lines from A through [the ends of] the diameter to MBN, and they will cut off the diameter IZ' of the circle which is sought, as is clear in this diagram.

[FIGURA 18]

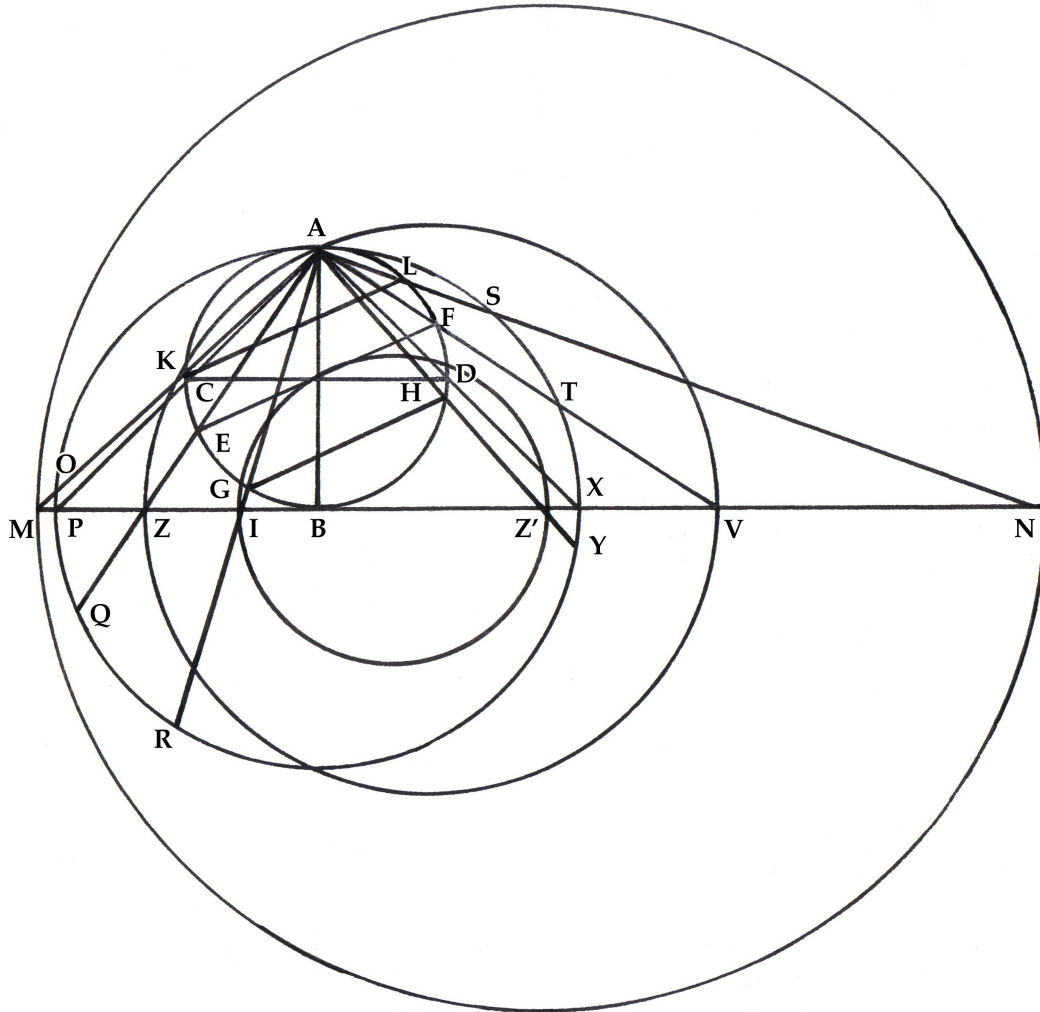


Figura inscriptionis in plano puncti in spere equidistantis zodiaco

[Complete diagram] Bγ Bε Bκ Cη Cι Eα¹⁴ Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mο
 Mρ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ¹⁵ Qβ Qγ Qδ Qλ Qμ Sδ Sκ Tδ Vι(fol. 334^r) Wβ Wι¹⁶
 Xβ

¹⁴ In ms Ea the circles in the sphere slope in the opposite direction from those in the normal diagrams, which throws off the lettering on the circles in the plane.

¹⁵ The diagram in ms Pv is the mirror image (left/right) of the normal layout of this figure.

¹⁶ The diagram in ms Wι is poorly drawn which leads to mis-lettering.

[*Partial diagram*] Mv Vβ

[*Outline, or space only*] Aα Bθ Dγ Dη Eζ Eu Lβ Mφ Pν Vπ Vψ Wα Wε₂

[*No space*] Cε Eδ¹⁷ Mv Mψ Nα Xα

Pθ: “R”

[*Caption*]

Figura ... zodiaco] Bγ Bε Cη Cι Eβ Eη Eτ Fα Fβ(*twice*) Fζ Lγ Lε Lη Mδ Mη Mo Oζ Oξ Oτ Ou Pα Pδ Pλ Pμ Pο Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Wβ Xβ; *om.* Bκ Lζ Mρ Vι; Figura inscribendi punctum equidistantem zodiaco in plano Wι; Figura inscriptionis alicuius puncti equidistantis zodiaco in alteram partem Pυ; Figura proiectione in plano cuiuslibet puncti circuli in sphaera equidistantis a zodiaco Eα; Proiectio in plano pluncti equidistantis ecliptice in spere Pγ; *add.* Figura capituli 18 Bε

in spere] *om.* Pμ Pο; in utrum partem Mλ

[*Lettering on the diagram*]

A] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι Xβ B] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι Xβ C] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη Mδ Mλ Mo Mρ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.* Fβ Oζ Pτ Qδ Xβ; *illeg.* Mη D] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.* Fβ Qδ Xβ E] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.* Oζ Xβ F] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; C Xβ G] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ; *om.* Pο Wι Xβ H] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.* Pρ Xβ I] Bγ Bε Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mρ Oζ Oξ Oτ Ou Pα Pδ Pλ Pμ Pο Pρ Pτ Qβ Qγ Qδ Qμ Sk Tδ Vι Wβ; *illeg.* Qλ; *om.* Xβ; Y Sδ; Z Mη Mλ Mo Pγ Pυ Wι; Z Bκ; *add.* R Eα K] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.* Pμ Pο Xβ; *illeg.* Mη L] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; V Xβ M] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Oζ Oξ Mρ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι Xβ; *cut off* Eα Mλ Mo N] Bγ Bε Cη Cι Eβ Eη Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Vι Wβ Xβ; *om.* Eτ Mη Pο Qδ Wι; *cut off* Bκ; S, V Eα O] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη Mδ Mη Mρ Oζ Oξ Oτ Pα Pδ Pλ Pρ Pτ Qβ Qγ Qλ Qμ Sδ Sk Tδ Vι Wβ Xβ; *om.* Eα Fβ Ou Pγ Pμ Pο Pυ Qδ Wι; *cut off* Mλ Mo P] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ

¹⁷ The diagrams in ms Eδ are unrelated to the text.

Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι Xβ Q] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη
 Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Wβ Wι Xβ; *om.* Eα Pγ
 Qδ Vι R] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mλ Mο Mρ Oζ Oξ Oτ Oυ
 Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Wβ Wι Xβ; *om.* Qδ Vι; *illeg.* Mη; N Pρ S] Bγ
 Bε Bκ Cη Cι Eβ Eη Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pο Pρ Pτ
 Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk¹⁸ Tδ Vι Wβ Wι Xβ; *om.* Eα Eτ Pγ T] Bγ Bε Bκ Cη Cι Eβ Eη Fα Fβ
 Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pο Pρ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ
 Vι Wβ Wι Xβ; *om.* Eα Eτ Pγ Pτ Pυ V] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη
 Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Wι; *om.*
 Xβ; T Eα X] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mο Mρ Oζ Oξ Oτ
 Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Sk Tδ Vι Wβ Xβ; *om.* Fβ; Y Pυ; Z Wι Y] Bγ
 Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη Mδ Mλ Mο Oζ Oξ Oτ Oυ Pα Pδ Pλ Pρ Pυ Qβ Qγ Qλ
 Qμ Sδ Sk Tδ Vι Wβ Wι Xβ; *om.* Fβ Mη Mρ Pγ Pμ Pο Pτ Qδ Z] Bγ Bε Bκ Cη Eβ Eη Eτ Fα Fβ
 Fζ Lγ Lε Lζ Lη Mδ Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pτ Pυ Qβ Qγ Qδ Qλ Qμ Sδ Sk
 Tδ Vι Wβ Xβ; *om.* Cι Mη Pρ; X Wι; *add.* Q Eα Z'] Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fζ Lγ Lε Lζ Lη
 Mδ Mη Mλ Mο Mρ Oζ Oξ Oτ Oυ Pα Pδ Pλ Pο Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Sk Tδ Wβ Wι Xβ; *om.*
 Fβ Qδ; R Bγ Pγ Vι; X Pμ

[Other information]

point A] add. oculus Lη; *add.* polus meridionalis videns Bκ Lζ Mλ Pμ Pο Pυ Wι *point B] add.*
 polus septentrionalis contingens planum Bκ Lζ Mλ Pμ Pο Pυ Wι; *add.* ad septentrionalem Xβ
line CD] add. equator Bκ Lζ; *add.* equator diei Mλ; *add.* equator in spera Xβ *line EF] add.*
 ecliptica Mλ; *add.* zodiacus Bκ Lζ Pο Pυ *line GH] add.* equidistans zodiaco in(*om.* Pο Wι;
 versus Bκ Lζ) septentrionalem Bκ Lζ Mλ Oξ Pο Wι *line KL] add.* equidistans zodiaco
 in(*versus* Bκ Lζ) meridionali Bκ Lζ Mλ Pο *line MBN] add.* planum Bε Cη Cι Eβ Eη Eτ Fα Fβ
 Fζ Lγ Lε Lη Mδ Mο Oζ Oξ Oτ Oυ Pα Pδ Pλ Pμ Pρ Pτ Qγ Qδ Qλ Qμ Sδ Sk Tδ Wβ Xβ *circle*
ACBD] add. circulus magnus transiens per polos Lζ *circle IZ'] add.* circulus equidistans
 zodiaco in plano Xβ; *add.* equidistans zodiaco septemtrionali Bκ Lζ Pμ Pο Wι; *add.* equidistans
 zodiaco in septemtrione Qγ; *add.* equidistans zodiaco septemtrionali in plano Mλ; *add.*
 equidistans zodiaco in septemtrione in plano Bγ Pυ; *add.* primus circulus equidistans zodiaco
 Bε(*later hand*); *add.* zodiacus Wι *circle MN] add.* circulus equidistans Mδ; *add.* circulus
 equidistans zodiaco Eβ Eη Lγ; *add.* circulus equidistans zodiaco in australis in plano Fζ Xβ; *add.*
 circulus equidistans zodiaco in(*versus* Oξ) austrum Fα Oξ; *add.* circulus equidistans zodiaco in
 austrum in plano Fβ Lε Lη Oζ Oυ Pα Pρ Pτ Qβ Qγ Qλ Qμ Sδ Tδ Wβ; *add.* circulus equidistans
 zodiaco in merdionem Pμ Wι; *add.* equidistans zodiaco meridionalis Bκ Lζ; *add.* equidistans
 zodiaco meridionalis in plano Mλ; *add.* equidistans zodiaco in meridiem Pο; *add.* equidistans
 zodiaco in meridiem in plano Pυ; *add.* equidistans zodiaco in austrum in plano Bγ; *add.* secundus
 circulus equidistans zodiaco Bε(*later hand*) *circle PX] add.* equator Bε Cη Eβ Eη Fα Lγ Lζ Lη
 Mδ Mο Oτ Pλ Pο Pρ Qβ Qμ Sδ; *add.* equator(*corr.* to zodiacus Fζ) in plano Bγ Cι Eτ Fβ Fζ Lε Mη
 Mλ Oζ Oξ Oυ Pα Pμ Pτ Qγ Qδ Qλ Sk Tδ Vι Wβ Xβ; *add.* equinoctialis in plano Pυ *circle ZV]*
add. zodiacus Bε Bκ Cη Eβ Eη Fα Lγ Lζ Lη Mδ Mο Oτ Pλ Pμ Pο Pρ Qβ Qμ Sδ Wι; *add.*
 zodiacus(*corr.* to equator Fζ) in plano Bγ Cι Eτ Fβ Fζ Lε Mη Mλ Oζ Oξ Oυ Pα Pτ Pυ Qγ Qδ Qλ Sk

¹⁸ In ms Sk, point S is on arc AV rather than on arc AX.

Tδ Vι Wβ Xβ *add. circle and circulus Cancrī Pv*

- [*Marginal note*] Eτ Fζ Mη Qδ Xβ
- CD equator in spera
- EF zodiacus in spera
- KL equidistantis zodiaco in spera australis
- GH equidistantis zodiaco in spera septentrionalis
GH] LH Mη
- PX dyiameter equatoris in plano
- ZV dyiameter zodiaci in plano
- MN dyiameter equidistantis zodiaco in austrum in plano
in austrum] austral' Qδ
- IZ dyiameter equidistantis zodiaco in septentrione in plano
IZ] ZZ FMη Qδ Xβ in plano] *om.* Xβ
- B polus septentrionalis in plano
in] in in Mη
- A polus meridialis videns super planum
meridialis] *add. and del.* in plano Eτ

[APPENDIX 18]

Mss Mσ, Vθ, and Wε, which contain only capitula 17 and 18, have such a significantly different version of this proposition (especially after line 10) that it needs to be given separately as a whole.

PROIECTIO IN PLANUM CIRCULI EQUIDISTANTIS ECLIPTICE

Si autem aliquem circulum in spera equidistantem ecliptice in planum proicere velimus, fiat sic. Circulus AB transeat per polos mundi, qui sint puncta A et B; punctus autem B qui est
5 colurus solsticiorum et plani scilicet linea MBN. Linea CD est diameter circuli equinoctialis, linea EF diameter ecliptice, linea GD diameter unius circuli equidistantis eliptice versus partem septentrionis, linea CH diameter unius alterius circuli equidistantis ecliptice versus partem meridiei. Unde uterque duorum arcuum CE et DF est declinatio ecliptice ab equinoctiali. Et arcus GC est maxima declinatio circuli cuius diameter est linea GD ab equinoctiali. Similiter arcus DH est
10 maxima declinatio circuli cuius diameter est CH ab equinoctiali.

Transeant ergo due linee a puncto A per extremitates dyametri equinoctialis scilicet per puncta C, D ad puncta in plano qui sunt M, Q. Eritque linea MQ diameter equinoctialis qui describatur circa puncto B et transibit per punctum A. Nam linee MB et QB erunt equales linee AB et sit circulus MAQO qui erit equinoctialis in plano proportionalis circulo equinoctialis in spera
15 cuius dyameter est linea CD.

Deinde a puncto A protrahantur due linee per extremitates dyametri ecliptice, scilicet per puncta E, F usque ad puncta K, L in plano quarum una est linea AEKY et alia linea AFXL. Eritque linea KL dyameter ecliptice qui dividatur per medium in puncto V et describatur circa idem punctum circulus transiens per puncta K, L qui etiam transibit per puncta A quare ipse dividit
20 equinoctialem per equalia et erit circulus KALO qui erit circulus in plano proportionalis ecliptice in spera cuius dyameter est linea EF.

Postea a puncto A protrahantur due linee per extremitates dyametri GD usque ad puncta in plano P, Q, dyameter circuli in plano proportionalis circulo in spera cuius dyameter est linea GD equidistans ecliptice. Dividatur ergo linea PQ in duo equalia in puncto R circa quem describatur circulus transiens per puncta P, Q qui erit circulus in plano proportionalis circulo in spera
25 equidistanti ecliptice versus septentrionem, scilicet cuius dyameter est linee GD.

Deinde a puncto A exeant due linee per extremitates dyametri CH ad puncta M, N in plano, eritque linea MN dyameter circuli in plano qui est proportionalis circulo in spera cuius dyameter est linea CH equidistans ecliptice. Dividitur ergo linea MN per medium in puncto X'

- 1 Proiectio ... ecliptice] *om.* Mσ Vθ 7 septentrionis ... partem] *om.* Vθ 11 A₂] *om.* Vθ
 equinoctialis] *add.* qui describatur eis Mσ 12 C] G Vθ 17 K, L] *om.* Wε
 AEKY] ACKY Vθ AFXL] AFR *or* AFX Wε¹⁹ 19 K, L] M, L Mσ; *corr. from* M, L Wε
 quare] quia Vθ 20 KALO] KAL Wε 21 est] *add.* enim Mσ 24 R] I Vθ
 29 X'] R Wε

¹⁹ The handwriting in Wε is such that it is difficult to distinguish an X from an R. The same is true at line 29.

30 circa quem describatur circulus transiens per puncta M, N qui erit in plano circulus proportionalis circulo equidistanti ecliptice versus meridiem, scilicet cuius dyameter est linea CH.

Est etiam arcus YZ similis arcui EG, uterque enim subtenditur angulo YAZ in circumferentia utriusque circuli existenti. Et arcus MY est similis arcui CE propter eandem causam. Et eodem modo arcus MZ est similis arcui CG. Et propter eandem causam arcus QX est similis arcui DF; et arcus XS est similis arcui FH; et arcus QS similis arcui DH. Exemplum productorum habes in sequenti figura.

32 EG] CG V θ 34 QX] QXL or QRL W ϵ 35 XS] ZB W ϵ DH] DK W ϵ
productorum] dictorum W ϵ habes] habebus cuidcuirz ac lunde(?) W ϵ

Mss M σ , V θ , and W ϵ also contain yet another version of this proposition.

ALIUD EXEMPLUM.

Sit ut prius circulus AB colurus solstitiorum transiens per polos mundi, qui sunt A et B, B autem contingens planum; et linea MBN est communis sectio circuli AB et plani. Linea CD est dyameter equinoctialis, linea EF dyameter ecliptice, linea GH dyameter unius circulorum equidistantium ecliptice eorum qui sunt ad partem septentrionis, linea KL dyameter alterius circuli equidistantis zodiaco qui est ad partem meridiei. Unde uterque duorum arcuum CE et DF est declinatio ecliptice ab equinoctiali; duo autem arcus GC et DH sunt due maxime declinationes circuli cuius dyameter est GH ab equinoctiali. Similiter duo arcus CK et DL sunt due maxime declinationes circuli cuius dyameter KL ab equinoctiali. Transeant ergo lineae AKOM, ACP, AEZQ, AGIR, AH et Y, ADX, AFTV, ALSN.

10 Eritque linea PX dyameter equinoctialis qui transibit per A; nam XB et BP sunt equales BA. Item linea ZV erit dyameter ecliptice qui etiam transibit per A quia ipse dividit equinoctialem per equalia. Et linea IZ' erit dyameter in plano circuli cuius linea GH est dyameter in spera. At vero linea MN erit dyameter in plano circuli cuius linea KL est dyameter in spera. Extractis igitur medietatibus quarumlibet dyametrorum in linea MBN figuratorum et descriptis circulis secundum exigenciam earundem, erit circulus PAX equinoctialis in plano et circulus ZAV ecliptica in plano. Et circulus IZ' est circulus equidistans ecliptice versus septentrionem et circulus MN erit circulus equidistans ecliptice versus meridiem. Est etiam arcus PQ similis arcui CE, uterque enim subtenditur angulo PAQ in circumferentia utriusque circuli existentis; et arcus PR est similis arcui CG propter eandem causam. Similiter arcus PO est similis arcui CK. Et propter eandem causam arcus XS est similis arcui DL. Et arcus XY similis arcui DH.

