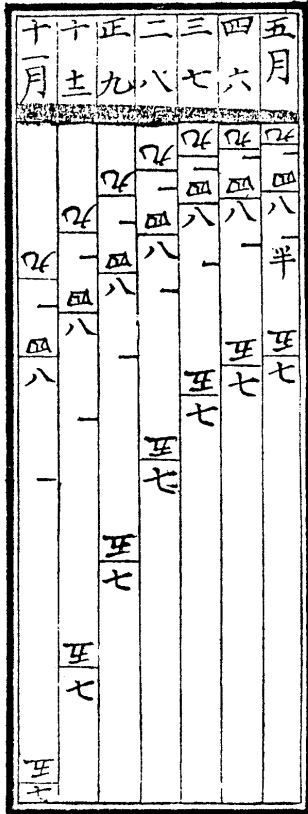


**Basho Hidokei – A Traditional Japanese Sundial**  
Fred Sawyer (Glastonbury CT)



*A Modern Reproduction by Prof. Akio Gotoh  
For latitude 35°N*

The Japanese term for a sundial is “hidokei”:

Hi – day / sun

Do – time / hour

Kei – plot / measure

The hidokei we consider here is a traditional Edo-era (1603-1867) Japanese paper sundial .

It is simple to use, exceptionally portable, and ideal for the traveler who wishes to carry a light load. Indeed, historically a common place to find the hidokei was on one panel of a folding map intended for travelers; thus, the map not only allowed you to follow your route, but it also had a means to help you time your progress.

At least one modern producer of this dial has called it the Basho hidokei. ‘Basho’ is the

pseudonym of Matsuo Munefusa (1644-1694), the seventeenth century Japanese master of haiku poetry. Although there is no strong evidence that Basho ever actually used this form of hidokei, his name and the dial are probably linked together because of Basho’s identification as an Edo-era traveler. Basho made several pilgrimages through the provinces of Japan, composing haiku and writing travel journals. These journals, in particular *Oku no Hosomichi* (Back Roads to Far Towns), have become classics of Japanese literature.

This hidokei is a horizontal altitude sundial. It is rectangular in form and divided into a number of columns, each column corresponding to some period of time (e.g. a particular month). Slits along the sides of the top portions of each column form a sequence of tabs. To use the hidokei, the traveler holds it on a horizontal surface and folds the tab for the current month up so that it stands vertically. The hidokei is then turned until the shadow of the upright tab falls exactly within the confines of its own column. The time is read from the position of the end of the shadow among the hour numbers or curves drawn on the lower portion of the hidokei.

The form illustrated here by Prof. Akio Gotoh uses columns to relate to more than one month, treating the hour lines as (approximately) symmetric about the summer solstice. The month designations at the top are: (g = gatsu or month)

Hidokei	Modern Form
11 10 1 2 3 4 5	D N F M A M J
g 12 9 8 7 6 g	J O S A J

Note that we have specified the 11<sup>th</sup> month as December. This situation may be somewhat perplexing, particularly since the Japanese term for November (not December) is Juulchi gatsu, literally the 11<sup>th</sup> month. To avoid confusion, we should recall that Japan did not adopt the Gregorian calendar until 1873. Before that date, there were generally two calendars in use. The official calendar was lunar, and is not easily applied to the hidokei. However, the common folk and farmers - people sensitive to the seasons

- used a solar calendar which recorded the beginning of the year as RisShun 立春 (Spring - Feb. 4). So, for approximate use with the modern Gregorian calendar, the columns must be offset by 1 month – e.g. the 11th month on the traditional calendar corresponded to the modern December, and the 5th month corresponded to June.

Feb 4	RisShun	Spring Begins
May 6	RikKa	Summer Begins
Aug 8	RisShuu	Autumn Begins
Nov 7	RiTou	Winter Begins

The time markings correspond to an ancient Japanese system of bells which announced the official time. The markings indicate daytime Toki 時 or time periods roughly equivalent to 2 temporary hours (i.e. 1/6<sup>th</sup> of the duration of sunlight on any given day). They progress from 6 bells at sunrise, to 5 bells 五 at 8am, to 4 bells 四 at 10am. They jump to 9 bells 九 at noon, and then decrease to 8 bells 八 at 2 pm and 7 bells 七 at 4pm. The sun sets at 6 bells. The morning and noon markers are upside-down here, while the afternoon markers are right-side up. This puzzling bell system (which continually cycles between 9 and 4 bells, night and day) has so far evaded attempts by historians to explain its origin.

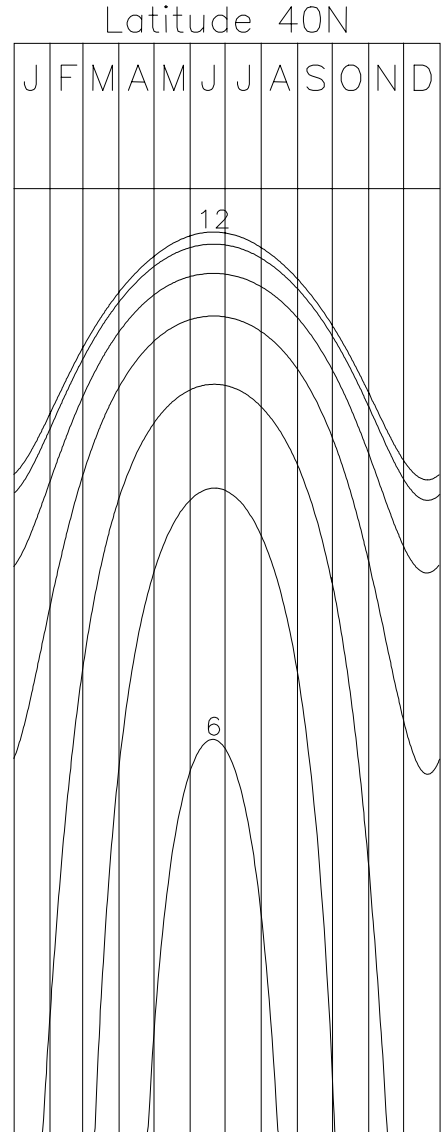
6 bells at sunrise	9 bells 九: noon
5 bells 五: 8am	8 bells 八: 2 pm
4 bells 四: 10am	7 bells 七: 4pm
	6 bells at sunset

If we replace the traditional Toki with modern equal hours, devote a column to each of the 12 months, and connect the hour points to make smooth lines for interpolation purposes, we have a sundial in the form given below.

*Special Thanks to Reinhold Kriegler of Bremen, Germany and to Prof. Akio Gotoh of Nara City, Japan for their assistance in preparing this material.*

This hidokei allocates a distinct column for each month of the year. The hour curves indicate solar time in modern equal hours rather than the traditional, variable-length temporary hours.

To use the hidokei, hold it on a horizontal surface and fold the tab for the current month up so that it



stands vertically. Turn the hidokei until the shadow of the upright tab falls exactly within its own column. The time is read from the position of the end of the shadow among the hour curves drawn on the lower portion of the hidokei.

Noon is the curve nearest to the month tabs. The curves increase in one hour increments down the column. Time is indicated by a continuous curve to allow for interpolation within a month.

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