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# ADAPTATION OF AN ASTRO-COMPASS FOR COLLECTION OF ORIENTED ROCK SPECIMENS

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Under certain field conditions, such as in areas underlain by strongly magnetic formations, the readings from an ordinary magnetic needle compass are hardly reliable if not completely misleading. The magnetic needle may be deviated to an even greater extent from the local magnetic meridian if the compass is brought in contact with the rock outcrop, as is often necessary in collecting oriented specimens. For this operation it is preferable to make use of an astro- or sun-compass.

Although certain types of astro-compasses may be obtained at a relatively low price from war surplus stores, they are not quite suited, as such, for quick and simple determinations of bearings in the field. However, their adaptation for this specific job is relatively simple as may be seen from a comparison of the two figures in this report.

## Transformation of the instrument

Figure 1 is a photograph of a Mark II Astro-compass which was used extensively by the air forces during the last world war. The transformations brought to the instrument are:

1 - Changing the hour circle from a $360^{\circ}$ graduation to a 24 hour dial (subdivided into five 12-minute intervals).

2 - Replacing the tripod mounting by a flat metal plate, one side of which is a straight edge.

3 - Lowering the sight and fixing it to the hour circle.

4 - Adding a round level on the base plate.

5 - Adding a reference point along the line passing through the vertical axis of the compass and parallel to the straight edge.


Figure 1. The Mark II Astro-compass as available in its original design

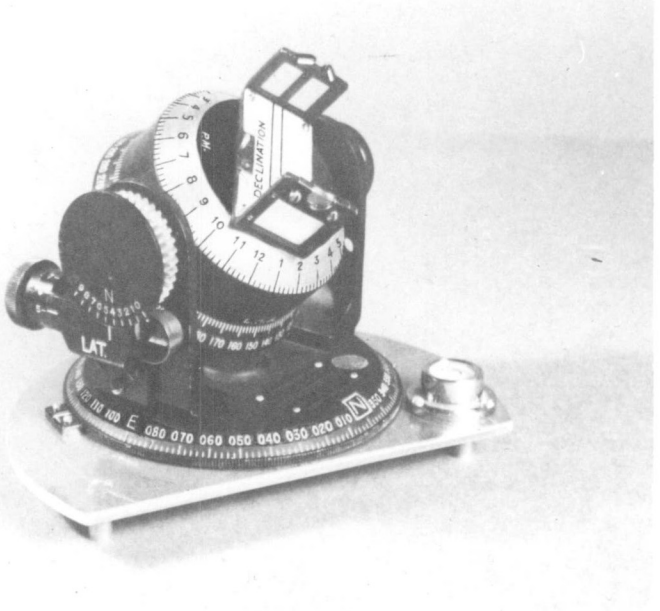


Figure 2. The Mark II Astro-compass after its transformation into a sun-compass adapted for oriented specimens collection

Given the standard time within an accuracy of $\pm$ 5 minutes and the longitude and latitude of a point within an accuracy of one degree, it is possible to determine the azimuth of a line at this point with the converted instrument. The latter is now, strictly speaking, a sun-compass and obviously sunshine is required for its use. Our experience is that its accuracy is better than one degree of arc.

Bearing measurement procedure

The procedure for reading a bearing is as follows:

1 - Set the vertical circle (LAT.) to the latitude of the point where the bearing is being determined.

2 - Set the hour circle to local apparent solar time. The latter may readily be calculated by the following formula:

$$A = S - E + \Delta\phi$$

where S is the standard time,

E is the equation of time, as given in the sun ephemeris tables -

$\Delta\phi$ = 4 N minutes, N being the number of degrees EAST of the time zone reference meridian. For example, at longitude 77°W, and at 3:00 P.M. daylight saving Eastern Standard time, on June 30, 1961, the value of A would be:

$$A = (3{:}00 - 1{:}00) - 3'{:}24'' + 4\,(75^{\circ} - 77^{\circ}) \text{ minutes}$$

$$= 2 \text{ h} - 11'24''$$

$$= 1 \text{ h. } 48'36'' \cong 1 \text{ h. } 48' \text{ P.M.}$$

3 - Line up the straight edge of the plate with the direction to be determined, the plate being held horizontally. The compass is then rotated about its vertical axis until the shadow of the pin forming part of the sight falls between the hairlines on the translucent

screen. If the observer stands behind the circular edge of the plate, the angle of the horizontal dial opposite the reference point on the plate ($120^{\circ}$ in Figure 2) is the azimuth of the line parallel to the straight edge and pointing to the observer's right.