20 Cum igitur aliquem circulum equidistantem ecliptice velis depingere in plano, si fuerit meridionalis ab ecliptica, sume in equinoctiali a puncto X versus [A] arcum unum equalem arcui composito ex declinatione ecliptice ab equinoctiali, et illius circuli depingendi ab ecliptica, ut est hic arcus XS qui componitur ex arcu XT, qui est declinatio ecliptice ab equinoctiali, et arcu TS qui

5 partem] om. W ϵ 6 zodiaco] add. sive ecliptico W ϵ 9 AEZQ] AZQ W ϵ 10 ADX]
DX W ϵ 13 IZ'] I W ϵ 17 IZ'] I W ϵ est] om. V θ 19 PR] PQR W ϵ

est declinatio illius circuli ab ecliptica. Postea in parte opposita, subtrahe CE declinationem ecliptice ab equinoctiali de declinatione huius circuli ab ecliptica, si potes, ut hic arcum PQ de arcu OQ et residuum quod est arcus PO sume a puncto P versus A. Quod si non potes subtrahere declinationem ecliptice ab equinoctiali a declinatione huius circuli ab ecliptica, fac e converso, scilicet subtrahe declinationem huius circuli ab ecliptica de declinatione ecliptice ab equinoctiali, et residuum sume a puncto [P] non versus [A] sed versus partem oppositam. Protrahe itaque lineas AS et AO quousque secent dyametrum MBN in punctis M et N, eritque linea MN [dyametrum] circuli meridionalis equidistantis ecliptice qui queritur.

Si autem talis circulus equidistans ecliptice fuerit septentrionalis ab ecliptica, subtrahe declinationem compositam ex declinatione ecliptice ab equinoctiali et declinatione illius circuli depingendi ab ecliptica sub puncto P in parte opposita, sicut est hic arcus PQR qui componitur ex arcu PQ qui est declinatio ecliptice ab equinoctiali et arcu QR qui est declinatio ecliptice huius circuli ab ecliptica. Postea in parte opposita sume differentiam duarum declinationum, scilicet declinationis ecliptice ab equinoctiali et declinationis circuli depingendi ab ecliptica sub puncto X, ut est hic arcus XY qui remanet post subtractionem arcus ST qui est declinatio ecliptice ab equinoctiali ab arcu STX qui est compositus ex declinatione ecliptice ab equinoctiali, scilicet arcu ST, et declinatione huius circuli ab ecliptica, scilicet arcu TX. Et hoc si declinatio ecliptice ab equinoctiali fuerit minor quam aggregatum ex declinatione eodem et declinatione circuli depingendi ut hic fit. Si vero declinatio ecliptice ab equinoctiali fuerit maior quam declinatio circuli describendi ab ecliptica, sume differentiam earum super punctum X versus punctum T. Et protrahe lineas a puncto A ad dyametrum MBN et abscondent lineam [in Z'] et I qui erit dyameter circuli septentrionalis equidistantis ecliptice qui queritur, ut satis patet in hac figura.

29 a] *om.* Mσ Vθ 32 AO] AC Wε 34 ecliptice] *om.* Wε 36 depingendi] *om.* Wε
 37 ecliptice₁ ... ecliptice₂] *om.* Vθ QR] PR Wε 42 TX] TXV Wε 47 hac] *om.*
 Vθ hac figura] figuris precedentibus et sequentibus. Nota quod precedentes canones sunt extracti per [*illeg.*] Magistrum Johanem de Gmundia ex [*illeg.*] compositione astrolabii ipsius Messahalach qui sequuntur. Wε²⁰; *mss* Mσ Vθ *end*

²⁰ At this point ms Wε continues with the Wε₂ versions of capitula 17 and 18 as collated above.

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[CAPITULUM 19.] ALIUS MODUS FACIENDI AZIMUTH

5 Possunt etiam azimuth hoc modo fieri. Sint 3 circuli, ut prius: ABCD Capricorni; FGHI Arietis; LMNP Cancri. Accipe igitur a puncto H de quarta HG 48 gradus latitudinis ubi sit K; et tantundem ab F de opposita quarta FI ubi sit Q, et ubi linea a G in K protracta diametro AC occurrerit, sit R; ubi vero linea a G in Q protracta diametro AC occurrerit, sit S, quod est cenith. Deinde super diametrum RS divisum per medium in puncto X

- 1 *om.* Cε Dγ Eα Eδ Eζ Ev Nα Pγ Po Qμ Rα Sβ Xα; De alia inscriptione azimuth Bε(*add.* Capitulum 19); De azimuth aliter inscribendis Bγ; De azimuth(acimuth Bθ) faciendis Bθ Vπ(*add.* Rubrica); De azimuth perficiendis Mη Pυ; De secundo modo faciendi azimuth Dη; De 2^o modo inscribendi azimuth Vβ; Secundus modus inscribendi(describendi Wβ) azimuth Eτ Fβ(*add. in marg.* Modus inscribendi azimuth) Mv Mv Vι Wβ
faciendi] inscribendi Mλ Pτ azimuth] azimut Oζ; azymuth Mλ; *add.* est talis Cη; *add.* et suff' Mλ; *add.* Rubrica Lβ
- 2 Possunt] Post Mv; Post hoc Qδ etiam] autem Tδ azimuth] *om.* Ev; azymuth *throughout* Mλ hoc modo] huius modi Vψ fieri] *add.* oportet Qδ Sint 3] Sintque Vπ 3] *om.* Qδ; 3^s Bε; tres Eδ Mo Mq Nα Pγ Pq Tδ Vψ; 93 Cε; 2 Pτ; duo Mη prius] *add.* scilicet Bε ABCD] ab eo Pγ
- 3 FGHI] *marg.* Bε a] et Ev H] HK Bθ Ev Qδ Vπ; hic Cε de quarta] diei quarta Eζ; de 14 Cη Mv Pγ; e 4^a Vπ; ex Bθ Ev quarta *and elsewhere*] 4^a many HG 48] HG XG *corr. to* HKG Pq HG ... de] *om.* Cε 48] ea Pγ; E 8 or E G Xα 48 gradus] 4 DX Nα latitudinis] *om.* Mo
- 4 ubi₁] ut Bγ Bθ Cη Eα Eδ Eζ Eτ Ev Mη Mv Pγ Vπ ab F] ABF Mv Sκ; ABF *corr. to* ab F Oτ; BF Cη; ab F quarta *corr. to* ab FGI Pq; A B T Nα F] C Bθ de] *om.* Pδ Pq opposita] *add.* de Mv Mφ Vι; *add.* scilicet Qβ de ... G] *marg.* Lε quarta] *interlin.* Bε quarta FI] si Cε FI] *om.* Vψ; FR Dγ Xα; *illeg. corr. to* scilicet Pq ubi₂] nisi Pγ; ut *corr. to* ubi Sδ Q et₂] quare Cη Mv; quia Sκ; QR Pγ ubi₃] I ibi Nα a G] AG *several*; a AG Pγ K₂] H Qδ; HK *corr. to* K Sδ protracta] proiecta Mv
- 5 occurrerit₁] decurrit Bγ Cη; decurrerit Wβ sit₁] *add.* ibi Tδ; *add.* S quod est cenith Lγ sit₁ ... sit₂] *om.* Xα R] I Xβ; *add.* punctus oppositus cenith Pδ R ... sit₂] *om.* Bθ Cε Dγ Eτ Fζ Mη Nα Pα Pγ Qβ Sδ Vπ Vψ; *marg.* Oτ ubi vero] et Ev vero] autem Bε a G] AG *several* in Q] *interlin.* Bε; *add.* and del. per Wα Q protracta] *om.* Eη protracta] in Bε occurrerit₂] *add.* sit R et linea a G in Q diametro protracta AC occurrerit Qδ
- 6 s] *add.* per zenith s Qδ quod est] *om.* Pγ quod est cenith] *om.* Sβ est] *om.* Bθ Eτ Ev Mv Pυ Qμ; *interlin.* Bγ Po Vβ; scias esse Dγ Rα Xα cenith *and elsewhere*] zenith Bε super] *om.* Bε Eη Oζ Pλ Pq diametrum] *interlin.* Bγ; *om.* Cη Eτ Pγ RS] HRS Dγ; IG Pγ; IS Pμ Pυ Wβ; RG Bθ Ev; VS Xβ; YS Nα divisum] divisi Cη Pγ; divisi Mv; *ms* Xα ends x] s Pγ; 4 Wβ

[CHAPTER 19.] ANOTHER WAY OF MAKING AZIMUTHS¹

And again, azimuths can be made in this way. Let there be 3 circles, as before: ABCD, the [Tropic or circle] of Capricorn; FGHI [the circle through the beginning] of Aries; LMNP [the Tropic or circle] of Cancer. Therefore take from point H, in the quarter HG, 48 degrees of latitude² where K is; and in the same way from F in the opposite quarter FI where let it be Q, and where the line extended from G to K meets diameter AC, let it be R; indeed, where the line extended from G to Q meets diameter AC, let it be S, which is the zenith. Then on the diameter RS divided in half at point X

¹ This method (among others) of drawing azimuths has been studied by J. L. Berggren in “Medieval Islamic Methods for Drawing Azimuth Circles on the Astrolabe,” *Centaurus*, 34 (1991), 309-344. It is what he has called “An Anonymous Method” (pp. 330-333) found in our text and in the writings of al-Sijzī and al-Bīrūnī.

This method is also given by Abū ‘Alī al-Ḥasan al-Marrākushī (p. 332) who introduces some errors, one of which (dividing individual “quadrants” [SG, GR, RI and IS] into equal parts rather than dividing the whole circle, or the two semicircles, into equal parts) is copied here at lines 12 and 13.

See also Samsó, *On Both Sides*, pp. 429-430. Samsó notes (p. 430) that “these two chapters [i.e., 19 and 20] pose the problem of the source used: neither al-Sijzī nor al-Bīrūnī seem to have been known in the Islamic West, and al-Marrākushī’s *Mabādi’*, a work written in Egypt which shares a common error with the *De compositione*, was never accessible in a Latin or Hebrew translation. The method probably derives from an unknown source or was actually used by astrolabe-makers. Whatever the case, it is also in the treatise by Rudolf of Bruges.” [Notes refer to Julio Samsó, “al-Bīrūnī in al-Andalus,” in Josep Casulleras and Julio Samsó, eds., *From Baghdad to Barcelona: Studies in the Islamic Exact Sciences in Honour of Prof. Juan Vernet* (Barcelona: Instituto “Millàs Vallicrosa”, 1996) 2: 583-612, reprinted in Samsó, *Astronomy and Astrology in al-Andalus and the Maghrib* (Aldershot: Ashgate-Variorum, 2007), VI; and Richard Lorch, “The treatise on the astrolabe of Rudolf of Bruges,” in Lodi Nauta and Arjo Vanderjagt, *Between demonstration and imagination. Essays in the history of science presented to John D. North* (Leiden: Brill, 1999), p. 90.]

² Latitude 48°N passes through Orléans, Munich/München and Vienna/Wien.

- describe primum azimuth, et sit eius ea pars que incidit in circulum horizontis manifesta; reliqua vero quasi occulta quia postmodum delebitur que necessario transibit per puncta G, I sicut orizon. Cumque divideris per medium semicirculos SGR, RIS in punctis Z, O, eice lineam ZO longe in utramque partem transeuntem necessario per centrum X. In illa enim invenies centra reliquorum azimuth hoc ordine. Divides, scilicet portionem
- 10
- 7 describe] describere Qδ; inscribe Eδ; scribe Ea; *add. and del.* in circulum Vπ ea] *om.* Nα Sβ; EA Sκ; illa Dη Eβ Fa Fβ Fζ Lβ Ly Le Lη Mδ Mv Mφ Oξ Ot Pa Pl Pμ Pv Pq Qβ Qγ Qλ Sδ Tδ Vι Wα Xβ; *add. interlin.* illa Mq Po que] quem Vπ; qui Mv incidit] cedit Bε; incedit Bθ; scindit Le Tδ in] *om.* Ea Eβ Ev Mv circulum] circulo *some* manifesta] in anima Cη Eτ; manifestam Dγ
- 8 vero] *add.* manifesta Eδ quasi] *om.* Wβ; 9 Cε; Q Cη Eτ Fζ quia] Q Cη Eτ; que Nα postmodum] postea Dη; postea modum Nα que] quod Bθ; *add.* ut Mv Vι; *add. and del.* ut Mφ necessario] acto Pθ transibit] *om.* Mv
- 9 G, I] G Vψ; G, R Pγ Tδ; S, I Wβ sicut] *add.* z Ra Cumque] *illeg.* Eη; Consequenter Bγ Bθ Dγ Ea Eδ Eζ Mv Nα Pγ Po Pτ Pv Qδ Qμ Ra Sβ Vβ Vπ; Con[sequente]r Cη Eτ Mη Mλ; Cum Vψ Cumque divideris] *om.* Lβ divideris] divisio Bγ Bθ Cη Dγ Ea Eτ Ev Mλ Mv Pγ Pτ Qδ Sβ Vβ Vπ; desens Qλ per medium] *om.* Pv semicirculos] semicirculis Bγ Bθ Dγ Ea Mλ Pτ Pv Qδ Sβ Vβ(*interlin.*) Vπ; semicirculi Eζ Eτ Mη Mv; semicirculi *corr.* to semicirculos Po SGR] OGR Mη; SGE Vι; SR Bε Eδ SGR, RIS] *om.* *and lacuna* Sκ; SGIRIS Mv; SGRI Mo; SGRNS Vβ RIS] *om.* Pμ Pq; RS Cε; NS Nα; RXIS Ev; RYS *corr.* to RIS Tδ; VH *corr.* to RIS Po; SV Wβ; XIS Bθ; *add.* ipsas Ea in punctis] *om.* Mv
- 10 Z, O] *om.* Pq; et O Dγ; R, O Nα eice] *om.* Pδ; *illeg.* Pv; ehice Xβ; eijce Pq; proice Bε Pv eice lineam ZO] *om.* Oζ ZO] *om.* Bθ Cη Eδ Eτ Ev Mη Po Qμ; et O Dγ; RO Nα longe] *om.* Cη; longam Bγ(*interlin.*); in punctis Mδ in] *om.* Eβ Qδ necessario] *om.* Dη centrum] punctum Cε Dη Mo x] x. [Fβ Qλ; R Nα; Y Bθ Ev Vπ Wα; 4 Pγ Wβ
- 10-11 transeuntem ... enim] proiecta Oζ Pv
- 11 In ... enim] *illeg.* Eη; In alia enim Nα; In illa Pv; In illa enim N Mv; In illa enim scilicet linea longe in utramque partem eiecta Qγ; In illa enim scilicet linea longe in utramque partem proiecta Ot Pμ; In illa enim sicut linea longe in utramque partem proiecta Bε; In illa etiam Pθ; In illa linea N Pτ; In illa N Fβ Mη Mv Qλ Wβ; In illa N scilicet linea longe in utramque partem proiecta Fζ Ly Oζ Oξ Pq; In illa scilicet linea longe in utramque partem eiecta Lβ; In illa vero Cε Mo Mq; In illa vero linea Dη; In illis enim scilicet linea longe in utramque partem proiecta Qβ Sδ; In linea N Cη; In linea N illa(*interlin.*) Bγ; In scilicet linea ZO illa enim Sκ; Scilicet in illa V Wα; Scilicet linea ZO XI illa N Cι; *add. interlin.* scilicet linea Vβ; *add. in marg.* scilicet linea longe in utramque partem eiecta Ov invenies] *om.* Pτ; *illeg.* Eη; *add.* 4 Eδ; *add.* omnia Ea Eζ centra] *om.* M; centrum Bθ Ev Qδ Vπ; *add. interlin.* 9 Bγ Divides] divide Bε Le Mδ Mv Oζ Ov Pv Vπ scilicet] *om.* Fβ Pq portionem] positionem Xβ

draw the first azimuth, and that part of it which falls on the circle of the horizon should be visible; the rest, however, as if hidden (because afterwards will be deleted) which necessarily will cross beyond points G, I, just as the horizon. And when you have divided the semicircles SGR, RIS in half at points Z, O, extend line ZO in length in each direction, necessarily passing through centre X. For in that [line] you will find the centres of the remaining azimuths in this sequence. You will divide, that is the portion

15 primi azimuth que est RI, in 9 partes equales; que licet sit maior quarta, tamen gerit potestatem quarte circuli. Similiter etiam divides portionem IS in 9 partes equales; que licet actu sit minor quarta, imposita tamen est quarta et prima nona ab R sit RT, secunda TY, tertia YZ', quarta Z'X' ita quod ubi lineae a puncto S, quod est cenith, ad

- 12 primi] *om.* Mo azimuth] *om.* Cε que est] *om.* Eη; scilicet Bε RI] *om.* Pq; *interlin.* Po; 12 Cη Wβ; 15 Bθ Dγ Ev; I Vι; IRG Bε(*marg.*); IZ Vψ; IZ/13 Eτ; NS Nα; RS Pτ; RZ Pγ; XI Mq 9] novem *some*; *illeg.* Pγ; 0 Mv; 4 Eτ; 41 Cη; et Nα partes] *om.* Pq equales] *add.* ita quod Pτ que licet] que I3 Bθ Cε Cη Ev Lη Pμ Vπ Xβ; q I3 Bε(*add. interlin. licet*) Eα Eβ Eδ Eζ Eη Fα Fβ Lγ Mv Oζ Oξ Oτ Ov Pα Pγ Pθ Po Pv Qβ Qγ Qλ Sδ Vι Wα Wβ; quilibet Lε Mo Mv Nα Qδ; q libet Mη Pv Pq Pτ Tδ sit] *om.* Fζ; *interlin.* Oξ maior] *illeg.* Pλ quarta] *om.* Cε; *interlin.* Bε Eη; *add.* in potentia Eα Pδ tamen] *om.* Pα Tδ; T *corr. in marg. to* tamen Ov; cum Cε Qβ Qδ Vπ; *add.* circuli Dη gerit] geritur Bθ Vπ
- 13 potestatem] partem Ev; vicem Dη Similiter] super Vψ divides] *om.* Qβ; dividat Bε portionem] positionem Xβ IS] IG Bθ Ev Pv; RIS Bε(*interlin.*) 9] novem *a few* equales] *om.* Dγ Rα Sβ
- 13-14 tamen ... quarta₁] *om.* Bγ Cη Eτ Pγ
- 14 que licet] et I3 Fβ; I3 Cε Eδ Eζ Mη Mv Pθ Pτ Qλ Sκ Wα Wβ; licet Bθ Cι Eα Ev Fα Mλ Nα Pδ Po Pv Qμ Vβ Vπ Vψ; q/que I3 Eβ Fζ Lβ Lγ Lε Lη Oζ Oτ Pα Pμ Pv Qβ Sδ XβI (q) I3 *corr. in marg. to* (q) licet Ov; que libet Pq Tδ actu] acta Pv Qβ Sδ; actū Fβ; ac^u Eα; arcu Cι imposita] impotens Dη; impotentia Bθ Dγ Mλ Mo Mv Mφ Nα Pδ Pτ Pv Sκ Vβ Vι Vπ est] *add.* maior Qλ Sβ Wα nona] *om.* Pτ; *corr. interlin. to* nota Pλ ab R] ab BR Cη; a B2 Wβ; A.B.R Nα Sκ Vψ; a puncto R Tδ RT] IR Vψ; RS Pτ
- 14-15 et ... Z'X'] *marg.* Ov
- 15 secunda] 2^a *many*; a Nα TY] TN Pτ; TP Sκ; TU *corr. to* TV Pv; TV Bγ Bθ Cε Dγ Eζ Mλ Mv Nα Qγ Rα Vβ Vπ; TX Cη Qδ Sβ Wβ; Y Pγ TV ... Z'X'] *illeg.* Pv tertia] 3^a *many* tertia YZ] *om.* Cη; tertia VY Bγ(*marg.*) tertia ... Z'X'] tertia quarta ZY, YZ Wβ YZ'] *corr. from* YT Po; RY Nα; VI Cε; VR Pγ; VX Sβ; VY Bθ Dγ Eζ Ev Mη Mλ Mv Pτ Pv Qμ Rα Vβ Vπ; VZ Qγ; X Wα; Y Qδ; YR Sκ quarta Z'X] *om.* Eτ Pγ quarta ... est] Nono YR [*illeg.*] quod nisi lineae a punctos op[*illeg.*] Nα Z'X'] *illeg.* Eη; *corr. from* YZ Po; IZ Cε Mv; x7 Sβ; YZ Bγ Bθ Cη Dγ Eζ Ev Mη Mλ Pθ Pτ Pv Qμ Rα Vβ Vπ Vψ; ZC Xβ; *add.* 5^a Dη; *add. interlin.* et deinceps Bγ; *add.* et sic de aliis Mo ita quod] idque Eα; *add.* 3 Qδ; itaque Xβ ubi] *om.* Lη Mo; videlicet Vπ S] SOZ Eδ; scilicet Pλ; scilicet P Qδ; supra Mη quod est] *om.* Cε

of the first azimuth which is RI,³ into 9 equal parts; though it [RI] is greater than a quarter, nevertheless it carries the weight [or value] of a quarter of a circle. Similarly you will also divide the portion IS into 9 equal parts; though it is less than a quarter as drawn, nevertheless a quarter is assigned, and the first ninth from R should be RT, the second TY, the third YZ', the fourth Z'X' so that the centres of the other azimuths will be set where lines from point S, which is the zenith,

