The slide rule and the sun dial

The reality, sadly, is that the slide rule has become a way of the past. I still have two modern rules, my two wood and ivory ones having long since sprouted wings. I used them in college, and in my early days in aviation in the form of the E6B and CR-1. Little is to be gained by pages of slide rule usage, however, the design of a horizontal dial with a slide rule may be of interest.

Assume a latitude of 32.75 degrees (lat) , and the sun's local hour angle of 15 degrees (lha). The hour line angle (hla) formula is:-

$$hla = atan(\ sin(lat) * tan\ (lha)\ )$$

On most slide rules the lower fixed part has the "X" scale first, then the "SIN" next, and the "TAN" below that.

To the right, above 32.75 is found the SIN value of 0.54, and this number has to be remembered.

Then the cursor is moved to above the tangent of the local hour angle, 15 degrees in this case, the right side of the lower picture.

And the 10 (representing 1) is placed above the tan(15). see right side below.
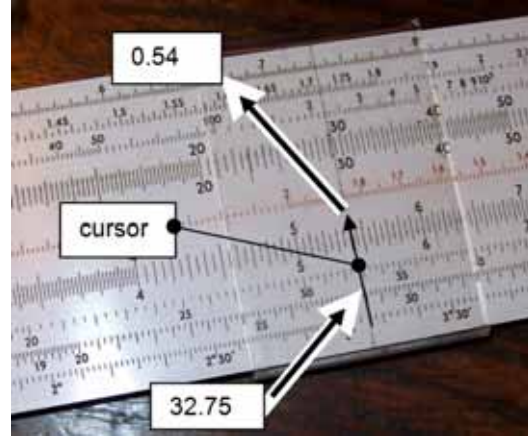
Then go to the remembered sin of the latitude of 32.75, namely 0.54, upper left below, and look down to the "TAN" scale which is by definition now acting as ATAN, showing 8.25 degrees.
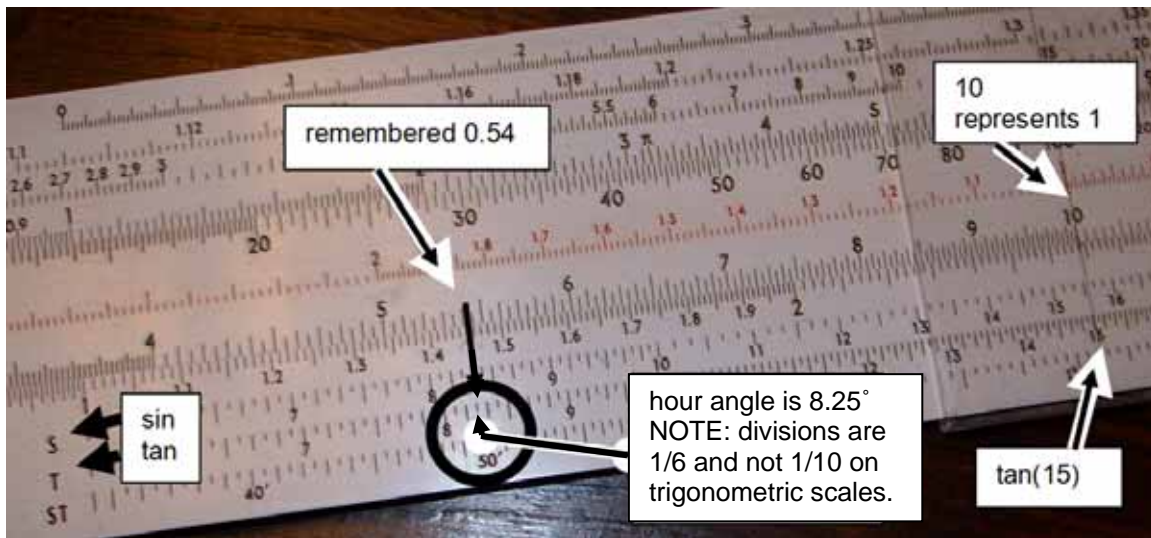
And a spreadsheet confirms the result with 8.2478 degrees to the slide rule's 8.25.

The process is repeated with other hours and with longitude correction.

latitude	radians		
32.75	0.5716	0.5410	sin(lat)
15	0.2618	0.2679	tan(lha)
atan(sin(lat)*tan(lha))		0.1440	
degrees is		8.2478	