

Digital Bonus : WEDGE
Fred Sawyer (Glastonbury CT)

The digital edition of this issue of *The Compendium* includes a bonus program: WEDGE, which provides a calculation of all the angles needed for the wedge technique outlined in the discussion of Nicole's project to reposition her sundial.

The program requires the user to input any 3 of the 6 quantities: Latitude L2, Latitude of the dial as a horizontal L1, Longitude difference M2-M1, Inclination I of the wedge, Rotation R of the dial on the wedge, or declination D of the wedge. Once any 3 of these values are given, the other 3 are calculated by pressing F1, thus taking much of the mental labor out of the enterprise of setting up a dial in a location other than the one for which it was designed.

It also makes easy work of the more general problem considered by René Vinck: dealing with a dial that does not begin as a horizontal.

The values of L1 and M1 are constants of the dial; they do not change, no matter where the dial is positioned. In the notation used in my own article, these constants are L1 and M1.

| | WEDGE | Vinck | Value |
|--------|-------|-------|-----------|
| Input | L2 | L | 40°N |
| Output | L1 | L' | 43.9692°S |
| | M2 | - | 0° |
| | M1 | - | 35.9589° |
| Output | M2-M1 | dg | -35.9589° |
| Input | I | I | 90° |
| Output | R | ds | 26.7324° |
| Input | D | D | -25° |

(Vinck says that L' and dg are constants. The value of dg is actually equivalent to M2-M1, but

since Vinck begins with an assumption that M2 = 0°, we have dg = M2 - M1 = -M1 and dg is therefore constant, given his initial assumption).

Now, to consider his example: given a vertical declining dial (which indicates local solar time) at latitude 40°N with declination 25° E of S, we input the latitude L2 = 40°, the inclination I = 90° and the declination D = -25° to obtain the values of Table 1. This process finds the constants L1 and M1 of the dial: L1 = 43.9692°S and M1 = 35.9589°. By assumption, M2 = 0°.

Now re-run the Wedge program using these values of L1, M1 and M2 and inputting the new latitude (51°N) where you wish to reposition the given vertical decliner. The result is Table 2.

| | WEDGE | Vinck | Value |
|--------|-------|-------|-----------------|
| Input | L2 | L | 51°N |
| Input | L1 | L' | 43.9692°S |
| | M2 | - | 0° |
| | M1 | - | 35.9589° |
| Input | M2-M1 | dg | -35.9589° |
| Output | I | I | 99.9583° |
| Output | R | ds | 22.0362° |
| Output | D | D | 25.4094° E of S |

We now see that to reposition the dial at L2 = 51°, we need to 1) change its declination to -25.4094°, 2) lean the dial forward somewhat so that its inclination becomes 99.9583°, and 3) rotate it on its supporting wall counterclockwise by 4.6962° (i.e. 22.0362° - 26.7324°).

Fred Sawyer
8 Sachem Drive Glastonbury CT 06033
frederick.sawyer.es.72@aya.yale.edu