

Koppelortes an. = Set the altitude of the place of observation

Lies Höhe (hr) und Azimut (Az) ab. = Read off the altitude (hr) and Azimuth (Az)

Note Plaque

Merke! = Note
 Nord = + Süd = - = North = + South = -
 Zahlen mit Vorzeichen δ oder hr = Calculate with sign δ or hr
 Zahlen ohne Vorzeichen τ oder Az = Calculate without sign τ and Azimuth (Az)

Auxiliary Plaques

Breite (on fixed microscope) = latitude
 Aus Dunkel: Hell: (on rheostat) = Off. Dim. Bright.

The storage box made of wood has fittings to enable it to be securely fixed at the navigation station and in addition provides stowage for the electrical power lead, spare bulbs, a black silk illumination hood to enable to instrument to be used in bright background light and an illustrated instruction booklet.

Requisition Numbers

Instrument: FI 23894
 Storage box: FI 23894-1
 Electrical power lead: FI 23894-2
 Silk illumination hood: FI 23894-3
 Spare bulb: FI 32777-1
 Instruction booklet: 45 01 01-1

Operation Of The ARG1

1. Connect the instrument to the 24v supply and adjust the brightness.
2. Focus both the fixed and moveable microscopes.
3. Set the grid so that the value of -90° appears in the latitude scale as seen by the fixed microscope. This setting is effected by simply rotating the knob until it clicks into position and the two triangular marks are then seen to be opposite each other.
4. Move the moveable microscope until the cross in the field of view is set approximately at the time angle and declination of the heavenly body. The microscope is then rotated till arms of the cross are parallel to the lines of the chart and by means of the adjusting knobs the cross is set accurately on the required values of time angle and declination.
5. Turn the latitude knob until the latitude of the place of observation is set at the fiducial mark in the fixed microscope.
6. On the moveable microscope, the spring loaded ring is rotated to bring the arms of the cross into alignment with the chart markings, and the altitude and azimuth are read directly from the chart.

Note

The time angle ($^{\circ}$) then used in Germany until about the middle of the 20th century, was counted from 0-360 $^{\circ}$ or 0-24 hours from the lower meridian through east, south and west. M therefore differs from hour angle by 180 $^{\circ}$ or 12 hours. This definition, which was introduced when astronomical time began to be reckoned from midnight to midnight, has numerous advantages and is closely related to local time. If LHA is less than 180 $^{\circ}$ then time angle = LHA+180 $^{\circ}$, and if LHA is more than 180 $^{\circ}$, then time angle = LHA-180 $^{\circ}$.

Time angle and azimuth are numbered from 0-180 $^{\circ}$ below, right to left, and from 180-360 $^{\circ}$ above, left to right, in relation to the equator line on the grid.

If time angle is less than 180 $^{\circ}$, then azimuth is less than 180 $^{\circ}$, and if time angle is greater than 180 $^{\circ}$, then azimuth is greater than 180 $^{\circ}$. This is a simple rule according to whether the calculation is being made on the eastern or western celestial hemisphere.

Sample Sight Reduction With ARG1

Herewith the results of an observation of Altair that I made on the 6th November 1992 at DR position N 51 $^{\circ}$ 17' & W 000 $^{\circ}$ 27', using a Plath SKS-3D gyro-octant (#5501) with a two-minute averaging period. ARG1 (#297316) is utilised for the sight reduction.

	ASSUMED POSITION	DR POSITION
GHA Aries	326 $^{\circ}$ 14'	326 $^{\circ}$ 14'
GHA Inv	001 $^{\circ}$ 11'	001 $^{\circ}$ 11'
SHA Altair	062 $^{\circ}$ 23'	062 $^{\circ}$ 23'
GHA Altair	029 $^{\circ}$ 48'	029 $^{\circ}$ 48'
Assumed Lon	000 $^{\circ}$ 45' W	000 $^{\circ}$ 27' W
LHA	029 $^{\circ}$ 00'	029 $^{\circ}$ 21'
$\pm 180^{\circ}$		
l	209 $^{\circ}$ 00'	209 $^{\circ}$ 21'
Dec Altair	08 $^{\circ}$ 51' N	08 $^{\circ}$ 51' N
Assumed Lat	51 $^{\circ}$ 00' N	51 $^{\circ}$ 17' N
Azimuth	219 $^{\circ}$ 47'	220 $^{\circ}$ 00'
Ho	41 $^{\circ}$ 13'	41 $^{\circ}$ 13'
Hc	41 $^{\circ}$ 34'	41 $^{\circ}$ 12'
A	21' A	01' T

Accuracy And Comparison With Other Methods Of Sight Reduction

Comparative trials were conducted by the German Hydrographic Institute at Hamburg in the 1940's between the ARG1 and the S-Diagrams developed by K. Schütte. On the basis of 26 calculations, errors of the ARG1 were calculated to be $\pm 0.74'$ of altitude and $\pm 0.83'$ of azimuth. A comparison of other different methods of sight reduction is as follows: