The Sundial Primer
SONNE and Your
Horizontal/Vertical/Inclining Sundial

created by
Carl Sabanski

At this point I assume that you have downloaded and set up SONNE on your computer and have also read the overview document. If not please read “Getting Started with SONNE” and “SONNE and Your Sundial”.

These instructions will help you learn how to use SONNE to design a horizontal, vertical or inclining sundial. Initiate the program SONNE. After entering the required information in the “Location and Reference Year” screen you will go to the “Type of Sundial” screen shown in Figure 1. There are selections here for horizontal, vertical and inclining / reclining sundials. Select the type of sundial you want to design.

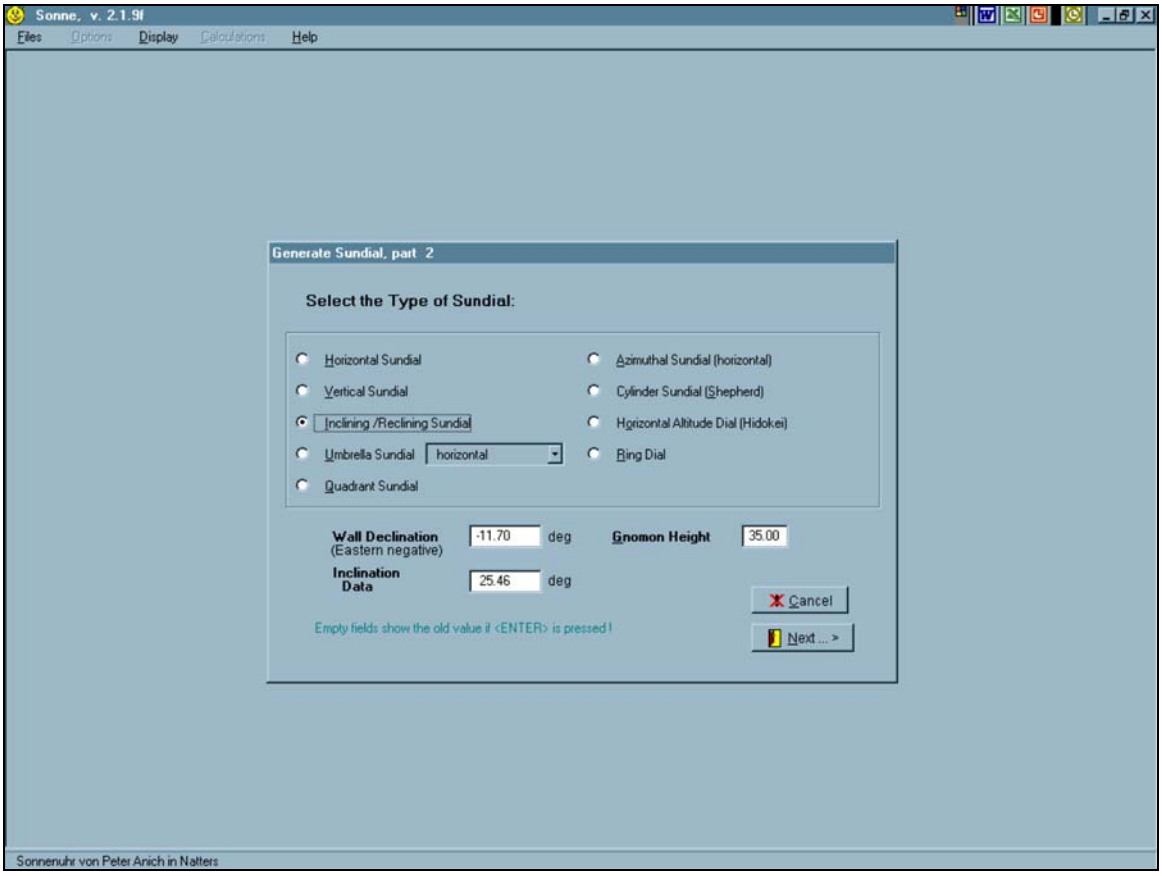

Figure 1: Type of Sundial

The parameters for horizontal, vertical and inclining sundials are entered on a single input sheet. This is shown in Figure 2 and is the “Parameter of Sundials” screen. Here information is entered that is relevant to the design of the sundial. The following describes the various entries and selections that can be made in this screen.