³ This is erroneous; the entire semicircle SIR (or the entire circle) should be divided into equal parts, rather than just the individual "quadrants" (SG, GR, RI and IS). The same error is repeated in the next line. The text is following the lead of al-Marrākushī who appears to have introduced the error. See Berggren, "Medieval Islamic Methods," p. 332.

partes tantum nonas ducte, scilicet ad secundam, quartam, sextam, octavam, et deinceps pretermisiss in partibus diametrum primi azimuth tetigerint centra reliquorum azimuth statuentur; et omnes per S cenith circuietur ita ut partes eorum horizontem vel circulum Capricorni excedentes minime figurentur. Et sic invenies ad dextram centri x 8 centra secundum numerum eorundem; ac parem a se distanciam similiter facies ad sinistram

- 20
- 16 partes] pares Pδ Vβ; partes pares Xβ tantum] tm many nonas] corr. interlin. to notas PA; notas PQ ducte] deducta Bγ; deducte Bθ Cε Cη Dγ Dη Eα Eδ Eζ Eτ Ev MΛ Mv Mo Nα Po Pτ Pv Qδ Qμ Rα Sβ Vβ Vπ Wβ; ducte corr. to deducte Pγ scilicet] om. Nα PQ Sκ secundam] 2^{am}/2 many; om. Vψ quartam] 4^{am}/4 many; add. gradus Ev quartam ... octavam] 4^m 8^m corr. in marg. to quartam, sextam, octavam Bγ sextam] 6^{am}/6 many; om. Pγ Po Pτ; add. primi azimuth Pμ sextam, octavam] om. Mv octavam] 8^{am}/8 many; 8^{am} corr. to 6^{am} octavam Po et] add. sic Wβ deinceps] inceptus Pδ
- 17 pretermisiss] premissis Vψ partibus] add. et ubi Mo diametrum] triametrum Pv; add. tre Po tetigerint] tetigerit many; tangerit Sδ; add. ibi Mo tetigerit ... azimuth₂] om. Ev centra] centrum Nα reliquorum] aliquorum Xβ
- 18 statuentur] statuent Nα; statuenture Cη omnes] add. partes Bε Dη Eβ Eη Fα Fζ Lβ Lγ Lη Mδ Mφ Oζ Oξ Ou Pα Pλ Po(interlin.) Pρ Pv Qγ Qδ Qλ Tδ Vι Wα Xβ per ... partes] marg. Ou per S] partes Mo S] om. Pρ; interlin. Pθ; G Mv Oτ Qμ; 6 Nα; 8 Cη; octo Mη cenith] om. Bγ Cη Eδ Eζ Mη Mv Oτ Qμ circuietur] illeg. Bε Mv; circinentur Mo Mφ Rα Vψ; circiuntur Nα; circuietur Cι; circulentur Bγ; circumentur Pθ; continentur Dη Mφ ita] om. Fβ Sκ; infra Vψ ut] om. Mv; quod Cε Dη; add. Qquod Po vel] per Bγ circulum] circolorum Lβ
- 19 excedentes] extendentes Nα minime] medie Eα sic] sicut Pδ; super Vψ ad dextram] ad extram Vπ centri] om. Eη x 8]⁴ illeg. Bγ; x Bε Xβ; x C Nα; x G Lβ; x S Cε Pρ Vψ; x [Cι Eη Fβ Pδ Pθ Sκ Vβ; x [.8 Eα; x S.x.8 P; x 9 Mφ; IG Bθ; 18 Cη Eτ Ev Mv Pγ Vπ; 48 Mδ; 4 [Wβ centra] centrum Vψ; add. ita Cε
- 20 eorundem] eorum Bε Xβ ac] AC Dη a se] om. Bε Cη Eη Vβ Wβ; interlin. Bγ; A S E Dη; ad se Mv [accusative]; si se Xβ parem] partem Pθ Po Pτ Vπ Vψ a] ad Vψ similiter] sic Mv Mφ Vι
- 20-21 ad ... facis] om. Xβ

⁴ The phrase “x 8” (i.e., “... centre [point] x, eight centres ...”) causes a great deal of scribal confusion. Sometimes “x” becomes “10” (and combines with “8” to become “18”) and sometimes “8” becomes “S” which sometimes is written as “[” which can be read as “scilicet”. As seen in the apparatus, further confusion and misreadings (e.g., “x” is read as “4”) can also occur.

drawn only to nine parts [i.e., points]⁵ (that is to the second, fourth, sixth, eighth, and so on) will have touched [i.e., intersected] the diameter of the first azimuth in the omitted parts [i.e., the area of plate below the horizon]; and all [the azimuths] will circle through S, the zenith, such that parts of them extending beyond the horizon or the circle of Capricorn are minimally drawn. And so you will find to the right of centre X eight centres according to the number of the same; and in like manner you will create to the left of X an equal distance from them.⁶

⁵ That is to 9 of the 18 points of division along the semicircle RS. This produces azimuths spaced 10° apart.

⁶ This sentence contains problems of strict translation and interpretation. However, the sense is that one constructs on the right of X a mirror image of what is on the left of X, that is, a set of centres on which you would construct the rest of the azimuths.

X. Et nota cum facis divisionem quartarum per 9 ubi quelibet nona continet 10 gradus quod cuilibet none licet essent inequales contingent 10 gradus et exhibunt inde azimuth continentis 5 gradus; et si fieret divisio quartarum ad 20 exirent azimuth ad 10 gradus in subdupla proportione.

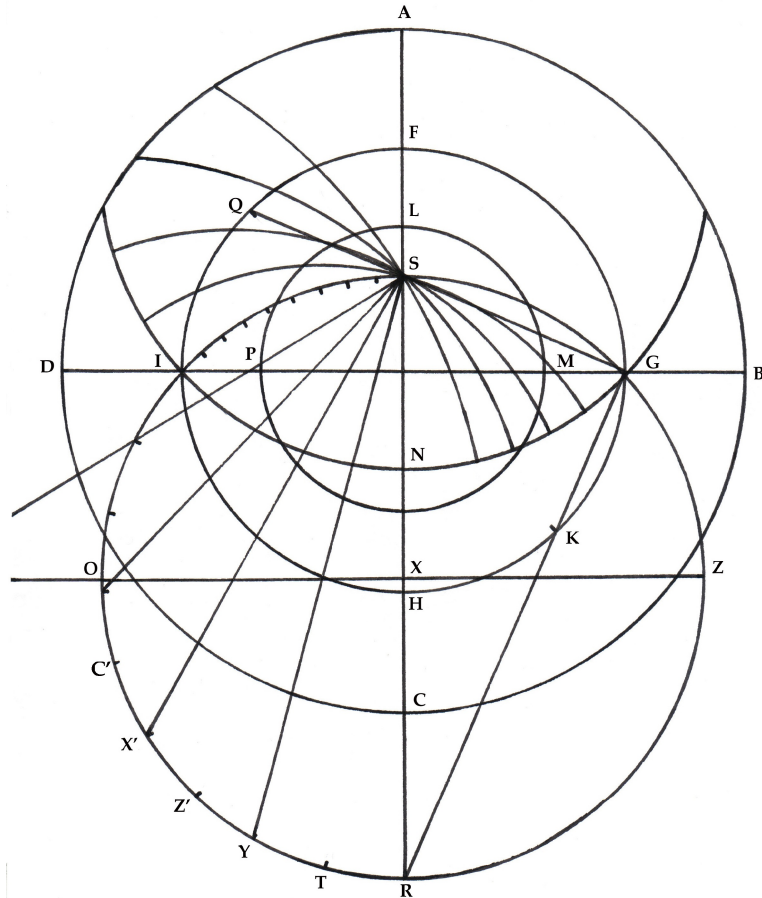
- 21 x] 10 Bθ Cη Eτ Mν Pγ Po Vπ Wα Wβ; 4 Oξ; R Nα; .x[. Eα Pδ Pθ Sκ Vβ; *add.* maior et nō reliqua vero quasi occulta quia postmodum delebitur que necessario transibit per puncta G, I sicut horizon Fβ(*repeat of ll. 9-10*) nota] nota nota Eδ; nota quod Bε Cη Eτ Pγ Vβ(*interlin.*) Wβ; nota quod *corr. to* nota Bγ nota cum] cumque Fβ facis] fecis Bε Cε Dγ Eν Mλ; facies Lε Mφ Qλ Vι Wα; facis *corr. from* facies Eζ; feceris Bθ(*add. ad*) Dη Fβ Mo Mν Nα Pτ Pυ Qδ Vβ Vπ(*add. ad* per 9] *om.* Mη; 90 Pγ 9] 90 Cη Eτ ubi] ut Cε; *add. vero* Bθ Vπ nona] *om.* Fζ Oυ; nota Vπ; *add. and del.* quelibet Qλ; *add.* quelibetque Wα continet] habet Bθ Eν 10] x *many; illeg.* Pτ
- 22 quod] vel Xβ quod ... gradus] *om.* Bγ Cη Eδ Eζ Eτ Eν Lβ Mη Mν Pγ Po Qμ Vζ cuilibet] quilibet Nα none] novene Dγ Mλ Rα essent] sint Eα contingent] *om.* Cε; attingent Sκ 10] x *several* exhibunt] exirent Mφ Vι
- 23 et ... gradus₂] *om.* Eτ Pγ si] similiter Mν fieret] facies Mν; ect Eα exirent] exierent Qλ; exiret Cη; exuent Lβ; *corr. from illeg.* Po 10] 20 Nα; *add. ad* Qμ gradus₂] *om.* Eα
- 24 in subdupla] sub duppaci Nα proportione] *add. exemplic* sic Eδ; *add.* Explicit Po Mη Rα; *add.* Explicit gradus in subdupla proportione expli[cit] Eζ; *add.* semper Bγ; *add. in marg.* ut patet in figura Po; *add.* ut patet in hac figura. Explicit Sβ

And note, when you divide the quarters by 9 where any ninth contains 10 degrees, that though they are unequal to any of the nine⁷ they will extend 10 degrees, and azimuths containing 5 degrees will then be produced; and if the division of the quarters into 20 [degree segments] were made, azimuths of 10 degrees would be produced, in a half proportion.⁸

⁷ Since the text contains a mathematical error, the divisions of the semi-circle are not equal; those in one “quarter” segment will be larger than those in the other “quarter” segment. While they represent divisions of 10 degrees on the sphere, in fact they are drawn larger or smaller than 10 as a result of being projected on the plane.

⁸ The text is re-iterating the fact that the spacing of the azimuths are half of the degrees in the divisions of the first azimuth. Thus dividing the first azimuth into “10-degree” segments will produce azimuths representing 5 degree spacing; and dividing the first azimuth into “20-degree” segments will produce azimuths representing 10 degree spacing.

[Figura 19]



Secundus modus inscribendi azimuth⁹

[Complete diagram] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mλ¹⁰ Mv Mo Mq

⁹ Since the text incorporates the error of dividing each of the two “quadrants” (SI and IR) into 9 parts, rather than the whole semicircle SIR into 9 (or 18) parts, the drawing of all the azimuth lines becomes virtually impossible (the radii of the circles become extreme as one approaches S along the semicircle SIR). Therefore I have followed the medieval scribes in drawing only a few of the lines from S and a few of the azimuths. Note: the diagram reflects the text and not the correct means of drawing azimuths.

¹⁰ The diagrams in mss Mλ and Rα are, for the most part, reversed left/right. The divisions are numbered similar to ms Pv. The lettering in Mλ and Rα is not listed in the apparatus criticus.

Mv(fol. 409^r) Oζ Oτ Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ¹¹ Qμ(fol. 155^v) Rα¹² Sδ Tδ Vβ
Vi(fol. 333^v) Xβ

[Partial diagram] Σκ Wβ

[Outline, or space only] Bθ Dγ Dη Eζ Eυ Λβ Μφ Πν Σβ Vπ Vψ Wα

[No space] Cε Eδ¹³ Nα Oξ

Pθ: "S"

[Caption]

Secundus ... azimuth] Bγ Cι Eβ Eη Eτ Fβ Fζ Λγ Λε Mη Mν Oτ Oυ Πα Πδ Πτ Πυ Qβ Qγ Qδ Qλ Sδ
Tδ Xβ; om. Mv Πλ Πο Vi; Al' modus azimuth Mθ; Figura inscriptione azimuth Πμ; Figura secundi
modi inscribendi azimuth Vβ; Primus aliorum modorum faciendi azimuth Eα; Secunda figura
inscriptione azimuth Mλ/ 3^{us} modus imponendi azimuth Bε(add. Figura capituli 19ⁱ)

inscribendi] om. Cη Fα Λη Mo Mδ Qμ; faciendi Oζ Πγ Πρ

[Lettering on the diagram]

A] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πμ
Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ B] Bγ Bε Cη Cι Eα Eη Eτ Fα Fβ Fζ Λγ Λε Λη
Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πρ Πτ Qβ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; om. Qγ; cut
off Eβ; D Πμ Πο Πυ C] Bγ Bε Cη Cι Eα Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ
Oτ Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; faint but legible Eβ D]
Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πρ Πτ
Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; B Πμ Πο Πυ F] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Λγ Λε
Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi
Xβ G] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ
Πδ Πλ Πμ Πο Πρ Πτ Qβ Qγ Qδ Qλ Qμ Tδ Vβ Vi Xβ; I Πυ; s corr. to G Sδ H] Bγ Bε Cη Cι Eα Eβ
Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ
Qλ Qμ Sδ Tδ Vβ Vi Xβ; om. Eη I] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν
Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; G Πυ K]
Bγ Bε Cη Cι Eα Eη Fα Fβ Fζ Λγ Λε Λη Mδ Mo Oζ Oτ Oυ Πα Πγ Πδ Πλ Πρ Πτ Qβ Qγ Qδ Qλ Tδ Vβ
Vi Xβ; om. Eτ Mη Mν Mρ Mv Πμ Πο Πυ Qμ; faint Eβ; H corr. to K Sδ; add. latitudinis gradus Πρ
L] Bγ Bε Cη Cι Eα Eβ Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ
Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; om. Eη M] Bγ Bε Cη Cι Eα Eβ Eη Fα Fβ
Fζ Λγ Λε Λη Mδ Mo Mρ Mv Oζ Oτ Oυ Πα Πγ Πδ Πλ Πρ Πτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; om.
Eτ Mη Mν Πυ; P Πμ Πο N] Bγ Bε Cη Cι Eα Eβ Eη Fα Fβ Fζ Λγ Λε Λη Mδ Mo Mρ Mv Oζ Oτ
Oυ Πα Πγ Πδ Πλ Πμ Πο Πρ Πτ Πυ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vi Xβ; om. Eτ Mη Mν Πα O] Bγ Bε
Cη Cι Eα Eη Eτ Fα Fβ Fζ Λγ Λε Λη Mδ Mη Mν Mo Mρ Mv Oζ Oτ Oυ Πα Πδ Πλ Πμ Πο Πρ Πτ Πυ

¹¹ The diagram in ms Qλ is very faint, perhaps because it was drawn in a different colour of ink. The lettering is barely readable, and the lines and circles have almost disappeared.

¹² See above, note 10.

¹³ The diagrams in ms Eδ are unrelated to the text.

Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vι Xβ; *faint* Eβ; *om.* Pγ P] Bγ Bε Cη Cι Eα Eβ Eη Fα Fβ Fζ Lγ Lε
 Lη Mδ Mo Mρ Mu Oζ Oτ Ou Pα Pγ Pδ Pλ Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vι Xβ; *om.* Eτ Mη
 Mν; M Pμ Po Pv Q] Bγ Bε Cη Cι Eα Fα Fβ Fζ Lγ Lε Lη Mδ Mo Oζ Oτ Ou Pα Pγ Pδ Pλ Pρ Pτ
 Qγ Qδ Qλ Vβ Vι Xβ; *om.* Eη Eτ Mη Mν Mρ Mu Pμ Po Pv Qβ Qμ Sδ Tδ; *faint* Eβ R] Bγ Bε Cη
 Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mν Mo Mρ Mu Oζ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ
 Qδ Qλ Qμ Sδ Tδ Vβ Vι; *om.* Eα Mη; X Xβ S] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ
 Mη Mν Mo Mρ Mu Oζ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vι Xβ;
add. zenith Pρ X] Bγ Bε Cη Cι Eα Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mν Mo Mρ Mu Oζ Oτ Ou
 Pα Pγ Pδ Pλ Pμ Po Pρ Pv Qβ Qγ Qδ Qλ Qμ Tδ Vβ Vι Xβ; *faint* Eβ; H Pτ; H *corr.* to X Sδ Z Bγ
 Bε Cη Cι Eα Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mδ Mη Mo Oζ Oτ Ou Pα Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ
 Qλ Sδ Tδ Vβ Vι Xβ; *faint* Eβ; *om.* Mν Mρ Mu Pγ Qμ

[*Lettering of the divisions of the first azimuth (arc RI)*¹⁴]

om. Cη Eα Eη Mη IZ'Z''X'V Pv TOVZ' Pγ TVY Vβ TVYZ' Bγ TVYZ' C' Pμ
 TVYZ' Z'' Po TYZ'[*illeg.*] Eβ TYZ'CX' Pα TYZ'EC' Fζ TYZ'X' Mu Pλ Pρ Pτ
 Qδ TYZ'X'C' Cι Fα Fβ Lγ Lε Lη Mδ Mρ Oζ Pδ Qβ Qγ Qμ Sδ Tδ TYZ'X'C' G Oτ
 TYZ'X'E X'β TYZ'X'F Vι TYZ'X'R or TYZ'X'C' Bε TYZ'X'σ Ou TYZ'X'Z'' Eτ
 Mv YZ'X'C' Mo

[*Other information*]

divisions of RI 1, 2, ... 7, 8 Pv¹⁵ *divisions of G to AC* 15, 30, ... 75, 90 Pv *divisions of I to B/D*
to A 15, 30, ... 75, 90 Pv *add.* Capricorni Pρ *add.* Arietis et Libre Pρ *add.* circulus
 Cancri Pρ *centre of equator/tropics* *add.* E Qμ

¹⁴ The arc RI of the first azimuth is not always divided into 9 parts, nor are all the points of division necessarily lettered. As well the lettering generally extends from R to O only.

¹⁵ The divisions in ms Mλ are similarly numbered.

