

# The Digital Sundial

Congratulations on purchasing the digital sundial. Designed and hand-built in Germany, the digital sundial is a precision instrument for indoor use. It operates without electricity, and has no moving parts. Instead, the sunlight is cast through masks in the shape of numbers that show the current time of day. The numbers can be read easily and with high contrast through the horizontal mirror. The accuracy and readability greatly surpass that of traditional sundials.

The digital sundial includes a window mount and a tabletop mount. Either mount positions the sundial display at the proper angle (preset to your geographic location), and positions the mirror horizontally below. The following parts are included:

- Display and mirror;
- Parts for the window mount: long angled bar, suction cup, distancing ball;
- Parts for the tabletop mount: short angled bar, base plate.

## Installation instructions (see attached sheet)

Select a south-facing window. The digital sundial can be attached to the windowpane (A), or it can be placed on the windowsill or on a nearby table (B).

### A – Window mount (use the long angled bar):

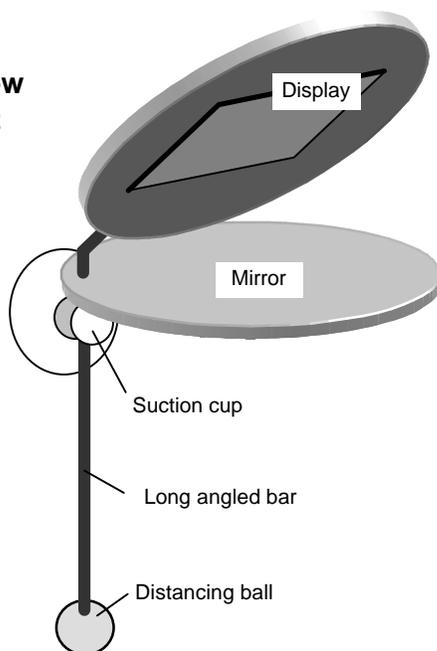
1. Slide the mirror onto the long end of the angled bar, and position it close to the bend in the bar. The mirror's reflecting side should face up.
2. Slide the suction cup onto the long end of the angled bar and position it right below the mirror.

3. Attach the distancing ball to the bottom end of the bar (the ball keeps the bar parallel to the windowpane).
4. Attach the sundial display to the short angled end of the bar. The smooth side of the display should face upwards, and the side with the rectangular mask should face towards the mirror.
5. Peel off the protective plastic film from the mirror surface and from the smooth side of the display. *Do not peel off the rectangular mask!*
6. Moisten the suction cup and attach the sundial to the windowpane, about 1-2 feet below eye-level.

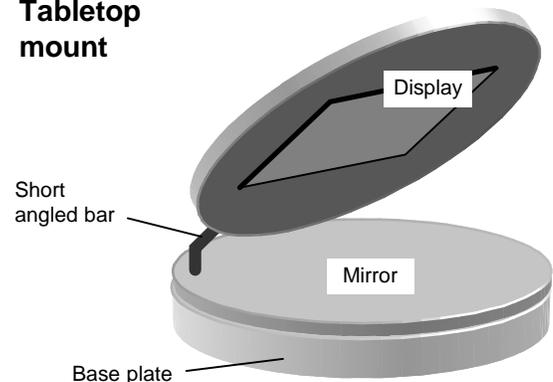
### B – Tabletop mount (use the short angled bar):

1. Slide the mirror onto one end of the angled bar, and position it close to the bend in the bar. The mirror's reflecting side should face up.
2. Remove the protective plastic film from both sides of the base plate.
3. Stick the angled bar into the hole in the base plate such that the mirror rests directly on the base plate.
4. Attach the sundial display to the other end of the bar. The smooth side of the display should face upwards, and the side with the rectangular mask should face towards the mirror.
5. Peel off the protective plastic film from the mirror surface and from the smooth side of the display. *Do not peel off the rectangular mask!*
6. Place the sundial on the windowsill or on a table close to the window.