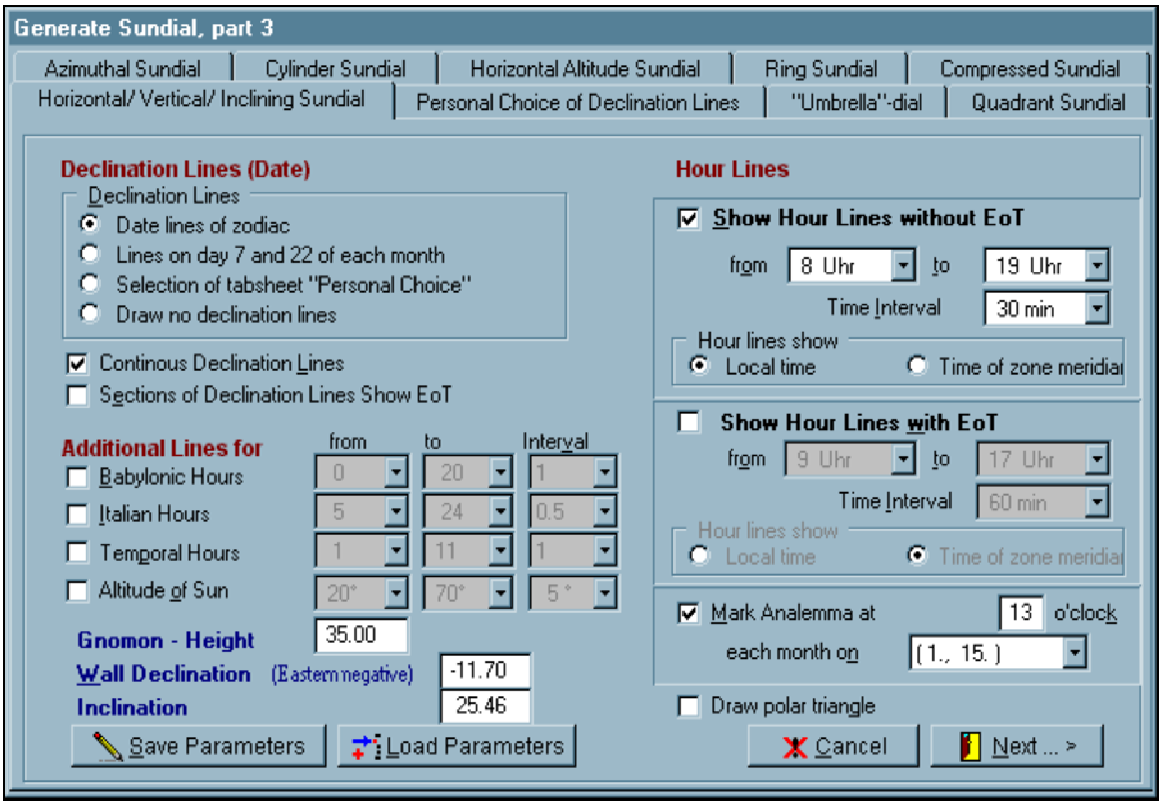

Figure 2: Horizontal/Vertical/Inclining Sundial

If a “Horizontal Sundial “ is selected the “Wall Declination” and “Inclination” data cannot be changed. The “Gnomon-Height” can be changed. If a “Vertical Sundial “ is selected the “Inclination” data cannot be changed. The “Wall Declination” and “Gnomon-Height” can be changed. If an “Inclining/Reclining Sundial “ is selected the “Wall Declination”, “Inclination” and “Gnomon-Height” data can be changed.

Hour Lines

This area is divided into 3 sections and you start from the top and work you way down.

- **Show Hour Lines without EoT**
  - Select the range of hours the sundial will display using the 24 hour clock; midnight = 0/24 Uhr, 6 a.m. = 6 Uhr, noon = 12 Uhr, 6 p.m. = 18 Uhr. Enter the earliest time in “from’ and the latest in “to”. If the range is entered as “from” 0 Uhr “to” 24 Uhr the program will automatically display only the hours that the sundial is illuminated at a given location.
  - Select the “Time Interval” between the hour lines; 10, 15, 20, 30 or 60 minutes.
  - Select the type of hour lines that will be shown. “Local time” will display hour lines that show local apparent or sun time. “Time of zone meridian” will display

hour lines that show zonal solar time, which is local apparent time corrected for longitude but not the Equation of Time.

- **Show Hour Lines with EoT**
  Select the range of hours, the time interval and the type of hours the sundial will display as described above. The EoT will be displayed as an analemma or figure 8 on the selected hour lines. If the "Time Interval" selected is small the sundial will become very busy with overlapping analemma and will be difficult to read. Try it and see. The type of hour lines shown would normally be the same type as selected above. Again, try this out and you will see why.

- **Mark Analemma at**
  This option will mark the analemma for the time selected at given days of each month; (1), (1, 15), (7, 22), (1, 11, 21), (1, 8, 15, 22). This will allow you to use that particular hour line to determine the date. The first day of the month is shown as a filled red circle and intermediate days are shown as empty circles.

Declination Lines (Date)

There are six selections for the declination lines as follows:

- **Date lines of zodiac**
  This option will draw 7 declination lines and includes the solstices and equinoxes.
- **Lines on day 7 and 22 of each month**
  This option will draw 2 declination lines each month and includes the solstices and equinoxes.
- **Selection of tabsheet "Personal Choice"**
  This option will draw any declination lines included in the tabsheet "Personal Choice". This is a way to include a special date(s) such as a birthday, anniversary, etc.
- **Draw no declination lines**
  This option will draw no declination lines. Although no lines are drawn, the hour lines are still terminated at the solstice lines as though they were there. The hour lines will not carry on to the origin.
- **Continuous Declination Lines**
  The declination lines will be drawn as continuous lines.
- **Sections of Declination Lines Show EoT**
  The declination lines will be drawn as dashed lines, on for 15 minutes and then off for 15 minutes with every second section starting at the beginning of a full hour mean time from June 21 to Dececember 21. This option was intended to help read mean time when there weren't as many time intervals available.

Additional Lines for

Additional hour lines can be shown on the sundial for Babylonic, Italian or Temporal hours. Read the "SONNE Glossary" for definitions of these kinds of hours. These hour lines can be used with or without the hour lines discussed above. The sundial will become very busy so be careful what you select and have a purpose in mind. An interesting sundial can be created by using only Italian hours that are numbered in a countdown fashion. This sundial can be used to display the time left before sunset.

Lines that show the altitude of the sun can be shown on the sundial.

Draw polar triangle

This selection will draw a triangle that represents the gnomon for the sundial based on the "Gnomon-Height". Without it only the position for a pin or perpendicular gnomon is shown as a small circle. The triangle can be used as a template to build a gnomon. It also shows the origin of the sundial that is the point from where all the hour lines begin.

When all the sundial parameters have been entered select the "Save Parameters" button.

Sundial Type	Time Zone	Longitude	Latitude	Inclination	Wall Declination
equatorial (upper face)	TZ	LON	phi	90-phi	180
equatorial (lower face)	TZ	LON	phi	90+phi	0
polar	TZ	LON	phi	phi	0
horizontal	TZ	LON	phi	0	0
vertical south (NH) vertical north (SH)	TZ	LON	phi	90	0
vertical north (NH) vertical south (SH)	TZ	LON	phi	90	180
vertical east	TZ	LON	phi	90	-90
vertical west	TZ	LON	phi	90	90
vertical declining	TZ	LON	phi	90	d
inclining	TZ	LON	phi	i	0
inclining/declining	TZ	LON	phi	i	d
NH: Northern Hemisphere, SH: Southern Hemisphere					

Table 1: Sundial Configuration Table

Personal Choice of Declination Lines

This sheet is shown in Figure 3 and allows you to include declination lines on your sundial for any day of the year. In this way the sundial can be personalized to show a birthday, anniversary or any other special day. Just enter “day/month” and select the “Date into List” button. The list can also be saved.

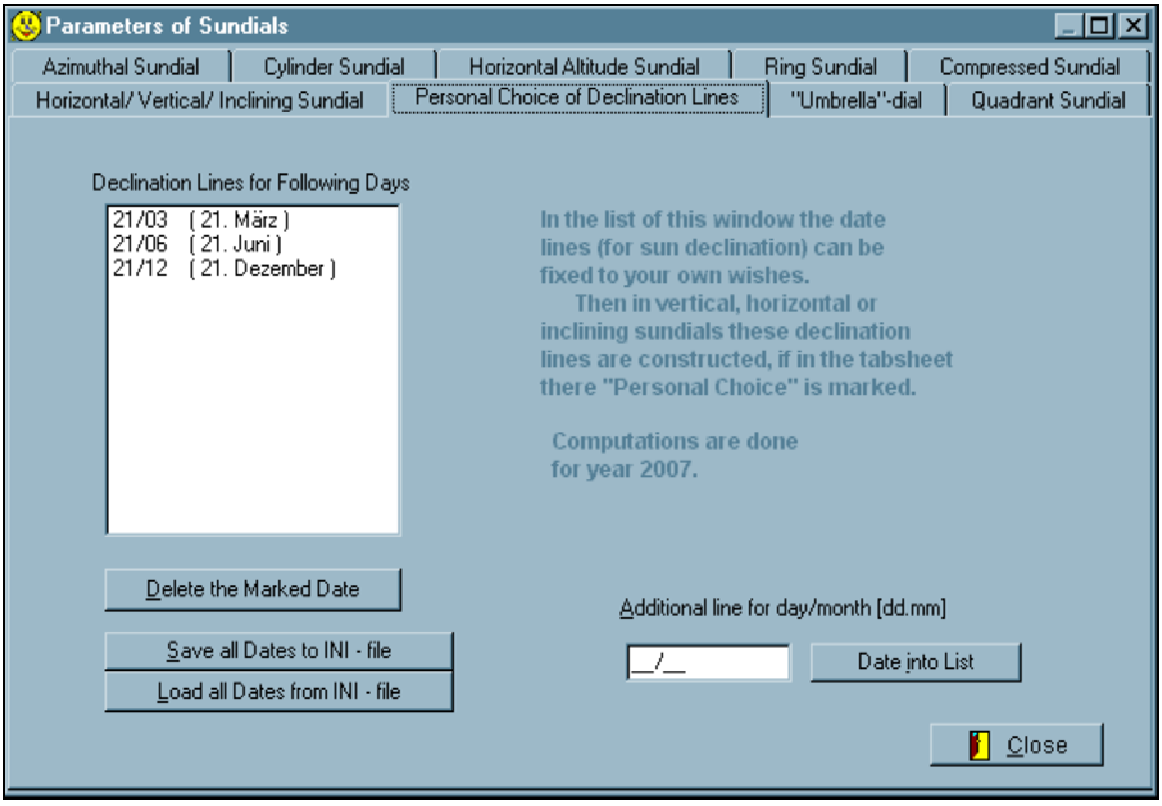

Figure 3: Personal Choice of Declination Lines

The following are examples of designs for horizontal, vertical and vertical declining sundials.

