

Apianus: Astronomicum Caesareum

Corrections for the Facsimile

Three types of corrections must be made to the Leipzig facsimile in order to reproduce the book as originally published in Ingolstadt in 1540; unless these corrections are made, it will be impossible to use the book as intended for predicting planetary positions.

1. Several assemblies must be moved to different folios: in particular, the lunar assembly found on folio C belongs on F II; the upper disk found on F II belongs on G V, but the lower disk on F II should go on G IIIb, and in turn the lower disk on G IIIb belongs on [G 5].
2. Nearly every instrument requires a central thread. Each planetary longitude assembly requires three threads, from points E and A in the center and from point F on the epicycle. The planetary latitude mechanisms should have central threads with small seed pearls and the quadrant on [M 4] requires two threads with seed pearls from the lower left corner A.
3. The internal gluing of all of the planetary longitude mechanisms has been done incorrectly in the facsimile

and sometimes it is necessary to cut the hole required in the lowermost disk. Because the mechanisms have unfortunately not been assembled in a uniform manner, the procedure will vary from one planet to another and from one copy of the facsimile to another. The detailed instructions for Saturn will suffice for Jupiter, Mars and Venus as well.

Detailed Instructions

- ✓ [B3] Requires central thread on planisphere. ✓ Add small printed pieces to edge of planisphere (3 of them). If stub X beside the trepidation oval on the planisphere is set at $0^S 0^0$, the stub "Y Aux Communis" must be completed at $0^S 18^0 30'$; the stub "Aux ♂" must be added at $4^S 14^0$ (just below the spar for the mast of Argo Navis); the stub "Aux ♀" must be completed at $6^S 29^0 30'$ (just below the hindmost foot of Centaurus).
- C Remove all volvelles and add central thread. This change can be made more swiftly if the newly-reprinted central circle with the four colored quadrants is glued onto the center.
- ✓ [C3] Saturn: identification list--
- | | |
|----------------|-------------------|
| M (Mean motus) | (26 cm. diameter) |
| Aux | (25 cm.) |
| Deferens | (22.5 cm.) |
| Equantis | (3 cm.) |

according to several different erroneous schemes. The planetary longitude mechanisms are found as follows:
 Saturn, [C 3]; Jupiter, D [1]; Mars, [D 3]; Venus, E 2;
 Mercury, [E 4]; Moon, F 2.

The scheme for Saturn, Jupiter, Mars and Venus is the same. To test if these are working correctly:

(a) The lowermost disk must rotate independently and concentrically to the pattern printed on the page.

(b) The second disk must rotate concentrically over the lowermost disk, and must carry the small inner disk; the small inner disk must keep the end of the line labelled "E equantis" always in the direction of the "P AUX" stub on the second disk.

(c) The Third and uppermost large "DEFERENS" disk, which carries the pair of rotatable epicycle disks, must turn independently and concentrically about the small inner disk. In other words, the two large lower disks rotate about a different axis than the uppermost "DEFERENS: disk.

In most instances these planetary longitude mechanisms must be cut loose from the page and repaired with the addition of new concealed parts. Sometimes it is necessary to cover a hole mistakenly cut in the second large disk,

1. Remove all the disks by inserting a knife between the M and Aux disks, etc.
2. On the folio page, carefully centered, there will be glued a ring 13 cm in diameter, together with a spindle that moves freely inside it. (The facsimile has been reproduced with such remarkable detail that the gluing stain of the original ring can be seen on the verso of the folio leaf.) On the enclosed sheets of new parts, the ring is labeled A and the three pieces of the spindle are labeled B_1 , B_2 and B_3 .
 - 2a. Glue the circles B_3 and B_2 on top of each other and to the center of B_1 ; important--be sure to glue these pieces completely to the edge of the circles so that the larger disks cannot later slip into them between the pieces.
 - 2b. Glue the ring A, onto the folio page exactly centered in the frame, and containing the freely-moving assembly B_{1-3} .

3. Use the large template to cut a hole 6.5 cm in diameter in the large M disk, exactly centered. The M disk will now fit over the B_3 spindle, and will turn freely and concentrically; no glue is required.
4. Glue the Aux disk directly onto the 6.5 cm B_3 spindle. (Take care to place the glue at the outermost periphery of the spindle so that disk M cannot be pushed off-center.)
5. Glue the small top spindle (2.4 cm diameter) into the hole erroneously cut in the Aux disk.
6. Make sure that the small central Equantis disk has two and only two threads; from E and from A.
7. The small central Equantis disk with its two strings must be removed, carefully centered on the upper spindle, and reglued so that it is aligned with the P stub on the Aux disk, with the words "E equantis" toward the stub P. In other words, the Deferens disk will now turn freely between the Aux and small Equantis disks, but the Aux and small Equantis disks are fastened together and turn together. The alignment of the Equantis disk with the P stub is very important.

[C4] Saturn latitude: requires central thread with seed pearl.

✓ D Jupiter longitude (same as Saturn, [C3])

DII Jupiter latitude: requires central thread with seed pearl.

✓ DIII Mars longitude: exactly the same as Saturn, [C3]

[D4] Mars Latitude: The thread requires a seed pearl.

EII Venus longitude: exactly the same as Saturn, [C3]

EIII Venus latitude: the thread requires a seed pearl.

[E4] Mercury longitude: identification list--

| | |
|--------------|-------------------|
| M | (26 cm. diameter) |
| Aux | (25 cm.) |
| Aux equantis | (23 cm.) |
| Deferens | (21 cm.) |
| Equans | (6 cm.) |
| Mundi | (4 cm.) |

1. Remove the disks from the page, and fasten the two lower disks in the same manner as for Saturn. Follow those instructions through #6.
2. Use a curved manicure scissors to carefully enlarge the holes in the small green Equans disk and the blue Aux-equantis disks by cutting out the black rings as precisely as possible.

3. Glue a new spindle 3.3 cm. in diameter (made by gluing together the three circles on the large sheet of parts) onto the yellow Aux disk on the printed circle provided.
4. Glue a new eccentric spindle (5.7 cm. in diameter) onto the blue Aux-equantis disk on the printed circle provided. This eccentric spindle is found on the large sheet of new parts; the small eccentric hole must be cut out.
5. Sub-assembly: Place the deferens disk over the new eccentric spindle (so that it can turn freely) and glue on the small green Equans disk, matching the direction of the lines on the blue Aux-equantis and green equans disks. This alignment is important.
6. Place the sub-assembly (Aux-equantis, Deferens, Equans) over the smaller spindle on the Aux disk, and glue the small Mundi disk on top, carefully centered on the spindle, and aligned with the P stub of the Aux disk (with the word "Deferentis" toward P).

- F Mercury latitude: the thread requires a seed pearl.
FII Moon's longitude

Remove the disks now on FII, and take off the small central medallion picturing the earth. It is necessary to place the assembly formerly on C1 onto this page. This can be done simply by gluing down the central spindle so that three large disks turn concentrically. The earth-medallion, with a thread from A, should be glued to the central spindle. there must also be two other colored threads, from E, and from the center of the epicycle.

[Note: in the original publication, there was a fixed spindle connecting the earth-medallian directly to the page FII, so that the earth did not rotate. An eccentric spindle piece has been provided on the large sheet of new parts for those wishing to rework this assembly more completely. However, it should work properly without these additional changes.]

FIII Requires central thread.

[F4] Requires central thread.

G Lunar-solar aspects with the other planets:

Requires a central thread with seed pearl.

GII Aspects of the planets among themselves:

Requires a central thread with seed pearl.

GIII verso

1. Insert a knife and remove the entire assembly.
2. Lay aside the lowest, buff-colored disk, and replace it with the lower disk formerly on F II.
3. Glue the assembly back onto G III verso.

[G5] New and full moons

1. Remove the redundant paper ring from the uppermost disk formerly on F II.
2. Place the uppermost disk formerly on FII and the lowermost disk formerly on G III verso onto this page, [G5]. It is necessary to have a new spindle and central flower disk and thread.

3. Attach new stub to the lower disk, ^{found on large sheet of new parts.}

H Requires central thread with seed pearl.

HII Move thread to center.

JII Both threads require seed pearls.

KIII Requires new special central disk, printed on large sheet of new parts, and a central thread.

[K4] - MIII Requires central thread.

[M4] Requires two threads with seed pearls from
diamond near A in lower left corner.