### A – Window mount



### B – Tabletop mount



## Positioning the sundial and setting the time

For maximal accuracy of the displayed time, the axis of the sundial display needs to be positioned parallel to the axis of the earth, just like the gnomon of a regular sundial. To do this, point the upper angled end of the bar towards north, perhaps using a compass. Since the angle of the bar is pre-set to the approximate latitude of your geographic location, no further adjustment is necessary.

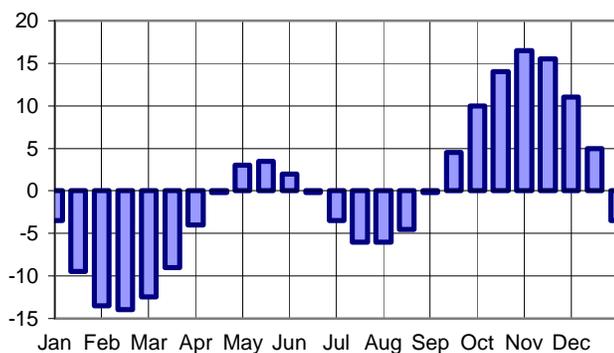
On a sunny day, set the time by rotating the display on the angled end of the bar. Note: Do not change the position of the bar (which should remain pointing north), but only rotate the display itself, until it shows the correct time. Daylight saving changes can be accommodated in the same manner.

## Reading the time

Reading the sundial is easy – simply read the displayed numbers, which change every 10 minutes, from about 8:30 AM until 5:30 PM. More precise readings are possible by observing the brightness of the displayed minutes. For example, if both “40” and “50” are visible with equal brightness, it is 45 minutes after the hour. As do all sundials, the digital sundial requires bright sunlight to work well. If the sky is overcast, the diffuse light will cause multiple numbers to appear at the same time.

Note that sundials show the true *solar* time, rather than the *standard* (“mean”) time displayed by mechanical and electronic clocks. Solar time and standard time differ by varying amounts during the course of a year. This difference is called the “equation of time”, and is shown below:

Equation of Time (minutes)



On January 1, for example, a sundial will run about 3 minutes slow; on October 15, it will be about 14 minutes fast compared to a clock showing standard time. If desired, the digital sundial can be adjusted from time to time to accommodate this changing difference, by rotating the display on the end of the angled bar as described above.

## How it works

The principle underlying the digital sundial is amazingly simple. Two photographic masks are separated by a thin sheet of plexiglas. The first mask is a regular array of thin vertical slits, casting a striped pattern of light onto the second mask. This second mask contains all the numbers to be displayed during the day, cut into vertical stripes, and interleaved in such a way that only a single number's stripes are illuminated at a time. As the sun moves through the sky, the illuminated numbers change to indicate the current time. During transition times, two hours will be visible simultaneously. The displayed minutes can help disambiguate these situations.

To ensure maximum quality and a highly accurate time display, each sundial is manufactured by hand to extremely precise specifications. For example, the two masks need to be aligned with a precision of 1/10,000 inch!

## Caring for your digital sundial

The digital sundial is built to last a lifetime. No special care is required, except for occasional dusting with a soft brush or cloth, for example, a lens-cleaning cloth. Do not use abrasive cleaners, which can scratch the sensitive plexiglas surfaces. If the sundial does get damaged, replacement parts can be ordered at the address below.

## Contact information

For more information, spare parts, angled bars for other latitudes, etc., please visit our web page at [www.digitalsundial.com](http://www.digitalsundial.com). E-mail inquiries can be sent to [info@digitalsundial.com](mailto:info@digitalsundial.com). Surface mail should be addressed to:

Digital Sundials International  
4194 Snake Mountain Road  
Weybridge, VT 05753  
USA

**WARNING!** Keep out of reach of small children. The digital sundial is not a toy and contains small parts that could pose a **choking hazard**.

**WARNING!** When reading or adjusting the digital sundial, never look directly or through the mirror into the sun. Severe eye injury may result.