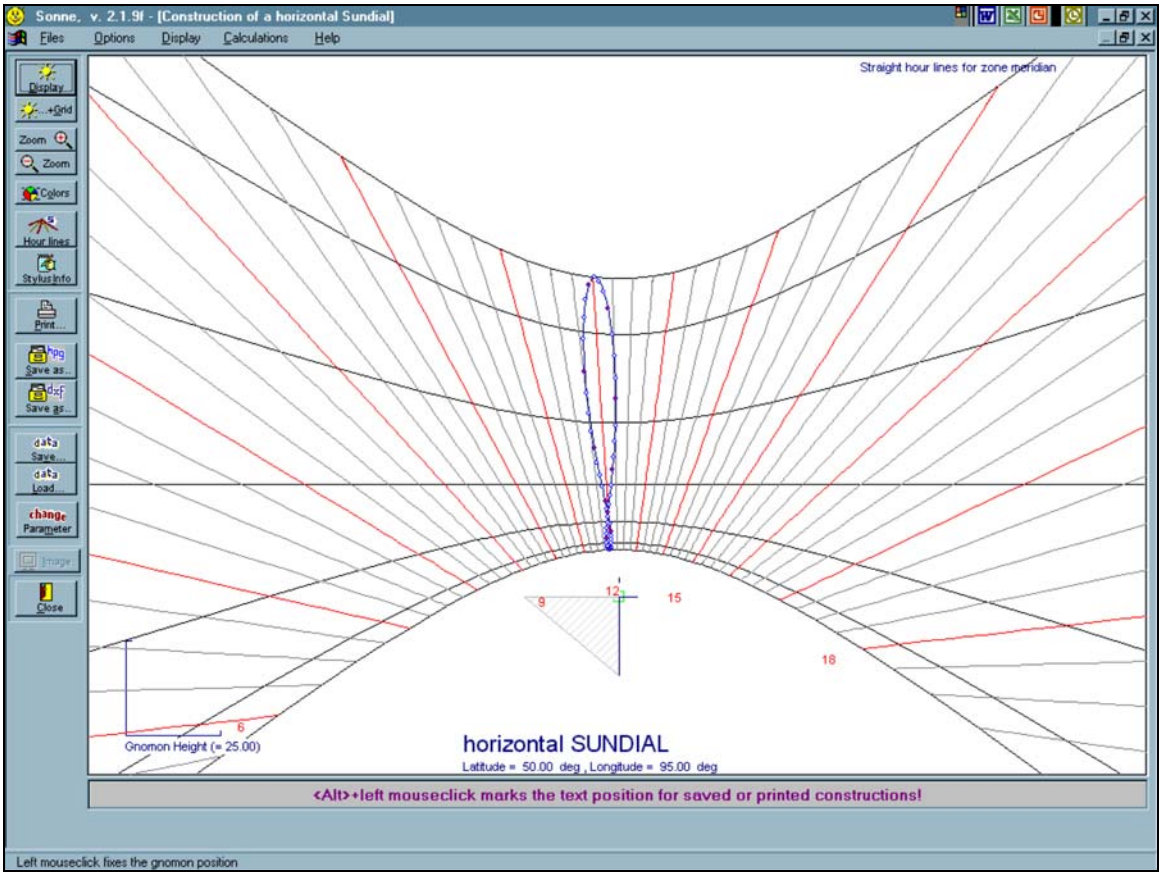

Figure 4: Horizontal Sundial

The following are the parameters used to design the horizontal sundial shown in Figure 4.