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[CAPITULUM 20.] ALIUS MODUS FACIENDI AZIMUTH

5 Alius modus faciendi azimuth levior et planior predicto: fac circulum Capricorni ABCD et equatorem diei EFGH super centrum I, et faciemus partem circuli emisperii BFHD et protrahemus diametros EG, HF orthogonaliter secantes se super I, sitque punctus K cenith capitum. Faciemus rursus posito centro in diametro AG in continuum

- 1 Alius ... azimuth] *ms* Gα *begins; om.* Bγ Bκ Cε Cη Dγ Eα Eβ Eν Gα Nα Pγ Qμ Rα Sβ Vχ; Capitulum de alio modo faciendi azimuth Bε; De 3^o modo faciendi azimuth Xβ; De 3^o modo inscribendi azimuth Vβ; Item de azimuth Pν; Item de azimuth scilicet aliter. Rubrica. Bθ Vπ; *add. in marg.* Capitulum 20 Bε; *add in marg.* 3^{us} modus inscribendi azimuth Fβ(*i.e., repeated*)
- before* Alius] *add.* Item Pμ; *add.* Sequitur Pν Alius] Sequitur tercius Mν; Tercius Dη Pδ Vι Wβ; 3^{us} Fβ Mν Ov Pq Pτ faciendi] *om.* Oφ Mq; conficiendi Pq; de Mλ; describendi Wβ; inscribendi Dη Fβ Mν Mν Pτ azimuth] azymut Mλ; azymuth Oφ; *add.* melius Pμ
- 2 Alius] *mss* Lζ Oφ Vχ *restart* faciendi] conficiendi Pq levior] *twice* Fζ et planior] *om.* Wβ planior] *corr. from* plenior Vι fac] faciemus Oφ circulum] *add.* emisperii Gα Capricorni] *om.* Mo
- 2-3 Capricorni ... circuli] *om.* Eν
- 3 et equatorem diei] *om.* Mλ diei] *om.* Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Eν Gα Mν Mo Nα Pγ Pτ Pν Sβ Vβ Vπ Wβ; *interlin.* Po; qui est Oφ Vχ EFGH] GFEH Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Gα Mη Mλ Mν Po Pτ Pν Rα Sβ Vπ Wβ; GFEG Pγ centrum] *om.* Vι I] *om.* Vπ faciemus] facies Eη; facies hijs Eα partem] *om.* Oζ Pλ Pq; *add.* per Cε Mλ circuli] circulum Pλ emisperii] *om.* Cη Eζ Mν Pγ; *interlin.* Bγ BFHD] BFCH Gα; BFGD Qβ; BHF D Pγ; BHFDO Mo; BSHD Pν Sκ; GHSHDO Cε
- 4 et ... HF] *marg.* Bε; *om.* Cη diametros] *add. interlin.* equatoris Bε EG] AG Bγ Bθ Cε Lζ Mη Mλ Mν Mo Nα Oφ Pγ Pτ Pν Rα Sβ Vβ Vπ Vχ; *corr. from* AG Po EG, HF] *om.* Eδ, Mδ; AGHF Gα Qμ; EG, GH, HF Qβ Sδ secantes] cecantes Eζ; tangisse Xβ se] *om.* Bθ Eν Gα sitque] *om.* Eν; scilicet Wβ κ] *om.* Wα; *marg.* Fβ; A Cε; *add.* punctus Bε Eβ Eη Fα Lβ Lγ Lε Lη Mδ Mq Oζ Oξ Oτ(*interlin.*) Ov Pλ Pμ Pq Qβ Qγ(marg.) Qλ Sδ Tδ Xβ
- 5 cenith and elsewhere] zenith Bε Nα Pq; *twice* Rα Faciemus] *om.* Cη; faciemusque Bε Oφ *add. interlin.* ~I uno altero circulo Bθ rursus] *add.* in Nα centro] *om.* Oζ Pq in₁] *om.* Eδ; *interlin.* Po in diametro] *om.* Nα AG] EG Bε Dη Eβ Eη Fα Fζ Lγ Lβ Lε Lη Mδ Oζ Oξ Oτ Ov Pα Pλ Pμ Pν Pq Qβ Qγ Xβ; G *interlin.* Gα
- 5-6 continuum directumque] continuum directum Bγ Cη Dγ Eζ Eτ Lβ Lζ Mo Po Pτ Xβ; continuum et directum Bθ Cε Dη Eν Mλ Mν Nα Pγ Pν Vβ Vπ; continuum et directumque Qδ; continuum et in directum Wβ; continuum in continuum directum Eδ; directum continuumque Pθ; motinum directumque Wα

[CHAPTER 20.] ANOTHER WAY OF MAKING AZIMUTHS

Another way of making azimuths,¹ easier [to execute] and clearer than the one mentioned above: make the circle of Capricorn, ABCD, and the equator, EFGH, on centre I, and we will make part of the horizon circle, BFHD, and we will draw the diameters EG, HF perpendicularly intersecting at I, and let point K be the zenith overhead. Again we will make – the centre positioned in diameter AG extended uninterrupted

¹ This method is the same as in Capitulum 19, only here the first azimuth is correctly divided into equal segments. As well the lines which are drawn to the division points (and which intersect with the diameter of the first azimuth circle) start not from the zenith point but from the projection of the point on the sphere diametrically opposite the zenith point.

For Samsó's comments on possible sources for this capitulum, see Cap. 19 note 1.

directumque protracta super punctum O circulum transeuntem per H, K, F puncta qui sit
 KFLMNH. Protrahemusque diametrum NL equidistantem HF in utramque partem
 quantum oportuerit; et dividemus semicirculum MLK per trinos et trinos vel quinos et
 quinos gradus vel denos et denos, prout volumus facere azimuth. Et punctum M, qui est
 10 punctus oppositus summitati capitum, coniungemus cum unaquaque illarum

- 6 directumque] directum Qμ punctum] *om.* Sβ O] C Mv; D Et H, K, F] *del.*
 Pq; HKP Nα qui sit] que sit Bκ Fα Lβ Lε Mδ Oτ Oυ Qλ Pμ Tδ; que sit sint Oφ; q sint
 Bε Pq Sδ; que sint Bθ Lη Qβ VψWβ; que sunt Qδ Vι Vπ; quid sit Mη; sit Ev; *add.* circulus
 Bγ; *add. interlin.* scilicet circulus Vβ
- 7 KFLMNH] KAFLMNH Nα; KFBMNH Gα; KFCLMNH Eυ; KFELMNH Vπ; KFLMN Fα; KFLVMH Eτ;
 KFMNH Pγ; azimuth Wβ; *corr. from* KLFMNH Pθ Protrahemusque] Protrahemus Vπ;
 Protrahemus quocumque Lβ; Protrahemus quoque Eβ Fα Fβ Fζ Lγ Lε Lη Mq Mυ Mφ Oζ
 Oξ Oτ Oυ Pα Pλ Pμ Pν Qβ Qγ Qδ Qλ Sδ Tδ Vι Wα Wβ Xβ diametrum] *om.* Eη Oφ
 NL] *om.* Pq; ^NL Vχ; vel Pγ equidistantem] equidistanter a Vβ; equidistantes Nα
 HF] HG Mδ; *ms* Bδ starts in] *om.* Cε; M Nα
- 8 quantum] quam Cη Dγ; qucm(!) Mv oportuerit] obtuerit Pγ; *add. interlin.* que sit
 NOL Pq semicirculum] circulum Bθ(*add. interlin. semi*) MLK] BMN Gα; LMK Eα;
 MKK Mv; MKL Cε Mυ Vψ; MLB Eδ; MTK Bδ trinos et trinos] tercios et tercios Fα;
 ternos et ternos Dη et trinos] *om.* Cε Fζ Pλ Pq Qμ; gradus Vχ et trinos ...
 quinos.] *om.* Vι vel] *om.* Pν; *add.* per Cε Dη Pθ
- 8-9 trinos ... denos₂] ternos gradus vel quinos aut denos Oφ; 3(tres Dγ; trinos Bγ(*interlin.*) Mo
 Mq Rα Sβ Vβ) vel(et Mq; *add.* per Gα Po) quinos(q Nα) gradus vel denos(10 Nα) Bγ Bθ
 Bκ Cη Dγ Eδ Eζ Eτ Eυ Gα Lζ Mη Mλ Mν Mo Mq Nα Pγ Po Pτ Pυ Qδ(*add.* et dinos) Rα Sβ
 Vβ Vπ Wβ; trinos et quinos vel quinos et trinos gradus vel duos Sκ et quinos] *om.*
 Pμ et₃ ... gradus] *om.* Qμ Vχ
- 9 gradus] 6^a Bδ vel₂] *add.* per Cε et denos] *om.* Bδ Cε Cι Eα Pδ Qμ Vχ Vψ
 prout] per ac Xβ; secundum quod Oφ Vχ; ut Qδ facere] *om.* Vπ Et
 facere] *om.* Gα M] *om.* Bγ Bδ Eη Eυ; *interlin.* Bθ
- 10 punctus] *om.* Eυ; punctum *some* oppositus] oppositum *some*; *add. interlin.* zenith seu
 Bε capitum] capitis Vψ cum] *om.* Eη unaquaque] una quarum Mλ;
 utraque Dη illarum] *om.* Sβ; illa Cε; aliarum Mυ Mφ Qλ Vι Wα

and straight – a circle on point O passing through points H, K, F which is to be [circle] KFLMNH. And we will draw diameter NL parallel to HF in both directions as much as it ought to be; and we will divide semicircle MLK by 3 at a time and 3 at a time or 5 at a time and 5 degrees at a time or 10 at a time and 10 at a time to the extent that you wish to make azimuths. And we will connect point M which is the point opposite to the high point overhead with each of those

divisionum usque ad lineam LN, sintque linee producte MP, MR, MS, MT, MY, MZ, MF'.²
 Post hoc posito centro super puncta P, R et cetera describe circulos transeuntes per
 punctum K, qui est cenith caputum; et illi, si perficerentur, transirent per punctum M qui
 est oppositum cenith caputum; quare cum per opposita transeant in spera erunt omnes
 15 ex circulis maioribus; horum autem circulorum solum facies partes apparentes supra

- 11 LN] HI Qδ; LM Bθ Ev Vπ; M Pγ sintque] sicque Nα; sicutque Sκ linee] *om.* Mo
 MP] *twice* Rα; in P Oζ; OP Mλ; RAP Pγ; *add.* MQ Bθ Bκ Dγ Lζ Mλ Oφ Vβ Vπ Vχ
 MP ... MF'] MQ MS ML MP MT Gα MR] *om.* Mv; MV Xβ MS] S Bδ MS ... MT]
 scilicet MF Bδ MT] *om.* Mv Mφ MF Bδ; *add.* ML Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Ev Lζ
 Mη Mλ Oφ Pγ Po Pτ Pv Qδ Rα Sβ Vπ Vχ; *add.* ML MV MX Qμ; *add.* MN Eτ; *add.* MR Cε; *add.*
 MU MV Mv; *add.* MV Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Lζ Mη Mλ Oφ Pγ Po Pτ Pv Rα Sβ Vβ Vπ
 Vχ Wβ; *add.* MV EM VX Ev; *add.* MX Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Lζ Mη Mλ Mv Mφ Oφ Po
 Pτ Pv Rα Sβ Vβ Vπ Vχ MY] MX Eα Pγ; *add.* Mζ MX Qδ MZ] *om.* Eα; HZ Eδ Eζ;
 MC Bδ; MX, MX MR Nα MF'] *om.* Sβ; MSF Bγ Bθ Bκ Cη Dγ Eδ Eζ Ev Lζ Mη Mλ Mv Oφ
 Pγ Po Pτ Pv Qμ Rα Vβ Vπ Vχ
- 12 Post hoc] *om.* Cε posito] opposito Mv Mφ Vι Wα super] sic Qγ puncta]
add. -que Cε P, R] *illeg.* Qμ; F,Z,Y Pφ; PFRS Dη; PM Mη; P,Q,R Bγ Bθ Bκ Cη Dγ Eδ Eζ Eτ
 Ev Lζ Mλ Mv Mo Nα Oφ Po Pv Rα Sβ Vβ Vπ Vχ; per a R Pγ; R,P,L,S,Q Gα et ceteris]
om. Fβ Gα describe] describes *many*
- 13 K] HIK Pγ qui,] que *some* caputum] *om.* Cε Ev Vπ illi] *om.* Mv; quidem Vχ;
add. *interlin.* que Vι; *add.* *interlin.* scilicet circuli Vβ si] 3 Xβ perficerentur]
 aperficerentur Eζ; superficierentur Vψ transirent] *marg.* Pτ; exirent Bθ Qδ Vπ;
 transiuntemrent Lγ punctum₂] *add.* K ... punctum (= *repeat of l. 13*) Wβ
- 14 est] *add.* punctus Cε caputum] capitis Mo; *add.* Glossa:(*om.* . Bκ) Et nota quod
 invenies circulum transeuntem per cenit et principium Arietis et Libre et erit priumum
 azimuth; et secundum quod deprimitur vel elevatur cenit secundum. Hoc oportet
 querere centrum illius in diversis locis in dyametro ita quod primum azimuth semper
 transeat per cenit et principium Arietis et Libre. Bκ Lζ quare cum] qui arcum Pγ
 cum] eam Pv per] *om.* Mλ Oξ Rα opposita] *add.* puncta Bε Bδ Bκ Cι Dγ
 Dη Eβ Eη Gα Lε Lη Mδ Mη Mλ Mv Mφ Mφ Oζ Oξ Oτ Ov Oφ Pδ Pθ Pμ Pv Pφ Qμ Rα Sβ
 Sκ Tδ Vβ(*interlin.*) Vψ Xβ spera] sui Oξ Pμ Qγ erunt] erit Eζ; eruntque Ev
 omnes] *add.* erunt omnes Eδ
- 15 ex] *om.* Gα; in Mη maioribus] *add.* T Oξ; minoribus *corr. in marg. to maioribus* Sδ
 autem] *om.* Qδ; de Wβ solum] solis Bθ Sκ supra] extra Fβ Mv Mφ Vι
 Wα; super Mδ Qγ

² Some manuscripts, including some early ones, give this point a double lettering, i.e., "SF" in both the text and in the diagram. The majority use an "F" which I mark as "F'" (F-prime) in order to distinguish it from the "F" which helps define the equator.

divisions right up to line LN, and let the extended lines be MP, MR, MS, MT, MY, MZ, MF'. Next, after positioning the centre on points P, R et cetera, draw circles passing through point K, which is the overhead zenith, and if they were completed [properly] they would pass through point M which is opposite the overhead zenith; therefore when they pass through opposite [points] on the sphere, they will all be from the greater circles;³ however, of these circles you will construct only the parts appearing above

³ I.e., “great circles” – circles on a sphere which pass through opposite points, usually, but not necessarily, the poles.

20 circumum emisperii usque ad circumum Capricorni, eruntque inter quoslibet duos ex
circulis illis tot gradus quot intercipientantur inter divisiones semicirculi KFLM. Cum
autem hoc feceris, sume de linea LN aperte 11 partes equales OF', OZ et cetera. Et
super illa puncta positis centrīs describe circulos transeuntes per K, eruntque illi
azimuth. In aliis duabus quartis factis similiter sicut priores totidem gradus inter se
intercipient quot priores, et hec est figura.

- 16 circumum₁] *add. interlin.* eius Vβ eruntque] eritque Eζ quoslibet duos] quos Wa
duos] 2 *many*; 3 Cη Eτ; *add.* circulos Dη ex] *om.* Vι
- 17 tot] quot Gα; *add. in marg.* similiter est q'n ymo mediatis tamen Sβ gradus] gradibus
Nα; *add.* similiter est q'n immo medietas tamen Gα Rα quot] quod Eη Mv Rα
intercipientantur] inter 2 puncbantur (!) Xβ inter] *add. interlin.* lineas Bγ
semicirculi] circuli Vψ KFLM] KFMS Cε Eα; KKN Sβ
- 18 hoc] *om.* Pγ; hec Eζ sume] sumte Wα linea LN] LME A LN Qλ Wα LN] LM
Eζ; M Gα; *corr. from* LM Po aperte] apparente Eδ; ex parte Pδ 11] *om.* Cε Fζ; EM
PQ; N⁴ Bγ Bδ Bθ Dη Gα Lζ Mo Mq Mv Mφ Oφ Pθ Pλ Po Pτ Qγ Qλ Sδ Tδ Vβ Vι Vχ Vψ
Wβ Xβ OF', OZ] *corr. from* OF OZ Oξ; D.F.O.R.O.[*illeg.*] Nα; GSF, GZ, GY Vχ; OF'OR MQ; OF',
OZ, OY Cι Eα Eτ Pδ Pθ Qδ Vψ Wβ; OSF, OZ Qμ; OSF, OZ, OY Bγ Bθ Bκ Cη Dγ Eδ Eζ Ev Lζ
Mη Mλ Mv Mo Oφ Pγ Po Pτ Pv Rα Sβ Sk Vβ Vπ; OSFO, ZO, Y Cε et cetera] *om.* Nα
- 19 super] similiter Mδ Qγ illa] *om.* Pγ; ista Nα centrīs] circinis Sβ describe]
describere Vψ K] H Pγ Vπ
- 20 aliis] illis Nα duabus] *om.* MQ; 2 / 2^{bus} *some*; C Pγ duabus quartis] 24 Pv
factis] fcīs Dγ Lγ similiter] sit Mv sicut] *om.* Qλ totidem] Dη Mv;
totidemque *all others*⁵
- 20-21 totidem ... priores] *om.* Lβ Qδ
- 21 intercipient] capient Cε quot] que Sκ; quod Mλ et ... figura] *om.* Vχ; et hoc
patet in figura Bε; et huius est figura que sequitur Eτ; et huius est figura(*add. interlin.*
inveniatis scilicet) antecedens Vβ; et patet in presenti figura Vι; ut apparet in hec figura
ultima Pτ; ut in supra figura Cε; ut patet in(*add. hac Bκ; add. predicta Dη*) figura Bκ Nα;
ut patet in figura supraposita Pv hec] hic / hoc *some*; huius Bγ Cη est] *add.* est
Oξ; *add.* precedens Lη figura] *add.* presens Fβ; *add.* supra Bγ Cη Dγ Eδ Eζ Gα Lζ Mλ
Mv Po; *add.* talis PQ; *add.* Explicitur compositio astrolabii cum [*illeg.*] nobilibus Gα⁶; *ms*
Gα ends

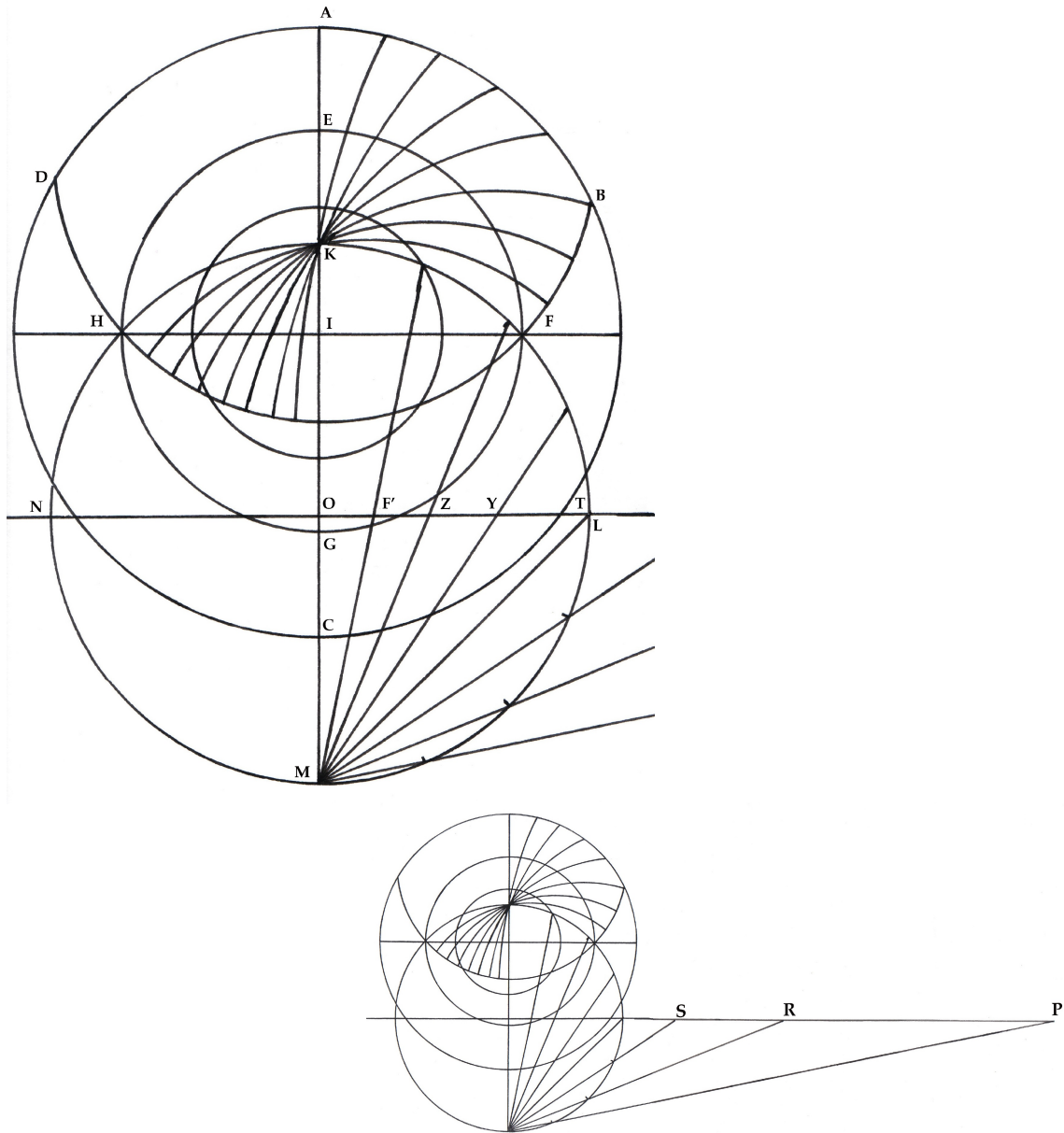
⁴ Whether a ms has "N" or "11" can be problematic since they tend to be written in almost exactly the same way. I choose to treat as "N" any reading which is marked off with dots, i.e., ".N." since this is a common way in which individual letters (signifying particular points) are indicated in the text in many mss.

