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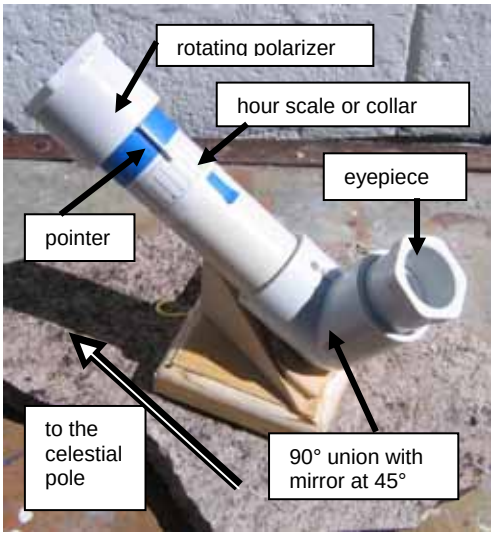
POLARIZED LIGHT AND THE SUN DIAL
(AFTER SUNSET AND BEFORE THE MOON AND STARS SHINE)

Clearly the sundial provides a measure of the time when the sun shines on the gnomon. A lunar dial can provide the time at night for a couple of weeks in a month, and for when the moon shines not, a nocturnal can provide the time from a few select stars on moonless nights. But what about determining the time when the sun is below the horizon and the moon or stars are insufficient for use? What about when a cloud limits the light to a gnomon?

Around 1848, Sir Charles Wheatstone used the polarizing effect of light coming from the celestial pole. Light from the sun reflected by the sky becomes polarized. Light coming through clouds tends to de-polarize. The alignment of this polarized light varies with the sun's position, the observer's position, and the part of the sky being observed. While the most polarizing effect does not always come from the celestial pole or polar axis extended, measuring the polarization from thence does provide a linear hour angle measurement.



Sir Charles used a polarizer which he rotated, the result was the observed sky became brighter or darker. The observer seeks the darkest light from the sky as it is a narrower region. As the sun orbits, so does the place where the polarizer provides the darkest light. And by using the celestial pole, that angle varies linearly and directly with the sun.

In true Illustrating Shadows form, four pieces of PVC piping were used, a mirror, and a lens from a cheap pair of polarized sun glasses.

A long tube points to the polar axis extended to infinity, the celestial pole. At its end is a rotating collar in which has been placed a circular cutout of one lens from a pair of polarized sunglasses. The lens was removed and cut using a Dremel rotating saw. At the base of the long tube is a 90 degree union, in which is placed part of a mirror angled at 45 degrees. This enables the light to be viewed from the polar axis easily. Without that 90 degree bend it would be hard to see the light from the sky because your eye would have to be below dial level.

The perimeter of the long tube has a paper collar divided evenly into 24 hours, and time is indicated by a pointer attached to the rotating collar containing the polarizer.

The pointer is set by seeking the darkest light and affixing a pointer to indicate the LAT on the paper collar of hours, backed off by the EOT. For fine tuning, the paper collar can be adjusted and then set rigid with a piece of masking tape. This technique means longitude corrections are automatically applied, and of course EOT (equation of time) must be considered.

From then on, whenever the time is required the long tube is pointed to the celestial pole and the polarizing collar rotated back and forth around the darkest light, until the darkest orientation is found. The EOT is applied and the time then read. Other polarizers can be used, however camera polarizers seem to be less satisfactory. This dial can read the time as long as the sun is illuminating the extended pole and as long as that extended pole is blue sky. Thus, before sunrise until after sunset, the time may be read, similarly if the observer's location has no well formed shadows.

This is not an all inclusive guide on polarizing dials, rather a starting point from which to work, and that starting point is a working polarizing dial.