- Latitude: 50º North
- Longitude: 95º West
- Time Zone: 90º West
- Selected Year: 2007
- Declination Lines: Date lines of zodiac
- Continuous Declination Lines
- Gnomon Height: 25.00
- Show Hour Lines without EoT: from 0 Uhr to 24 Uhr, Time Interval 15 min
- Mark Analemma at: 12 o'clock each month on (1, 8, 15, 22)
- Draw polar triangle

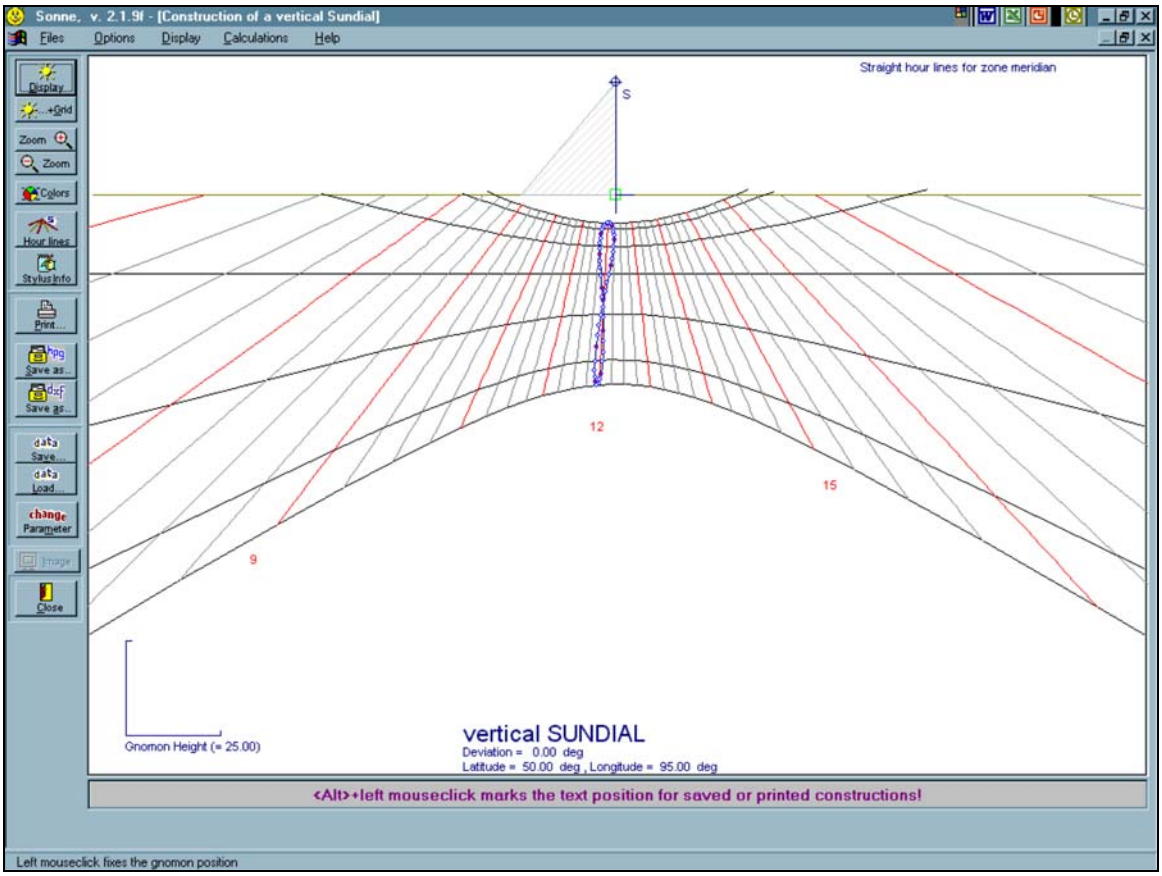

Figure 5: Vertical Sundial

The following are the parameters used to design the vertical sundial shown in Figure 5.