⁵ The *-que* is redundant here.

⁶ Because of the ordering of the capitula in ms Gα, and this being the end of the text of the *Compositio*, the explicit is here.

the circle of the horizon as far as the circle of Capricorn, and there will be between whichever two of these circles as many degrees as were cut off between the divisions of semicircle KFLM. However, when you have done this, take from line LN clearly 11 equal parts OF, OZ and so on. And on those points taken as centres draw circles passing through K, and these will be the azimuths. In the other two quarters made similarly just as the previous ones they will separate off just as many degrees between them as the previous ones. and this is the figure.

[FIGURA 20]



Tertius modus inscribendi azimuth

[Complete diagram] Bγ Bε Bκ Cη Cι Eα Eβ (upside down) Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ
 Mη Mλ Mν Mo⁷ Mρ Mυ (fol. 409^r) Oζ Oξ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Rα Qβ Qγ Qδ Qλ
 Qμ (fol. 156^r) Sδ Tδ Vβ Vι (fol. 333^b) Xβ

⁷ The diagram in Mo is a combination of both Figura 20 and Figura 21. The lettering noted here is only that which relates to Figura 20.

[*Outline, or space only*] Bθ Dγ Dη Eζ Eu Lβ Mφ Pv Sβ Sk Vπ Wα Wβ
 [*No space*] Bδ Cε Eδ⁸ Gα Nα Vχ
 Pθ: “T”

[*Caption*]

Tertius ... azimuth] Bγ Eβ Fζ Lγ Le Mη Mv Oξ Pα Pδ Pλ Pτ Qλ Sδ Tδ Xβ; *om.* Mρ Mu Rα Vi; Alius figura de inscriptione azimuth levior et melius quam priores Pμ; Bona doctrina inscribendi azimuth Bκ Lζ; Figura de inscriptione azimuth Po; Figura inscriptionis azymuth melior Mλ; Figura inscriptionis azymuth secundum alium modum et bonum Oφ; Figura inscriptionis azimuth secundum 3^m modum Fβ(*twice*); Figura 3ⁱ modi inscribendi azimuth Vβ; Secundus aliorum modorum azimuth Ea; Tertius modus azimuth et est levioris Pv; Quartus(*corr. from* Tertius) modus imponendi azimuth Bε(*add. Figura capituli 20^{mi}*); Tertius modus Mρ

Tertius] 3^{us} *many*; Alius Eη Eτ inscribendi] *om.* Cη Fα Lη Mδ Oζ Oτ Ou Qγ Qμ; conficiendi Pρ; faciendi Pγ Qβ; imponendi Eη; scribendi Cι Qδ azimuth] *add. cum inscriptione lineae crepusculi et aurore Mo*⁹

[*Lettering on the diagram*]

A] Bγ Be Bκ Cη Ci Ea Eβ Eη Eτ Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mρ Mu Oζ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *cut off* Oξ B] ¹⁰ Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mλ Mρ Mu Oζ Oξ Oτ Ou Oφ Pα Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *om.* Eτ Mη Mv Pγ Qγ; S Mo C] Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mo Mρ Mu Oζ Oξ Oτ Ou Oφ Pα Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qμ Sδ Vβ Vi Xβ; *om.* Eτ Mη Mλ Mv Pγ Pδ Qλ Rα Tδ D] ¹¹ Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mρ Mu Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *om.* Eτ Mv; T Mo E] Bγ Be Bκ Cη Ci Ea Eβ Eτ Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mρ Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Xβ; *om.* Eη Mu Vi F] Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mλ Mo Mρ Mu Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Po Pρ Pτ Pv Qβ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *om.* Eτ Mη Mv Pμ Qγ G] Bγ Be Bκ Cη Ci Ea Eβ Eη Eτ Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mv Mo Mρ Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *om.* Mu H] Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mλ Mo Mρ Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vi Xβ; *om.* Eτ Mη Mv Mu I] Bγ Be Bκ Cη Ci Ea Eβ Eη Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mo Mρ Mu Oζ Oξ Oτ Ou Oφ Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pv Qβ Qγ Qδ Qλ

⁸ The diagrams in ms Eδ are unrelated to the text.

⁹ The caption in Mo reflects the fact that the diagram is a conflation of Figura 20 and Figura 21.

¹⁰ Many, if not most, diagrams have “B” twice, once at the end of diameter HIFB, and a second time where the arc of the horizon intersects with the Tropic of Capricorn (DHFB).

¹¹ Many, if not most, diagrams have “D” twice, once at the end of diameter DHIF, and a second time where the arc of the horizon intersects with the Tropic of Capricorn (DHFB).

Qμ Rα Sδ Tδ Vβ Vι Xβ; *om.* Eτ Mν K] Bγ Bε Bκ Cη Cι Eβ Eη Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη
 Mλ Mν Mο Mρ Mυ Oζ Oξ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Tδ Vβ Vι
 Xβ; *om.* Eα Sδ; O Eτ; *add.* zenith Pρ L] Bγ Bε Bκ Cη Cι Eα Eβ Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mν
 Mο Mρ Mυ Oζ Oξ Oτ Oυ Oφ Pα Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qλ Qμ Sδ Tδ Vβ Vι Xβ; *om.* Mη
 Mλ Pγ Qδ; N Rα M] Bγ Bε Bκ Cη Cι Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mο Mρ Mυ Oζ Oξ
 Oτ Oυ Oφ Pα Pδ Pλ Pμ Pο Pρ Pυ Qβ Qγ Qδ Qλ Rα Sδ Tδ Vβ Vι Xβ; *om.* Eτ Mη Mλ Qμ; *cut off* Eη
 Pτ; H Mν; N Pγ N] Bγ Bε Bκ Cη Cι Eα Eβ Eη Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mο Mρ Mυ Oζ Oξ Oτ
 Oυ Oφ Pα Pδ Pλ Pο Pρ Pτ Qβ Qγ Qδ Qλ Qμ Sδ Tδ Vβ Vι Xβ; *om.* Eτ Mη Mλ Mν Pυ Rα; *cut off* Pμ;
 M Pγ O] Bγ Bε Bκ Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mη Mλ Mν Mο Mρ Mυ Oζ
 Oξ Oτ Oυ Oφ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qδ Qλ Qμ Rα Sδ Tδ Vβ Vι Xβ

[*Lettering along line OL extended*]¹²

[O] F' Z Y T [L] S R P Bε Cη Eα Eβ Eη Fα Fζ Lη Oζ Oτ Oυ Pλ Pρ Qβ Qγ Qλ Qμ Sδ; [O] F' Z Y [L] T S
 Mδ; [O] F' Z Y T [L] Pα Pτ; [O] F' Z Y T [L] S R Oξ Pδ Qδ¹³; [O] F' Z X Y T [L] S Cι Lε Lγ; [O] F' Z Y [L] S T
 Tδ; [O] F' Z Y [L] T R Q Mη; [O] F' Z Y [L] T S V P Xβ; [O] F' Z Y T [L] S R Fβ; [O] F' Z Y V S Eτ; [O] F' Z Y X [L]
 T Pυ; [O] F' Z Y X [L] T S P Pμ; [O] F' Z Y X [L] T S R P Mο Mρ; [O] S F' Z Y T [L] S R P Mν; [O] S F' Z Y V [L] T S
 R Q P Oφ¹⁴; [O] S F' Z Y V T Mλ; [O] S F' Z Y X [L] T S Q Pο; [O] S F' Z Y X [L] T S R Bγ; [O] S F' Z Y X [L] V T Vβ;
 [O] S F' Z Y X V [L] T S R Bκ; [O] S F' Z Y X V [L] T S R Q Lζ; [O] Y X T [L] S R Q P Mυ; [O] Y X V T [L] S R Q P Vι;
 [O] Z' Z Y 7 V Pγ¹⁵; [O] Z X Y [*om.* L] T S Q Rα¹⁶

[*Other information*]

divisions of arc from H to line IG] 10, 20, ... 80, 90 Vβ *divisions of arc from H to IA*] 15, 30, ... 75, 90
 Rα *divisions of arc from F to circle of Capricorn (at B) to A*] 10, 20, ... 80, 90 Vβ *add.* Arietis
 et Libre, equator diei Pρ *add.* Cancrī Pρ *add.* Capricornī Pρ *add.* cenith Oφ
add. centrum Oφ *add.* circulus hemisperii Pρ *add.* oppositum cenith Oφ
add. quelibet azimut continet 7 gradus cum division Lζ

¹² Note in many cases the line and letters extending to the right run off the page or into the gutter where they cannot be seen. Occasionally the line OL extended is continued down at right-angles, with the letters along this extension. In any case, only the visible letters are recorded here.

¹³ In ms Qδ the lettering runs from O out to the left along line ON extended.

¹⁴ In ms Oφ the lettering is repeated, right to left, along line ON extended.

¹⁵ In ms Pγ arc MH is divided P R S T X L.

¹⁶ In ms Rα the lettering runs from O out to the left along the line ON extended.

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[CAPITULUM 21.] DE POSITIONE LINEE CREPUSCULI ET AURORE

Cum vis ponere lineam crepusculi et aurore, describe equidistantem orizontem sub eo ad partem puncti oppositi cenith capitum cuius latitudo ab orizonte sit 18 graduum ad tot enim gradus sole existente sub orizonte apparet lux solis. Illum autem hoc modo describes: fac circulum Capricorni ABCD, et Arietis et Libre EFGH super

- 1 De ... aurore] *om.* Bγ Bδ Cε Dγ Eα Eυ Pγ Pτ Rα Sβ Vχ Vψ Xβ Nα; Capitulum de compositione linee crepusculi et aurore Bε; De linea crepusculi Pυ; De linea crepusculi et aurore Oφ(*add. marg.* De compositione linee crepuscule et aurore); De linea crepusculi ponenda. Rubrica Bθ Vπ; Descriptio linee crepusculorum. Capitulum Wβ; Lineam de crepusculo Lζ; Modus inscribendi linee crepusculi et aurore Pμ; *add. marg.* Capitulum 21 Bε
- before* De] *add.* Capitulum Fβ; *add.* Sequitur de positione linee cpe. Pυ positione] impositione Dη Eη Oυ Pδ; inscriptione Cη Eτ Fβ Mυ Mo Vβ linee] *om.* Pθ; aglenee Po; linea Mυ crepusculi] crepusculusculi Mδ et aurore] *om.* Dη Eτ Mλ Mυ Pυ Vβ aurore] *add.* capitulum Mo Qβ; *add.* capitulum rubrica Cη; *add.* Rubrica Pθ
- 2 Cum] *add.* vero Bκ vis] volueris Oφ Vχ ponere] *om.* Dγ et aurore] *om.* Mλ Mo describe] *add.* circulum Bγ(*interlin.*) Eα equidistantem] *om.* Bθ Vπ orizontem] orizonte Pλ; orizonti Bγ Bδ Dη Eα Eτ Eυ Mυ Mo Oφ(*add. interlin.* a] orizontem) Vπ Vχ Xβ
- 3 eo] *add.* n (= enim?) Wα oppositi] oppositam Bθ cenith and elsewhere] cenit some; zenith Bε Pφ; zenith Nα capitum] capitis Vχ cuius] *corr. from* huius Qδ sit] *om.* Bγ Cε Cη Eδ Eτ Mo Pγ Po Pτ; *illeg.* Eη; est Bθ Eυ Mυ Nα Pυ Qδ Vπ; *add. interlin.* est Vβ
- 4 ad] *om.* Xβ tot] totidem Mυ enim] *om.* Mη Qμ existente] *om.* Bκ Dγ Eδ Eζ Lζ Mλ Mυ Oφ Po Rα Vχ; exeunte Pυ apparet ... solis] *om.* Wβ solis] *add.* notabilis Dη; *add.* in orizonte Cε; *add.* sub orizonte Bθ Cη Dγ Eδ Eζ Eτ Eυ Lζ Mλ Mo Nα Oφ Po Pτ Pυ Rα Sβ Vβ Vπ Vχ; *add.* super orizontem Bγ Mυ Pγ Qδ
- 4-5 autem ... modo] quem circulum sic Qδ; sic Eυ
- 5 hoc modo] sic Vπ modo] *om.* Bε Pλ describes] describas Eζ fac] facies Vχ circulum] circulos Mυ

[CHAPTER 21.] ON THE PLACING OF THE LINE OF TWILIGHT¹ AND DAYBREAK

When you wish to make the twilight and daybreak line, draw a parallel² to the horizon below it to the side of the point opposite the overhead zenith, whose latitude from the horizon should be 18 degrees; for with the appearance of the sun below the horizon at so many degrees, the light of the sun is visible. You will describe this, however, in this way: make the circle of Capricorn, ABCD, and of Aries and Libra, EFGH, on

¹ *Crepusculum* usually means evening twilight, but it can refer to both morning (*crepusculum matutinum*) and evening (*crepusculum vespertinum*). Here, in its singular form and differentiated from *aurora* (“break of day”) it would be evening twilight.

The captions of many of the diagrams (q.v.) use *linea crepusculorum*, which would cover both times of day. The twilight line functions for both – when the sun is approaching the horizon at daybreak and night fades, and when the sun recedes below the horizon at sunset.

² Obviously the twilight/daybreak line or circle is parallel to the horizon in the sphere, but not parallel (or concentric) when projected on a plane.

centrum I, quos quadrabis duobus diametris se ortogonaliter abscondentibus super I, sicut AC, DB; et sumes latitudinem regionis ab F versus E in equatore que sit KF; item ab H versus G, que sit HL, et ducantur linee FK, FL, que occurrant diametro AC, quantum expedit in continuum et directum protracte super puncta O, Q; divisaque linea OQ, describatur super punctum medium pars circuli THQFS, qui erit circulus emisperii. Post

- 6 centrum] *om.* Bγ Bθ Bκ Cε Cη Dγ Eδ Eζ Eτ Ev Lζ Mη Mλ Mo Nα Oφ Pγ Pτ Pv Qμ Rα Sβ Vπ Vχ; *interlin.* Po Vβ; centro Bδ Bε centrum I] *om.* Mv I] A Mv; LI Pv; S Mη quos ... I₂] *om.* Tδ quadrabis] dactabis Cε duobus] *om.* Cε; duabus *many*; 2 some; *add.* mabus/inabus Vπ se] *om.* Eδ Oφ abscondentibus] incidentibus Xβ
- 7 sicut] sint que Oφ Vχ AC, DB] AB, CD Bθ Cι Dη Eζ Nα Pτ Qδ Sk Vι Vπ; AB, DB Qγ; AD, CB Cη Eτ Mv; AD, CH Pγ Wβ sumes] si acc Nα latitudinem] longitudes Nα regionis] *om.* Cε Mo ab F] ABF Eζ Nα Qμ Sk F] *om.* Bδ E] AC Bθ; AE Ev; C Mv que sit] *add.* que sit Lβ KF] HF Cι item] *om.* Pγ; itemque Oφ Vχ; *add.* *interlin.* aI' et Vβ
- 7-8 que sit ... G] *marg.* Pλ; *om.* Pq Wβ ab H] ABH Qδ Sk
- 8 versus] usque Nα que₁] *om.* Bθ Cε Ev; quolibet Fβ HL] K Sk; *add.* *interlin.* et FK Pq et ducantur] ducanturque Vχ FK, FL] *corr.* from FH, FL Pλ; FK Wβ; FKL Bδ; FKKL Mo; FKSFL Dη; FLH, FL Vι; FLZ, FL Mφ que₂] qui Fa Lη Oζ Pμ Qβ Sδ; *add.* ut Mv Mφ AC] AE Cη Dγ Ev Lζ Mλ Po Pv Vπ; aI' AE Oφ; *ms* Vχ ends
- 8-9 quantum ... protracte] *om.* Dη
- 9 in] *add.* diametrum Pv et] *om.* Eζ directum] *add.* quia Oφ protracte] *marg.* Bγ; *om.* Cη Eτ Pγ; protracto Bδ; protracta Cε; protractate Nα; protrahe Bε Eβ Ev Fa Fβ Fζ Lβ Lγ Lε Lζ Lη Mδ Mv Mφ Oζ Oξ Oτ Ov Pa Pλ Pμ Pv Pq Qβ Qγ Qλ Sδ Tδ Vι Wα; *corr.* in *marg.* from protrahe Rα puncta] punctum *many* divisaque] divisa quia Vπ; *add.* per medium Xβ divisaque ... OQ] *om.* Bκ Eτ Sk Vψ OQ] *om.* Qμ; *interlin.* Bε; OK Nα; vq Pγ; *add.* in duo media Bδ Ea
- 10 describatur ... circuli] *erased and corr.* to describes circulum Pq super punctum] per Dη punctum]³ Bγ Ea Eδ Xβ; p^m Lζ; primum Bδ Bε Bθ Cε Cη Cι Dγ Eβ Eζ Eη Eτ Fa Fβ Fζ Lβ Lγ Lε Lη Mδ Mη Mλ Mv Mo Mv Mφ Nα Oζ Oξ Oτ Ov Oφ Pa Pγ Pδ Pθ Pλ Pμ Pv Po Pτ Pv Qβ Qγ Qδ Qλ Sδ Tδ Vβ Vι Vπ Vχ Wα Wβ; *add.* eius Ev pars] *om.* Eδ; S P Vψ THQFS] OHGFS Pq; TH et FS Vψ; THOFS Mη; THQFG Oζ Pλ; THQSF Ev Mv Vπ erit] *om.* Mv; erunt Ea

³ While in some manuscripts it is quite clear whether the scribe wrote *primum* or *punctum*, in others the abbreviation (e.g., *p^m*) could be interpreted as either word. However, it is clear from the sense of the sentence that whatever was written it should be *punctum*.

centre I, which you will make square by having the two diameters cut each other perpendicularly on I, as AC, DB; and you will assume the latitude of the region along the equator from F towards E, which should be KF; similarly from H towards G, which should be HL, and let lines FK and FL be drawn, which are to meet with diameter AC extended as much as is useful uninterrupted and straight at point O and Q; and after dividing line OQ part of circle THQFS should be drawn on the mid-point, which will be the horizon circle. After this

hoc sumantur ab K versus F et ab L versus G arcus 18 graduum qui sunt KM, LN.

Ductisque lineis FM, FN, occurrent lineae AC super puncta P, R; lineam ergo PR dividemus per medium et in puncto medio posito centro describemus partem circuli VRX, qui erit circulus equidistans orizonti, cuius ab orizonte latitudo erit 18 graduum et ipsa est linea crepusculi et aurore, cuius hec est figura.

15

- 11 hoc sumantur] sumant arcus 18 Bθ Vπ ab] *add.* puncto Tδ ab K] a K/AK *many*;
 ABK Cη Nα K] *om.* Pα F ... versus₂] *om.* Wβ ab L] ABL Cη Nα Pv Qβ Sκ Vψ
 arcus 18 graduum] *om.* Cε Mo graduum] *interlin.* Bγ Po; *margin.* Pτ; *om.* Bθ Eδ
 Eζ Ev Mv Pγ Sβ Vπ; *add.* arcus idem Ev sunt KM, LN] MKM LN Mη KM, LN] KM
 et LN *some*; KM, HI Sβ; KLM LN Mv Mφ V; KLMN Eδ Eη Fζ Nα; KM, M Eτ; KM, IN Pγ; *add.*
interlin. in una in alia Oτ Ov
- 11-12 LN. Ductisque] Inductisque Cη Mv
- 12 Ductisque] Ducatque Fβ; Ductus quod Sκ FM, FN] FM, FU Cη; FM, N Cε Mo
 occurrent] occurrentque Fβ; securrent Eζ lineae] *om.* Bθ Vπ lineae ... PR₂] *om.* Oφ
 AC] NC Mo super] *twice* Bκ P, R₁] per Mη ergo] *om.* Mv
 ergo PR₂] G.O.P.R Nα PR₂] *corr. from* PMR Eα; PZ Fβ; patet Wα dividemus]
repeated Eδ
- 13 medio posito] *om.* Qδ posito] opposito Nα centro] dentro Mλ circuli]
om. Eτ Pγ VRX] MS VIS Wβ; MX Bε Eη; URS Cη; VIX Lβ; *corr. from* VIX Rα; vis Pγ; YXX
 Nα erit] eritit Vπ
- 13-14 qui ... orizonti] *om.* Oξ
- 14 circulus] *om.* Mo equidistans] *om.* Eτ Pγ orizonti] ab orizonte Bε; *add.* eius Pτ
 orizonte] *illeg.* Mv; oriente Cη 18] 1r Cε; 10 Eζ est] *om.* Bκ Mv
- 15 cuius ... figura] *om.* Lη Oφ; cuius figura hic supra apparet Dη; et hoc potest describi in
 precedentibus figuris vel in sequentibus Pδ; et hoc potest describi in precedentibus
 figuris vel in sequentibus, cuius hec est figura Sκ; quod patet describi in presenti figura
 vel sequenti Cε; ut patet in figura Nα; ut patet in superscripta figura Pv Vβ; utque in
 figura Bε; *add. interlin.* scilicet immediate ā'r'rdens Vβ hec] *om.* Mη Pγ Wβ; *add.*
 precedens Pv figura] *add.* sequens Tδ; *add.* supra Eζ Po Pτ; *add.* superscripta Bγ Cη
 Mo Wβ; *mss* Dη Mv Oφ Vχ *end*

let arcs of 18 degrees be assumed from K towards F and from L towards G, which are KM, and LN. And after you draw lines FM and FN, they will meet with line AC on points P and R; we will therefore divide line PR in half, and having positioned the centre in the midpoint, we will describe a part of the circle VRX, which will be the circle parallel to the horizon, whose latitude from the horizon will be 18 degrees, and this is the line of twilight and daybreak, of which this is the diagram.

[FIGURA 21]

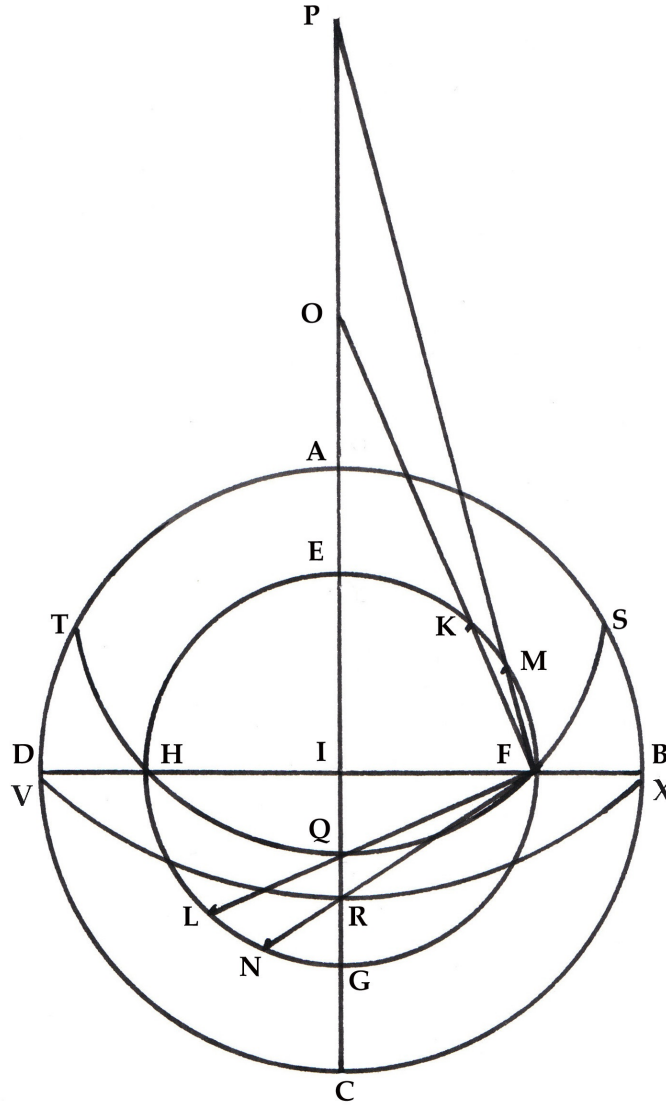


Figura inscriptionis lineae crepusculi et aurore

[Complete diagram] Bγ Bε Cη Cι Eα Eβ Eη Eτ Fα Fβ Lγ Lε Lζ Lη Mδ Mη Mλ Mν Mo⁴ Mρ
 Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Pο Pρ Pτ Pυ Qβ Qγ Qμ (fol. 156^v) Sδ Tδ Vβ Vι (fol. 333^v) Xβ
 [Outline, or space only] Bθ Bκ Cε Dγ Dη Eζ Eυ Lβ Mφ Oφ Pν Qδ Qλ Sβ Sκ Vπ Vψ Wα Wβ

⁴ The diagram in ms Mo is a conflation of both Figura 20 and Figura 21. The lettering noted here is only that which relates to Figura 21.

[No space] Bδ Eδ⁵ Na Ra
Pθ: “V”

[Caption]

Figura ... aurore] Cι Fβ Mo Oζ Pδ Pμ Pρ Vi; *om.* Lζ Mρ Pλ; Inscriptio lineae crepusculi et aurore Ea; Inscriptio lineae crepusculi Pγ; Inscriptio lineae crepusculorum Fa Mδ; Tercius modus inscribendi azimuth cum inscriptione lineae crepusculi et aurore Mo⁶; *add.* Figura capituli 21^{mi} Be inscriptionis] *om.* Et Mν Mν Po Vβ lineae] *om.* Eβ; linea Mν crepusculi] crepusculiem(!) sine crepusculorum Be; crepusculorum Cη Eβ Fζ Lγ Le Lη Oξ Ot Ou Pa Pρ Pτ Qβ Qγ Sδ Tδ et aurore] *om.* Bγ Cη Eβ Eη Et Lγ Le Lη Mη Mλ Mν Oξ Ot Ou Pa Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Xβ

[Lettering on the diagram]

A] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ B] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.*; κ Po; x Pμ C] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Oζ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi; *om.* Xβ; *cut off* Mu Oξ D] Bγ Be Bκ Cη Cι Ea Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Eβ Mδ; v Pμ E] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Lγ F] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Po Pρ Pτ Pu Qβ Qγ Qδ Tδ Vβ Vi Xβ; *om.*; z Pμ; *corr. from* P Sδ G] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mo Mρ Oζ Oξ Ot Ou Pa Pδ Pλ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Mλ Mu Pγ; *illeg.* Mν; γ Pμ H] Bγ Be Bκ Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Xβ; *om.* Cη Mu Pμ Vi I] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mλ Mo Mρ Mu Oζ Oξ Ot Ou Pa Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Pγ; L Mη Mν K] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Fβ L] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ M] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Fβ N] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ; *om.* Mδ O] Bγ Be Bκ Cι Ea Eβ Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mλ Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Vβ Vi Xβ; *om.* Cη Mη Mν; *illeg.* Eη Tδ P] Bγ Be Bκ Cη Eβ Fa Fβ Fζ Lγ Le Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Vβ Vi Xβ; *om.* Ea Tδ; *illeg.* Eη Et; *cut off* Cι Lζ Q] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo Mρ Mu Oζ Oξ Ot Ou Pa Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Sδ Tδ Vβ Vi Xβ R] Bγ Be Bκ Cη Cι Ea Eβ Eη Et Fa Fβ Fζ Lγ Le Lζ Lη Mδ Mη Mλ Mν Mo

⁵ The diagrams in ms Eδ are unrelated to the text.

⁶ The caption in ms Mo reflects the fact this diagram is a conflation of Figura 20 and Figura 21.

M ρ M ν O ζ O ξ O τ O υ P α P γ P δ P λ P μ P ρ P σ P τ P υ Q β Q γ Q μ S δ T δ V β V ι X β s] B γ B ϵ B κ
 C η C ι E α E β E η E τ F α F β F ζ L γ L ϵ L ζ L η M δ M η M λ M ν M ρ M σ O ζ O ξ O τ O υ P α P γ P δ P λ P μ
 P ρ P σ P τ P υ Q β Q γ Q δ V β V ι ; *om.* M ν T δ X β ; *later hand* S δ t] B γ B ϵ B κ C η C ι E α E β E τ F α F β
 F ζ L γ L ϵ L ζ L η M δ M λ M ν M ρ M σ O ζ O ξ O τ O υ P α P γ P δ P λ P μ P ρ P σ P τ P υ Q β Q γ Q μ S δ V β V ι
 X β ; *om.* E η ; c M η P ρ M ν T δ v] B ϵ B κ C η C ι E α E β E η E τ F α L γ L ϵ L ζ L η M δ M η M λ M ν M ρ
 M σ O ζ O ξ O τ O υ P α P γ P δ P λ P ρ P σ P τ P υ Q β Q γ Q μ S δ V β ; *om.* M ν T δ V ι X β ; d P μ ; m B γ ; o F β
 F ζ x B γ B ϵ B κ C η E α E β E η E τ F α F β F ζ L γ L ϵ L ζ L η M δ M η M λ M ν M ρ M σ O ζ O ξ O τ O υ
 P α P γ P δ P λ P ρ P σ P τ P υ Q β Q γ Q μ S δ V β X β ; *om.* C ι M ν T δ V ι ; b P μ

[Other information]

arc FM] *add.* latitudo regionalis O ξ *arc HL]* *add.* latitudo regionis M δ O ξ Q γ ; *add.* latitudo
 regionis 48 graduum L ζ *arc LN]* *add.* arcus 18 graduum O ξ Q γ *arc MK]* *add.* arcus 18
 graduum O ξ *arc VRX]* *add.* circulus equidistans orizonti F ζ M ρ ; *add.* circulus equidistans
 orizonti cuius lat[itudo] ab orizonte 18 g[radius] Q δ ; *add.* crespusculum matutinum /
 crespusculum vespertinum B ϵ ; *add.* linea crespusculi et aurore P ρ *circle ABCD]* *add.*
 Capricorni P ρ (*twice*); *add.* circulus Capricorni P ρ Q γ *circle EFGH]* *add.* Arietis et Libre F ζ P ρ ;
add. circulus Arietis et Libre Q γ *add.* *circle of Cancer]* *add.* Cancri P ρ *circle OFQH]* *add.*
 circulus hemispherii F ζ O ξ P ρ Q γ

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[CAPITULUM 22.] POSITIO STELLARUM FIXARUM IN RETHI PER DISTANCIAM EARUM AB
ECLIPTICA

5 Cum diviseris circulum signorum certissime, oportet te postea describere stellas
fixas in circulo signorum hoc modo: Ponemus circulum equinoctii diei, id est Arietis et
Libre ABCD et diametra abscindant se super E, et sint supra circulum signorum AZCH.

1-2 Positio ... ecliptica] *om.* Bγ Bδ Bκ Cε Eα Eδ Lζ Nα Pτ Rα Sβ; Aliter(*om.* Bθ Pv Vβ) de
impositione stellarum (*add.* fixarum Vβ) per latitudinem ab ecliptica Bθ Mη(*marg.*) Pv Vβ;
Capitulum de inscriptione stellarum fixarum per alium modum Fβ; Capitulum de
positione stellarum per equidistantiam ab ecliptica Bε; De impositione stellarum per
latitudinem ab ecliptica(!). Rubrica Vπ; De inscriptione stellarum fixarum capitulum Cη
Pμ; Descriptio stellarum fixarum per distantiam earum ab ecliptica Wβ; Inscriptio
stellarum Dγ; Inscriptio stellarum fixarum cum latitudinibus et longitudinibus quas
habent per circulum euntem per polos [zodiaci]¹ Mλ; Inscriptio stellarum per distantiam
earum(*om.* Mv) ab ecliptica Eτ Mv; Modus positionis stellarum Pδ; Positio stellarum Cι
Eζ Mη Po Qμ Sκ; Positio stellarum fixarum Mo; Quam quare supra infrancetio
conscriptam(?) Ev; *add. in marg.* Capitulum 22^{um} Bε; *add.* De inscriptio[ne] stellarum
fixarum in rethi per distantiam earam Pv; *add. in marg.* Impositione stellarum per
latitudine ab ecliptica Bθ

Positio] *ms* Mζ *begins*; Alius modus impositione Dη; Compositio Qδ; Inscriptio Vψ;
Modus inscriptionis Mζ in] *om.* Mζ Mv Mφ Wα earum] *om.* Eβ ab
ecliptica] *om.* Pv; ab ecliptica Mδ Mφ Sδ; *add.* Rubrica Qβ

3 Cum] *add.* positeris Fα diviseris] divisimus Cε Dη oportet] euce Oξ te]
om. Bθ Cε Pγ Vπ postea] postmodum Eδ describere] ponere Fβ

4 hoc] hic *some* hoc modo] *om.* Sδ equinoctii ... est] *om.* Dη diei] *om.* Mζ;
rep. Cε id est] et Eδ Pq

4-6 id est ... circulo] *marg.* Bγ; et Cη; scilicet *add. in marg.* equinoctialem ABCD ... circulo Mζ

5 abscindant] abscindet Bθ Vπ se] *om.* Pδ super] *add. interlin.* punctum Po
E] DC Eζ; ED Eδ sint supra] fac Bγ; fuerit supra Fβ; sicut supra Mη Pα; sint Pq
supra] super *some* signorum] *om.* Wβ; *om. or* zodiaci Mλ² AZCH] A et CH
Nα; AZH Qγ; AZHC Dγ; AZTH Mo Mv

5-6 ABCD ... Libre] *om.* Eτ Mv Pγ

¹ It is not possible to tell immediately if “zodiaci” in Mλ is the last word of the rubric or a substitute for “signorum” in line 5.

² See note to line 1.

[CHAPTER 22.] THE PLACING OF THE FIXED STARS IN THE RETE BY THEIR DISTANCE FROM THE ECLIPTIC³

When you have divided the circle of signs most accurately, you next ought to describe the fixed stars in the circle of signs in this way: We will take the circle of the celestial equator, that is [through the beginnings] of Aries and Libra ABCD and let the diameters intersect on E, and there should be on the circle of signs [the letters] AZCH.

³ This capitulum uses the system of defining star positions vis-à-vis the ecliptic, known in modern astronomy as “celestial latitude” and “celestial longitude”. The latitude is that of a circle parallel to the ecliptic and through the star, and measured from the ecliptic up to the pole of the ecliptic. The longitude is a great circle through the star and passing through the poles of the ecliptic, meeting the ecliptic at right angles and measured along the ecliptic from the beginning of Aries. Although this system is mentioned in Capitulum 10, it is different from the system described there in detail which uses right ascension and mediation to locate the star. See the notes to Capitulum 10. Samsó notes that this method is more or less standard, and is also described in Maslama’s extra-chapter (*On Both Sides*, p. 431).

For a further discussion of this problem, see Thomson, *Jordanus de Nemore*, Proposition 5, and commentary pp. 144-145.

Deinde numerabis in circulo Arietis et Libre ex puncto D versus C declinationem solis, id est 24 gradus, et pones ibi T; et in parte opposita similiter ex B versus A, et pones ibi X. Deinde pone regulam super T, X, id est super terminum numeri 24 graduum utrumque, et duces lineam occultam ex T in X. Postea considerabis in tabula stellarum fixarum
10 stellam quam vis ponere in circulo signorum, in quo signorum fuerit, et eius longitudinem et latitudinem, et utrum septentrionalis vel meridionalis sit.

Quod si fuerit septentrionalis numerabis in circulo Arietis et Libre a puncto T

- 6 numerabis] numera Xβ ex] a Eα Mζ; C *corr.* to a Sδ; et Nα C] E Cη Sκ
declinationem] distanciam Eτ
- 7 id est] *om.* Pq; maximam scilicet Mζ; scilicet Mη 24] 34 Sκ; ZE Lβ gradus]
gradibus Cη Eτ Bγ; graduum Qγ Tδ Xβ et₁ ... T] cum pones T ibi Vπ pones]
nonemus Fβ; pone Lβ ibi₁] *add.* tibi Pθ ibi₁ T] in C Pq; T I B I Qδ T] C Nα
T ... ibi₂] *om.* Cε T; et] *interlin.* Pθ; RT et C; S et Tδ; T ex Pv; TEX Cη Eτ Mv
et₂] *add.* absciderit Pτ et₂ in] *om.* Pq; ex Mo similiter] *om.* Eδ Pλ Pq
ex] X Bδ B] H Bθ A] *om.* Wα et₃ pones₂] *repeat* Pv ibi] *om.* Rα
X] *ex corr.* to X Pγ; Y Mδ
- 8 pone] pones *many*; ponas Pv; *add.* ibi Dη regulam] lineam (*margin.*) Eη T, X] ex
Mv; C, X Nα; I, X Wα; T, S, X Wβ id est] et Pq; idem Bδ; scilicet Cε Ev super₂]
om. Lγ Wβ; similiter Eα terminum] *illeg.* Nα; punctum Pq; tantum Cη; utrumque Bθ
numeri] *om.* Dη Vψ; *interlin.* Lζ graduum] g^a/g^d Mζ Nα Pθ Pq; grad. Mv Pq;
gradus Bγ Bδ Bε Cη Cι Dγ Eα Eδ Eζ Eτ Fβ Pγ Pv Qβ Lγ Lε Lζ Mη Mλ Pα Pδ Pτ Sδ Sκ
utrumque] *om.* Vπ; cot[*space*] Dη; utrum Lβ; *add.* numeri(?) Dγ
- 8-9 Deinde ... X] *om.* Mδ
- 9 et duces] *rep.* Lβ ex T in X] ex C M X Nα; ex T Ev; ex T in EX Eζ; ex T, X Pθ; ex T in EX
corr. to ex T in X Pq; in EX Eδ X] V Vπ
- 10 stellam] *om.* Cε Eα; stellas Vπ circulo signorum] astrolabio Dη signorum₁]
add. scilicet Lε Tδ in quo signorum] *om.* Lβ Wα; *rep.* Vπ signorum₂] *interlin.*
Bγ; *om.* Cη Eτ Mv Pγ Vβ Wβ; *interlin.* Bγ; signo Bε Cε Dη Eη Mζ Mλ Pq; *add.* situ Mq
in₂ ... fuerit] *om.* Mv Mφ Vι; gradu et minuto fuerit secundum Mζ fuerit] sit
Mλ et] que Pα; *add.* etiam Cι
- 11 longitudinem et] *om.* Mo Pτ Vψ latitudinem] *add.* et altitudinem Eα et₂] *om.* Bθ
Cε Eζ Ev Mη Po Vπ et utrum] *interlin.* Bγ; *om.* Cη Eτ Mζ Mv Pγ Vβ; et utrumque
Qλ; scilicet utrum Dη; V_f7(?) etiam Pv vel] ex Eα sit] *om.* Mζ; fuerit Bδ Dη Mδ;
sic Mv
- 12 Quod] Et Pθ Quod ... septentrionalis] *repeat* Qβ; *om.* Nα si] *om.* Pγ Pλ
fuerit] sit Mq septentrionalis] *add.* a zodiaco Vβ numerabis] *om.* Pλ Sβ
in circulo] *rep.* Mv T] A Mv; B Pγ; C Bθ Nα Pq Vψ; S Cη Eτ

⁴ The abbreviation g^a or g^d could stand for any case of *gradus*.