- Latitude: 50º North
- Longitude: 95º West
- Time Zone: 90º West
- Selected Year: 2007
- Declination Lines: Date lines of zodiac
- Continuous Declination Lines
- Gnomon Height: 25.00
- Show Hour Lines without EoT: from 0 Uhr to 24 Uhr, Time Interval 15 min
- Mark Analemma at: 12 o'clock each month on (1, 8, 15, 22)
- Draw polar triangle

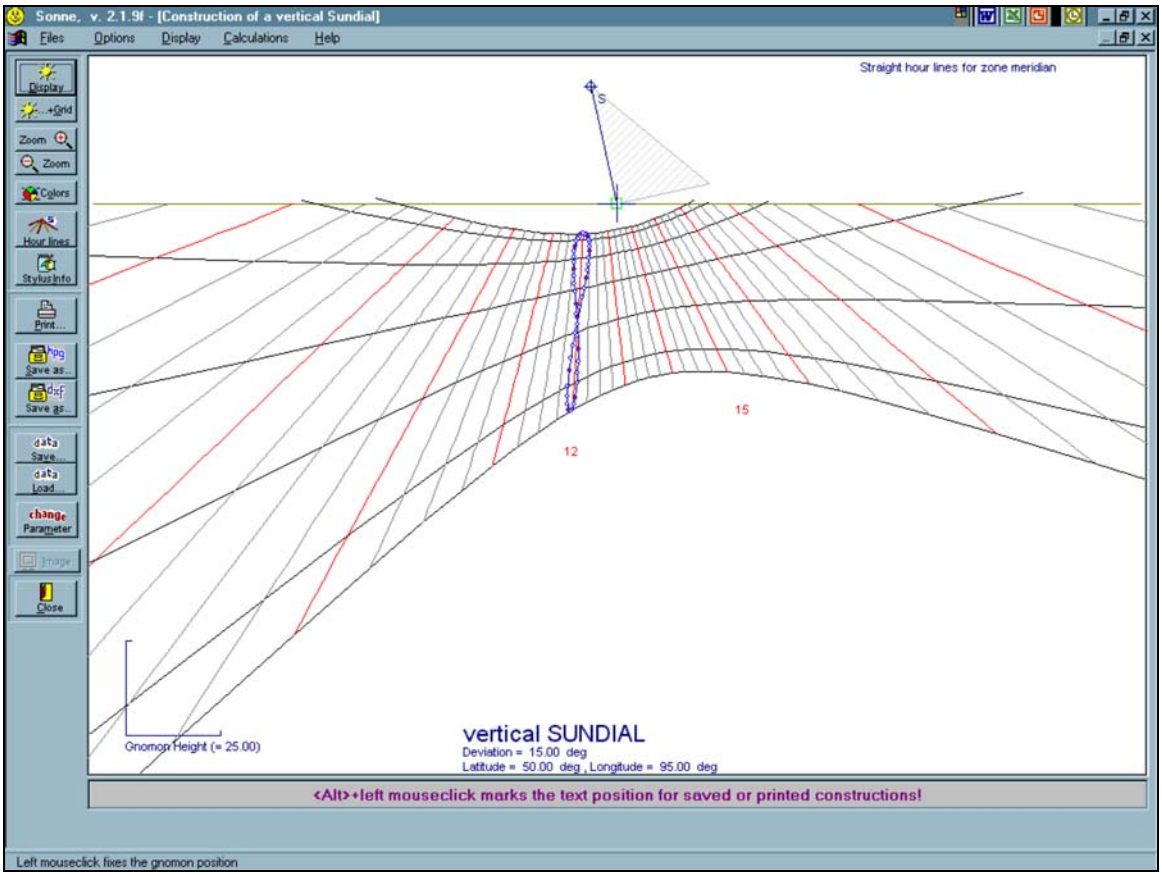

Figure 6: Vertical Declining Sundial

The following are the parameters used to design the vertical declining sundial shown in Figure 5.

- Latitude: 50º North
- Longitude: 95º West
- Time Zone: 90º West
- Selected Year: 2007
- Declination Lines: Date lines of zodiac
- Continuous Declination Lines
- Gnomon Height: 25.00
- Declination: 15º West
- Show Hour Lines without EoT: from 0 Uhr to 24 Uhr, Time Interval 15 min
- Mark Analemma at: 12 o'clock each month on (1, 8, 15, 22)
- Draw polar triangle

HAPPY DIALLING!