Then you will count off along the circle [through the beginnings] of Aries and Libra from point D towards C the declination of the sun, that is 24 degrees, and you will place there T; and similarly in the opposite part from B towards A, and you will place there X. Then place a ruler on T and X, that is on each end of the number of 24 degrees, and you will draw a faint line from T to X. Next in the table of fixed stars you will take note of the star the star which you wish to place in the circle of signs, in which of the signs it would be, and its longitude and latitude, and whether it is to the north or to the south.

Now if it be to the north, you will count off along the circle [through the beginnings] of Aries and Libra from point T

15 versus D tot gradus quota est latitudo illius stelle, et pones ibi V; et in parte opposita similiter scilicet ab X versus A et pones ibi Y. Deinde pone unum caput regule super punctum C, qui est caput Arietis, et aliud caput super finem latitudinis stelle, id est super V, et notabis contactum regule et diametri HB, et pones ibi R. Postea pones similiter unum caput regule super punctum C et super Y, et ubi regula abscindet diametrum HB, pones notam S. Postea fac circulum transeuntem per notas R, S, et in hoc circulo summitas stelle illius esse debet. Tunc considera in tabula stellarum fixarum

- 13 versus D] *om.* Σκ D] *interlin.* Eα gradus] *add.* et minuta Mζ quota] *sic* est] *om.* Bθ Vπ latitudo] altitudo Eδ; longitudo Vπ illius] *om.* Eδ; ipsius Mλ V] B Bθ Vπ; BV Qδ et₂] que Pα; ut Eτ Mη Pγ parte] partes Nα opposita] O P posita Nα
- 13-14 v ... ibi] *om.* Eν et₂ ... Y] *marg.* Mν
- 14 similiter] *om.* Bγ Cη Eδ scilicet] C Nα Y] v Mν Wβ pone] pones *few*; depone Vι unum] *om.* Lη regule] *om.* Mν Mφ Vι Wα
- 15 punctum C] *om.* Fζ C] *om.* Eν Lγ; *interlin.* Lε; S Pγ; T Pα qui est caput] scilicet ad primum Mζ caput₁] punctus Eν Arietis] *add.* et Libre Eδ; *add. and del.* et Libre Mζ caput₂] *om.* Pq; *add. interlin.* regule Bγ super] *om.* Eν super finem] superficiem Pγ latitudinis] *marg.* Σκ
- 15-16 id est ... V] qui est N Pq
- 15-17 qui ... C] *marg.* Oξ Ov Pα; *om.* Fβ Lβ Mδ Mq Pμ Pv Qλ Wα
- 16 V] Y Eν Pδ Pv; quinque Ov et diametri] in dyametro Bε Mζ contractum] reatum Nα pones₁] pone Pγ; ponemus Pq R] 12 Pq; C Qβ; I Vψ; R vel T Pδ; T Lγ Qδ Postea] ea Oζ pones₂] pone *some*
- 17 similiter] super Cε Eα Qβ unum] 1 *or* id est [= .i.] Eδ; supra primum Bδ regule] *om.* Mο; linee similiter Eα C] E Cη Mη Qμ; I Eδ Eζ; R Cη; X Eτ et₁] aliud Bε; *add.* aliud Mζ Mν Vι super₂] *om.* Mλ; similiter Qγ Y] C Qδ; I Po Pv; R Mν; T Pγ; V Wα; et V Vι; Y, I Nα ubi] ibi Nα Vι Wα; u ibi Mν Mφ; ut Cε Eδ abscindet] abscindat Qμ Rα
- 18 diametrum] *interlin.* Po; *om.* Eζ Pγ s₁] C Pq Postea] Post hoc pone et Pθ; *add.* pe Eδ R, S] I, S Pq Qλ Wα; R, C Nα s₂] supra Mη in] *om.* Sδ
- 18-19 R, S ... summitas] *om.* Eζ
- 19 illius] illi Nα esse debet] erit Mλ Tunc] *om.* Eτ in] *om.* Eζ Fζ; et Cε stellarum] *om.* Cη Wβ; *interlin.* Bγ stellarum fixarum] *om.* Mζ Mν
- 19-20 esse ... stelle] *om.* Bθ Vπ

towards D as many degrees as is the latitude of that star, and you will place there V; and similarly on the opposite side that is from X towards A and you will place there Y. Next put one end of a ruler on point C, which is the beginning of Aries, and the other end on the end[-point] of the latitude of the star, that is on V, and you will note the contact of the ruler and diameter HB, and there you will put R. Afterwards, similarly you will place one end of a ruler on point C and [the other end] on Y, and where the ruler cuts diameter HB, you will place the letter S. Afterwards make a circle passing through the letters R and S, and in this circle ought to be the elevation of that star. Then in the table of fixed stars take note of

- 20 longitudinem dicte stelle in quo gradu cuius signi fuerit, et per totum numerum gradus illius et per totum numerum nadir eius, videlicet ab exteriori circulo zodiaci et per polum zodiaci, id est per punctum K, fac transire unum pedem circini equaliter et ubi circinus abscederit circulum RS, ibi erit summitas illius stelle. Et si cum gradu illius longitudinis et latitudinis fuerint minuta, accipe de gradu sequenti sextam partem, si
- 20 dicte] *om.* Eδ; illius Ev Qδ in] prete Eδ gradu] *om.* Ev cuius] *om.* Mλ fuerit] steterit Qμ totum] tot Nα numerum] *om.* Pλ gradus] 6 Bδ; graduum Mζ Pϑ
- 20-21 gradus ... numerum] *om.* Eδ Eζ Fζ Oξ Pv
- 21 illius] istius MvVi et per totum] scilicet Dη numerum] *om.* Bε Nα nadir] Bε Bκ Eα Eη Fζ Lβ Mζ Mϑ Nα Oξ Pα Pλ Pμ Pϑ Sβ Wβ Xβ; gnadayr Sκ Vψ; gnadir Cε; gradair Pδ; guadair Pθ; guadayr Mη Pτ; nadair Bθ Dγ Dη Eβ Eδ Eζ Eτ Fα Fβ Lγ Lε Lζ Lη Mλ Mv Mo Mv Mφ Oζ Oτ Ov Pv Po Pυ Qβ Qγ Rα Sδ Tδ Vβ Vi Vπ; nadair *corr.* to nadir Qμ; nadayr Bγ Cι Ev Qδ; nadayz Cη Pγ; nadyr Mδ; naddir Bδ; vadir Qλ Wα eius] cuius Mv; illius Bδ Bε videlicet] *om.* Mv Mφ Vi Wα; scilicet Eα Eβ Pλ; *add.* in quo est divisio ipsius zodiaci in 360 gradus et ipse est ecliptica Pδ videlicet ... zodiaci] *om.* Mζ ab] A, B Nα; A, B, I Sκ zodiaci] *marg.* Ov; zodyachi Bγ; *add.* in quo est divisio ipsius(*om.* Fβ Mo) zodiaci in 360(260 Wα) gradus et ipse est(*om.* Fβ) ecliptica ab exteriori circulo zodiaci Fβ Lβ Lγ Oξ(*underlined*) Ov(*marg.*) Pμ Pv(*om.* in 360 ... ecliptica) Qλ Sκ Wα per₂] *om.* Fζ; propter Eδ; *add.* inventum ut in fine huius capituli dicitur Mδ
- 21-22 et₂ ... zodiaci] *om.* Mv; *marg.* Rα
- 22 polum] stelle Ev; *add.* signi Eα; *add.* signorum Bθ Cη Eδ Eζ Eτ Ev Mv Nα Pγ Po Pυ Qδ Qμ Rα Sβ Vβ; *add. and del.* signorum Pτ zodiaci] *om.* Oξ; circuli signorum Mζ; signorum Mλ; zodyachi Bγ; ydyaci Cη; *add.* R, C Nα; *add.* signorum Bκ Lζ; *add.* VE Qμ Rα; *add.* VS Sβ id est] et Lη(*add. in marg.* id est) Mϑ; lx id est Pγ; scilicet Mζ; vel Bγ; ve id est Bκ Bθ Cη Dγ Eδ Eζ Eτ Ev Lζ MvPv Vβ Vπ; ve id est *corr.* to id est Pτ; *add. interlin.* vel Vβ per] *om.* Cε Mo Fζ Pδ ubi] *om.* Cε
- 22-23 et ubi circinus] donec Bδ Bε Dη Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mϑ Mv Mφ Oζ Oξ Oτ Ov Pα Pλ Pμ Pν Pϑ Qβ Qγ Qλ Tδ Vi Wα Xβ et ... RS] *del. and add. in marg.* donec abscederit circulum RS Po
- 23 circinus] *marg.* Rα abscederit] *add.* vel intersecat Mζ RS] usque Nα; *add.* stelle et Bδ Bε Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mo Mϑ Mv Mφ Oζ Oξ Oτ Ov Pα Pλ Pμ Pν Pϑ Qβ Qγ Qλ Sδ Tδ Vi Vψ Wα RS ibi] R.S.I.B.I. Qδ erit] *om.* Nα stelle] *om.* Mη si] sic Dη Fβ Qλ Wα si cum] *om.* Pα illius₂] *interlin.* Vβ; *om.* Bθ Bκ Cε Dγ Eα Eζ Ev Mη Mλ Mo Nα Po Pυ Qμ Sβ Vπ; *add.* stelle Bδ
- 24 et latitudinis] *del.* Pτ; *om.* Mv Qλ Vi Wα et ... fuerint] volueris sumere Mζ fuerint] *om.* Pγ minuta, accipe] duc λT(?) idem Nα de gradu] gradum Mo sequenti] *om.* Cε Mη; scilicet Mv sextam] 6 / 6^m some; vi in Wβ
- 24-25 accipe ... minuta] *om.* Ev

the longitude of the said star, in which degree of which sign it be, and through the total number of its degrees and through the total number of its nadir,⁵ namely outside the circle of the zodiac,⁶ and through the pole of the zodiac, that is through point K, see that one arm⁷ of a compass passes uniformly and where the compass cuts circle RS, there will be the elevation of that star. And if with the degree of that longitude and latitude there are minutes, take from the following degree one sixth part

⁵ Again, “nadir” means a point 180° across (or around) the sphere.

⁶ That is (here and throughout), the ecliptic.

⁷ A difference between Latin (a “foot” [or even “leg”] of a compass) and English (an “arm” of a compass) idioms.

25 sint 10 minuta; si 15 quartam partem, si 20 terciam, et sic de aliis, et fac ut supra et hoc in stellis septentrionalibus.

30 Si vero sit meridionalis, iterum numerabis in circulo Arietis et Libre a nota declinationis solis scilicet a T versus C tot gradus quota est latitudo eius; et in parte opposita similiter ab X versus B, et ibi nota. Et pone regulam super unam illarum notarum et super capud Arietis, scilicet super C, et ubi absciderit diametrum HB, fac

- 25 10] *om.* Eα Mζ; 60 Xβ minuta] m Nα; *add.* vel Bε si₁] *add.* sint Pτ; *add. marg.* vero Bγ si 15] 15 et Eα 15] 11 Cη; enim Pγ; ri Lβ; *add.* minuta Bε quartam] 4^m *some* partem] *om.* Bδ Cε Cι Eη Fα Fζ Lβ Lγ Lε Lη Mδ Mη Mλ Mo Mq Mv Mφ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pθ Pλ Pμ Pν Qβ Qγ Qλ Sκ Tδ Vι Vψ Wα Xβ si₂] *add.* vero Dη 20] 2 Mυ; 30 Fζ Mν terciam] 3^m *some*; 2^{am} Wα; *add.* partem Bκ Et Mζ Pλ Po Pυ Vβ et sic de aliis] *rep.* Nα et₂ ... et₃] et cys Bε sic de aliis] *illeg.* Mζ; cyo(?) Pλ; sic de ceteris Mq supra] prius Nα et₃] ex Nα; ut Pγ hoc] in hoc Sκ
- 26 in] *om.* Bθ Eυ Vπ Vψ stellis] *add.* in Mλ septentrionalibus] *add.* ut in sequenti figura Sβ
- 27 Si] Sit Fβ vero] autem Bε sit] fuerit Bδ iterum] *om.* Lε Tδ Xβ; *illeg.* Mη; tunc Bγ Bθ Cε Cη Cι Dγ Eα Eδ Eζ Eτ Eυ Lζ Mζ Mλ Mν Mo Nα Pδ Pθ Po Pτ Pυ Qδ Sκ Vβ Vπ Wβ iterum numerabis] *om.* Pγ; tunc numerabis tunc numerabis Eδ numerabis] *om.* Lγ a] *om.* Bθ Eη Vπ; *marg.* Rα; an Bδ; et Cη Pγ
- 27-28 et Libre ... solis] *om.* Mζ a nota declinationis] et nota declinationem *and add. interlin.* al' a nota declinatione Vβ
- 28 solis] *om.* Po; *del.* Pq scilicet] *om.* Cε; *lacuna* Fζ a T] AT Cη Mυ Rα Sκ; a C Cε Mv Pq Qδ Sβ Vβ C] A Bθ Eυ Vπ; E Po; I Tδ; T Eη Mv Sβ Vβ gradus] graduum Mv quota] *sic* eius] *interlin.* Vβ; *om.* Dγ Eδ Eζ Eτ Mv Pγ Pτ Qμ; *add.* et ibi nota Bδ
- 29 opposita] apposita Sκ; *add.* eius Qδ ab X] ad 4 Wβ nota] *add.* puncta Mζ unam] una Vπ illarum] *om.* Mυ Mφ Wα; earum Dη
- 29-30] illarum notarum] notam Vι
- 30 notarum] *interlin.* Pτ super₁] *om.* Mζ; *add.* C Mλ Arietis] *add.* et Libre Eυ Qδ Vπ scilicet] *om.* Qδ; et Vπ scilicet super C] *om.* Mλ; quod est A Pq super₂] *om.* Sβ; similiter Vψ; sit Bε C] S Pγ; gradus Nα ubi] ibi Cε Qλ Wα HB] AB Sκ; KB Bδ
- 30-31 ubi ... similiter] ubi absciderit in diametro et super aliam notam pones similiter *del and add. marg.* Ubi absciderit dyametrum H, notam in dyametrum super aliam notam Po diametrum ... notam₁] *om.* Eδ Eτ Qμ diametrum ... in] a Mv HB ... diametro] *om.* Cη Eζ fac ... diametro] *marg.* Bγ

if there are 10 minutes; if 15, a quarter part [of a degree]; if 20, a third, and so on for the others, and also do this as above for northern stars.

If, on the other hand, it is a southern [star], again you will count along the circle [through the beginnings] of Aries and Libra from the mark of the sun's declination, that is from T towards C as many degrees as is its latitude [and place there a mark]; and similarly in the opposite part from X towards B, and make a mark there. And set the ruler on one of those marks and on the beginning of Aries, that is on C, and where it cuts diameter HB, make

notam in diametro. Et super aliam notam similiter pone regulam et super C, et ubi
 absciderit diametrum HB, fac notam. Postea fac circulum secundum longitudinem
 illarum duarum notarum in diametro; et in hoc circulo erit summitas illius stelle.
 Tunc considera in tabula stellarum fixarum in quo gradu cuius signi fuerit. Et fac
 35 transire equaliter unum pedem circini per terminum numeri illius gradus et per

- 31 notam₁] *om.* Bθ; *add.* pones Eζ in diametro] *om.* Bε Mζ; in directo PQ Et super₁] *om.* Ev Et super₁ ... regulam] Deinde ponas regulam super aliam notam Mζ super₁] similiter Pv; *corr. in marg. from* similiter Oξ aliam] illam Rα Sβ notam₂] *om.* Vπ similiter] *interlin.* Bγ; *om.* Cη Eτ Mv Wβ pone] pones *some* C] S Pγ ubi] ibi Cε
- 31-32 in ... notam] *om.* Eα Eη Nα Vψ Et super₁ ... notam] *marg.* Bε similiter ... notam] *om.* Qμ
- 32 absciderit] abscident Bθ diametrum] *om.* Vι fac₁] *add.* aliam Bδ; *add.* iterum Mζ fac₁ ... secundum] *om.* PQ notam] *add.* in diametro Lε fac₂] *om.* Fβ secundum] *om.* Qλ longitudinem] altitudinem Bθ Vπ; *corr. from* latitudinem Sκ
- 33 illarum] *om.* Mζ; earum Nα Pγ; earum *and add. interlin.* illarum Vβ; stellarum Pδ; *add.* stellarum Wα illarum ... summitas] *om.* Ev duarum] 2 *some* notarum] *add.* et super caput Arietis similiter super G et ubi abscident Nα; *add.* novissimarum Mζ diametro] *add.* HB Mζ et] *add.* ubi Mη hoc] *om.* Oξ
- 34 Tunc] *om.* Fβ; Et PQ; Et Sβ Tunc considera] *marg.* Bγ Tunc ... fixarum] *om.* Bθ Bκ Cη Dγ Eδ Eζ Eτ Ev Lζ Mη Mλ Mv Nα Pγ Po Pτ Pv Qμ Rα Vβ Vπ in₁ ... fixarum] *om.* Bγ Sβ fixarum] longitudinem dictae stellae Mζ in₂] *om.* Cε in₂ ... fuerit] *om.* Xβ fuerit] fuit Cη Dγ Ev Mη Pτ; sit Fβ; fuit illius gradus et per terminum(punctum Nα) numeri Bθ Nα Vθ; *add. in marg.* in zodiaco Mζ
- 34-35 Et ... circini] *om.* Mζ Et ... numeri] *om.* Bθ Ev
- 35 equaliter] *om.* Cι per₁] super Sβ per₁ ... gradus] ad 2 notas scilicet Cε terminum] totum Eδ; *add.* illius signi Pγ numeri] *om.* Bε illius] *om.* Pγ gradus et] *om.* Mo
- 35-36 illius ... terminum] *om.* Bθ Vπ et per terminum] parcium in q^a Ev

a mark on the diameter. And similarly place the ruler on the other mark and on C, and where it cuts diameter HB, make a mark. Afterwards make a circle according to the longitude of those two marks on the diameter; and in this circle will be the elevation of that star. Then in the table of fixed stars take note in which degree of which sign it be. And make sure that one arm⁸ of a compass passes uniformly through the end of the number of its degree and through

⁸ See note 7 to line 22 above.

terminum nadir eius, scilicet ab exteriori circulo zodiaci, et per polum zodiaci, scilicet per punctum κ. Et ubi circinus abscinderit circulum ad duas notas diametri, ibi erit summitas illius stelle. Et similiter pone omnes stellas meridionales.

40 Sic autem invenies polum zodiaci: numera a puncto A in circulo Arietis versus D 12 gradus, et pone ibi notam; et super notam illam et super C pone regulam, et ubi

- 36 terminum] tantum numeri Rα; totum numeri Eδ; *illeg.* numeri Qμ; *add.* numeri Bγ Dγ Mζ Mλ Mν Nα Pο Pυ Qδ Vβ Vψ Wβ nadir] Bδ Bε Bκ Eα Eη Mδ Mζ Mο Nα Pλ Pν Pο Sβ Wβ Xβ; gaudayr Sκ; gnadair Pδ; gnadayr Vψ; gnadir Cε; guadair Pθ; guadayr Mη; nadair Dγ Dη Eβ Eδ Eζ Eτ Fα Fβ Lβ Lγ Lε Lζ Lη Mν Mo Mυ Mφ Oζ Oξ Oτ Oυ Pα Pγ Pμ Pο Pτ Pυ Qγ Rα Sδ Tδ Vβ Vι Vπ; nadayr Bγ Cι Eυ Mλ Qβ Qδ; natair Bθ; vadair Qλ Wα; vadayz Cη eius] cuius Nα; illius Tδ cilicet₁] *om.* Pα Pο scilicet₁ ... zodiaci₁] *om.* Mζ exteriori] *add.* parte Eυ zodiaci₁] *om.* Cε et ... zodiaci₂] *om.* Eυ Mη per] *interlin.* Bγ; *om.* Bθ Bκ Cη Dγ Eα Eζ Fζ Lζ Mλ Mν Nα Pγ Pυ Rα Sβ Vπ Wβ; *add.* polum circuli signorum id est Mζ polum] *add.* 24 Cε zodiaci₂] *add.* et polum zodiaci (= *rep.*) Bθ Vπ
- 37 per] *om.* Fβ Fζ Mζ Pμ; super Sβ punctum] *om.* Oζ Pλ Pο κ] *interlin.* Bγ Pο; *om.* Bθ Cη Eδ Eζ Eυ Mη Pγ Pυ Qμ Vπ Et ubi] Fac transire unam pedem circini et ubi Mζ circinus] *om.* Bθ Nα abscinderit] attinget et abscindet Mδ abscinderit ... duas] *om.* Eζ circulum] *add.* factum Bγ Bθ Bκ Cη Eα Eδ Eτ Lζ Mζ Mλ Mν Nα Pγ Pυ Qμ Rα Vβ Vπ Vβ; *add.* fah(?) Sβ ad duas] .A.D. et Bθ Vπ; id est ad secundam Cε; et 2^{as} Eη duas] 2 *many*; 3 factum Mη; et Eυ ibi] et ubi Eζ; ubi Cε Pγ
- 38 illius] *om.* Mυ Qλ Vι Wα; huius Mο Et ... meridionales] *om.* Mζ pone] pones *some* meridionales] *add.* ut patet in prescripta figura Mν
- 39 *before* Sic] De inventione poli zodiaci Vβ; Inventio poli zodiaci super mediam declinationem Mλ Sic] Hic Eυ; Si Mη; *add. in marg.* Polus zodiaci Bε Sic ... zodiaci] Polum autem sic invenies Fβ; Polum autem zodiaci invenies Mζ; *add. in marg.* Capitulum de inventione poli Fβ autem] *add.* pones et Pθ polum] punctum Bθ numera] numerabis Mλ A] *om.* Fβ Nα versus] *twice* Vψ D] DT Mη
- 40 12] Bγ Bθ Cη Cι Dγ Eδ Eζ Eτ Eυ Lζ Mλ Nα Pγ Pτ Pυ Vβ Vπ Wβ; *om.* Mη; 12 *corr. to* 24 Eα Mζ; 24 Bδ Bε(*add. interlin.* 12) Cε Eβ Eη Dη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mo Mο Mυ Mφ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pο Pο Qβ Qγ Qδ Qλ Sδ Sκ Tδ Vι Vψ Wα Xβ; κ Mν ibi] ubi Eυ notam₁] *add.* similiter Eα et₂ ... notam₂] *om.* Pμ et₂ ... illam] *om.* Eτ Pγ Mν Wβ et₂ ... regulam] Deinde pone regulam super punctum C et notam istam Mζ super₁] similiter Eυ notam illam] eam Pο illam] *interlin.* Bγ; *om.* Cη
- 40-41 illam ... in] *illeg.* Pτ

the end of its nadir, that is on the outside of the circle of the zodiac, and through the pole of the zodiac, that is through point K. And where the compass cuts the circle at two marks on the diameter, there will be the elevation of that star. And similarly place all the southern stars.

Moreover, you will find the pole of the zodiac thus: count from point A along the circle [through the beginning] of Aries towards D 12 degrees,⁹ and place there a mark;¹⁰ and place a ruler on that mark and on C and where

⁹ When projected on the plane, the pole of the ecliptic is found by using half of its declination (from the celestial pole), i.e., 12 degrees rather than 24. Many scribes, however, did not understand this and accepted the substitution of 24 for the correct number, 12. The diagram (Figura 22A) generally shows the correct use of 12 degrees, and is reflected in the caption. See also Capitulum 9.

¹⁰ In some diagrams (Figura 22A), this point is labelled “F”.

abscinderit diametrum DB, fac notam K; et nota illa erit polus zodiaci, ut patet in hac figura.

Explicit compositio astrolabii

- 41 DB] AB Eτ Mυ notam] *add.* illam Bε Eζ κ] *om.* Bθ Eυ Vπ; B Pγ; *add.* et notam κ Pδ κ et nota] *om.* Mυ Mφ κ ... illa] illam Vι Wα et ... erit] que est Mλ nota] *om.* Dη illa] *om.* Cι Dγ Qβ; *add.* κ Eδ polus] poli Nα ut] *om.* Vι; sicut Bθ Eυ Qδ Vπ hac] *om.* Bγ Bε Bθ Cη Eδ Eζ Eτ Eυ Mη Mν Nα Pγ Po Pυ Qγ Qδ Vβ Vι Vπ Wβ; subiecta Mλ
- 41-42 ut ... figura] Bδ Eβ Eη Fα Fβ Fζ Lβ Lγ Lε Lη Mδ Mυ Oζ Oξ Oτ Oυ Pα Pδ Pθ Pλ Pμ Pν Pρ Pτ Qβ Qλ Sδ Tδ Wα Xβ; *om.* Vζ; ut hic patet in illa ultima figura Bκ; ut hoc patet in figura Cε Rα Sκ; ut hic patet Lζ; ut hic patet in figura Cι Mo Vψ; ut in sequenti figura manifestius apparet Dη; ut patet h' Dγ
- 42 figura] *om.* Mφ; *add.* precedente Pυ; *add.* sequente Rα; *add.* sequenti Vπ; *add.* supra Eζ Po Qμ Wβ; *add.* subiecta Vι
- 43 Explicit ... astrolabii] Bθ Mφ Pλ Pρ Qβ Vβ Vπ; Et hic de astrolabio dicta suffitiant Pν; Explicit scientia compositionis astrolabii. Oζ; Explicit compositio Pδ Pυ

it cuts diameter DB, make the mark κ ; that mark will be the pole of the zodiac, as is clear in this figure.

The Construction of an Astrolabe ends.

[FIGURA 22]

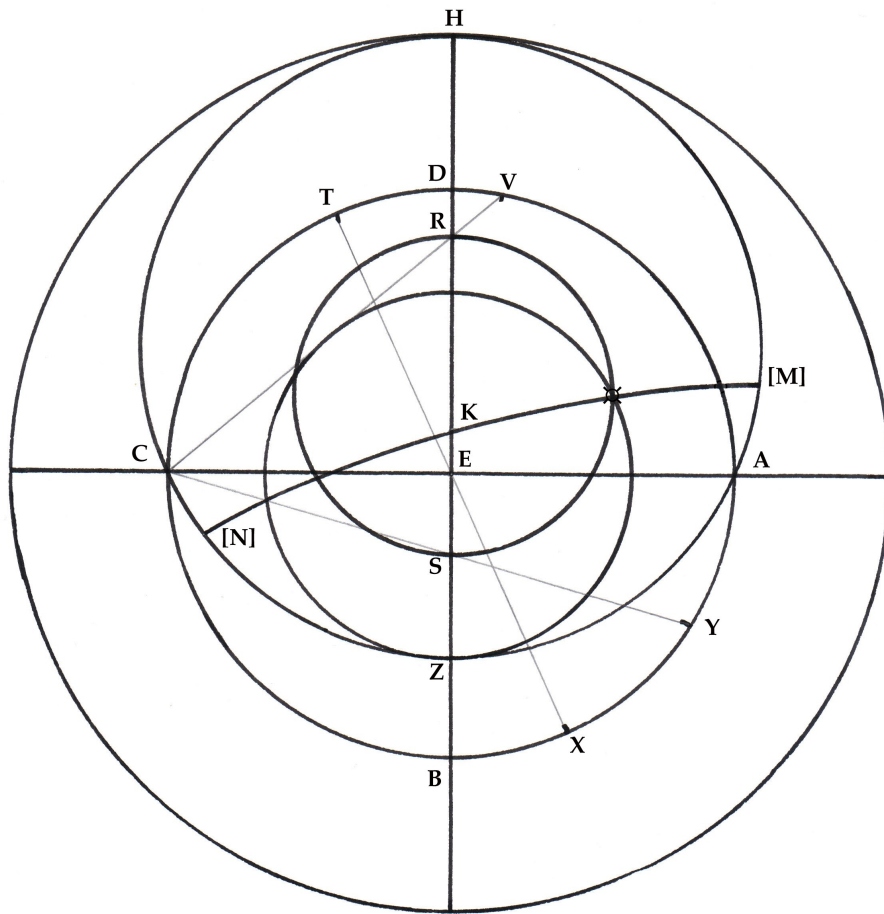


Figura inscriptionis stellarum fixarum in rethi per distanciam earum ab ecliptica¹¹

[Complete diagram] Bγ Bε Bκ¹² Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ (sideways) Lη Mδ Mζ
 Mλ Mν Mo Mρ Mυ (f. 408^r) Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ (fol. 157^r) Rα
 Sδ Tδ Vι (fol. 332^v) Wβ Xβ

[Incomplete diagram] Mη Sκ Vβ

[Outline, or space only] Bθ Cε Dγ Dη Eζ Eυ Lβ Mφ Pν Qλ Sβ Vπ Vψ Wα

[No space] Bδ Eδ¹³ Nα

Pθ: "X"

¹¹ This figure shows the positioning of a northern star only.

¹² The figure in ms Bκ is rotated clockwise 90°.

¹³ The diagrams in ms Eδ are unrelated to the text.

[Caption]

Figura ... ecliptica] Cι Eβ Eη Fα Fβ Fζ Lη Mo Oζ Oξ Oτ Ou Pα Pδ(*marg.*) Pλ Pμ Pρ Pτ Qβ Qμ Tδ; *om.* Bκ Ea Lζ Mζ Qδ; Figura impositionis stellarum fixarum secundum longitudes suas veras et altitudes suas ab ecliptica Xβ; Figura inscriptionis poli zodiaci supra medium declinationis Qγ¹⁴; Figura inscriptionis stellarum Rα; Figura inscriptionis stellarum fixarum Lγ Sδ; Figura inscriptionis stellarum fixarum latitudes suas ab ecliptica super longitudes suas veras Mν; Figura inscriptionis stellarum fixarum per tabulam factam per latitudes ipsarum ab ecliptica super mediam declinationis Mλ; Figura inscriptionis stellarum fixarum secundum longitudes suas veras et latitudes ipsarum Cη; Figura inscriptionis stellarum fixarum secundum latitudes suas ab ecliptica et longitudes suas veras Eτ Po Vι(*add.* in tabula posita); Figura inscriptionis stellarum secundum latitudes suas ab ecliptica et longitudes suas in tabula posita Mν; Figura inscriptionis stellarum secundum latitudes earum ab orbe signorum Pν; Figura inscriptionis stellarum fixarum secundum longitudes veras et latitudes ipsarum ab ecliptica Wβ; Inscriptio stellarum fixarum secundum latitudes ab ecliptica Pγ

per rethi] *om.* Bγ; per rety Mδ earum] *om.* Lε Mρ; earundem Bε *add.* Figura capituli 22ⁱ Bε; *add.* ex vide aliam figura loco hoc Fβ

[Lettering on the diagram]

A] Bγ Bε Bκ Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Cη Mν Qδ B] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Qδ C] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Qδ D] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Qδ E] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pλ Qδ; s Pμ H] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qγ Qμ Ra Sδ Tδ Vι Xβ; *om.* Qβ Qδ Wβ K] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Qδ R] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pρ Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Fβ Fζ Qδ S] Bγ Bε Bκ Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Po Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pμ Qδ; *illeg.* Pρ; P Cη T] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pμ Po Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pρ Qδ; *illeg.* Pλ V] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Oζ Oξ Oτ Ou Pα Pγ Pδ Pμ Po Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pλ Pρ Qδ; x Mν X] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pτ Pu Qβ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pρ Qγ Qδ Y] Bγ Bε Bκ Cη Cι Ea Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mδ Mζ Mλ Mν Mo Mρ Mν Oζ Oξ Oτ Ou Pα Pγ Pδ Pλ Pμ Po Pτ Pu Qβ Qγ Qμ Ra Sδ Tδ Vι Wβ Xβ; *om.* Pρ Qδ Z] Bγ Bε Bκ

¹⁴ Ms Qγ copies the caption from Figura 22A.

Cη Cι Eα Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mλ Mν Mo Mο Mυ Oζ Oξ Oτ Oυ Pα Pγ Pδ Pλ Pμ Po Pο
 Pτ Pυ Qβ Qγ Qμ Rα Sδ Tδ Vι Wβ Xβ; *om.* Mδ Mζ Qδ *add.* M Bγ Cη Eτ Mλ Mν Po Pυ Vι Wβ;
 N Rα *add.* N Cη Eτ Mλ Mν Po Pυ Vι Wβ; M Rα *add.* */O¹⁵ Bγ Eτ Mλ Mν Po Pυ Vι

[Circle of signs of the zodiac]

Divided into 12, with names, and 10 | 20 | 30] Bε Eβ Fα Lγ Lε Lη Mδ Mo Oζ Oυ Pα Pδ Pμ Pο Qδ Qμ
 Sδ Tδ *Divided into 12, with names*] Bκ Cη Cι Eα Eη Eτ Fβ Lζ Mν Mο Oτ Pγ Pλ Po Pτ Pυ Qβ
 Qγ Wβ Xβ *Divided into 12, add. Taurus | Cancer | Virgo | Scorpius | Capricornus | Pisces*
 Fζ Mλ *Divided into 12*] Bγ Mζ Vι *Not divided*] Mυ Oξ Rα(*add.* Capricornus | Aquarius)

[Other information]

κ] *add.* polus zodiaci Eα SR] *add.* latitudo septentrionalis Bκ Lζ *arc DT*] *add.* 34 g' Rα
arc AM] *add.* 13 g' merid. declinatio Rα *add.* Vult' Bε¹⁶; *add.* Vlt^u Volans Eη *add.*
 Aldebaran¹⁷ Bε Eη *add.* Delfin¹⁸ Cι Fα Fζ Lγ Lη Mδ Oζ Oτ Pμ Pο Qγ; *add.* Del Mo; *add.* Delf'
 Lε; *add.* Delf' Fβ Oυ Qβ *add.* Elfeta¹⁹ Rα *add.* Arietis et Libre | equinoctii Pο *add.*
 Cancri Pο *add.* Capricorni Pο *add.* meridies Pο *add.* occidens Pο *add.* oriens
 Pο *add.* septentrio Pο *add.* tasum(?) stelle Mζ

¹⁵ Where O appears in the diagram, it actually represents the position of the star itself and is not meant to be part of the lettering system.

¹⁶ See Lists of Stars – Appendix I, α Aquilae (α Aql).

¹⁷ See Lists of Stars – Appendix I, α Tauri (α Tau).

¹⁸ See Lists of Stars – Appendix I, ε Delphini (ε Del).

¹⁹ See Lists of Stars – Appendix I, α Coronae Borealis (α CrB). This identification is not certain.

[FIGURA 22A]

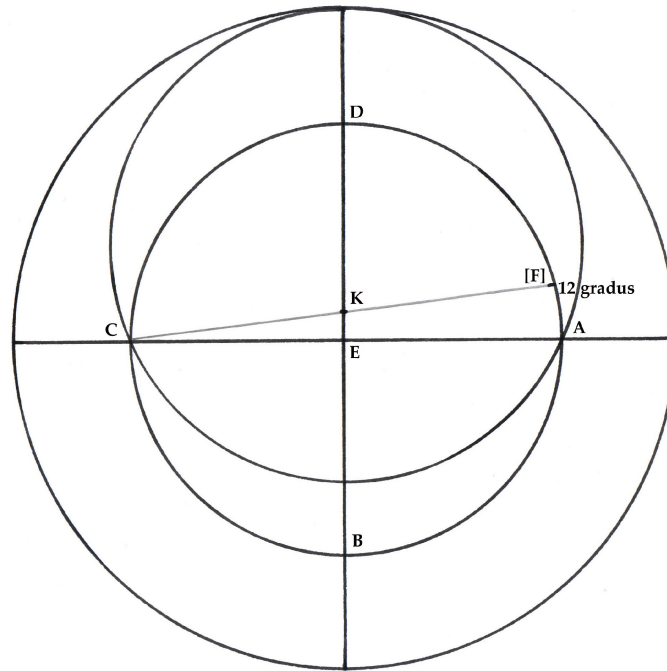


Figura inscriptionis poli zodiaci super medium declinationis

[Complete diagram] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ
 Mυ(f. 408^r) Oζ Oτ Oυ Pα Pδ Pλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ(fol. 157^v) Sδ Tδ Vβ Vι(fol. 332^v) Wβ
 Xβ

[Outline, or space only] Bθ Cε Dγ Dη Eυ Lβ Mζ Mφ Oξ Pν Qλ Vπ Vψ Wα

[No space] Bδ Eα Eδ²⁰ Eζ Mδ Nα Pγ Rα Sβ

Pθ: "Υ"

[Caption]

Figura ... declinationis] Bγ Bε Cη Eβ Eη Eτ Fβ(twice) Fζ Lγ Lε Mν Mo Mρ Mυ Oζ Oτ Oυ Pα Pλ Pμ
 Po Pρ Qβ Qγ Qδ Qμ Sδ Tδ Xβ; om. Bκ Lζ Vβ; Figura inventionis cenith zodiaci super medium
 declinationem Mη Pυ

Figura inscriptionis] Inscriptio Fα Lη inscriptionis] descriptionis Wβ super] supra Cι
 Pτ medium declinationis] declinationem totam Cι Pδ; mediam declinationem Mλ Vι Wβ

add. Figura per fine capituli 22ⁱ Bε add. Secundus est finis figurarum astrolabii. Deo
 gratias Qμ

²⁰ The diagrams in ms Eδ are unrelated to the text.

[Lettering on the diagram]

A] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ Mu Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vβ Vi Wβ Xβ B] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mλ Mν Mo Mρ Mu Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vβ Vi Wβ Xβ; om. Mη C] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ Mu Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vβ Vi Wβ Xβ D] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ Mu Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vβ Vi Wβ Xβ E] Bε Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lη Mη Mλ Mν Mo Mρ Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vi Wβ Xβ; om. Bγ Bκ Cη Lζ Mu Pρ Vβ K] Bγ Bε Bκ Cη Cι Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ Oζ Oτ Ou Πα Pδ Πλ Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vi Wβ Xβ; om. Mu Vβ add. F] Bγ Mη Mλ Mν Po Pυ Vi

[Other information]

K] *add.* polus zodiaci Lζ Pρ F] 12 Mu Πλ; *add.* 12 gradus Bε Bκ Cη Eβ Eη Eτ Fα Fβ Fζ Lγ Lε Lζ Lη Mη Mλ Mν Mo Mρ Oζ Oτ Ou Πα Pμ Po Pρ Pτ Pυ Qβ Qγ Qδ Qμ Sδ Tδ Vi Wβ Xβ; om. Bγ Cι Pδ Vβ *add.* 24 Bκ Lζ; *add.* 24 gradus Eτ Mη Mν Mρ Mu Po Pυ Vi *add.* circulus Arietis et Libre Pρ *add.* circulus Arietis et Libre sive equinoctio diei Pρ *add.* circulus Cancri Pρ *add.* circulus Capricorni Pρ *add.* meridies Pρ *add.* occidentis Pρ *add.* orientis Pρ