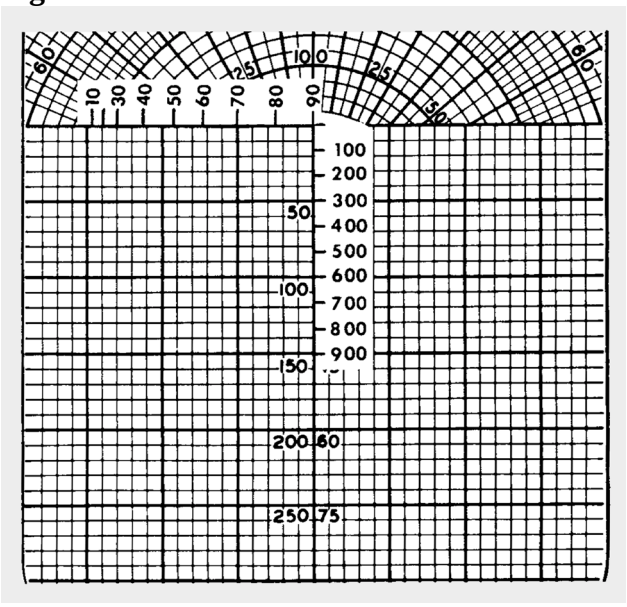
12.8.5. The subpoint method is convenient because Pub. No. 249 isn't used—only the *Air Almanac*. This method can also be used with a star near your assumed position and may be necessary if, for some reason, your Volume 1 is unavailable. The stars Dec and GHA are needed to determine if the observer is within 4^{o} of the subpoint. The *Air Almanac* may be used to find the Dec and sidereal hour angle (SHA) of the star. The SHA of the star is added to the GHA of Aries to find the GHA of the star.

12.9. Eliminating Motions with the Bracket Technique. For sun observations, you can eliminate motion calculations by using a shooting schedule of 3 minutes early, on fix time and 3-minutes late. With this schedule, the 3-minute early and 3-minute late shots have the same magnitude of motion, but an opposite sign. Therefore, these motions cancel each other out and do not need to be computed. The on-time shot has no motions. Therefore, the three intercepts can be averaged for a single LOP. At night, shooting the same star 4 minutes early and late, with a different star shot on time can employ a similar method. In this case, the intercepts for the same star's 4-minute early or late shots can be averaged. This reduces workload, but only two LOPs are obtained.

12.10. DR Computer Modification. Rather than eliminating motions, your DR computer can be modified so both observer and body motions can be computed at one time, without entry into the Pub. No. 249. Make a GS and latitude scale as shown in Figure 12.8. After constructing these, the DR computer can be modified for quick and accurate computations of 1-minute motion adjustments.

12.10.1. Tape the GS scale (0 through 900) along the centerline of the grid scale. Match zero to zero, 300 to 50 and 600 to 100 as shown in Figure 12.8. Then, tape the latitude scale along the zero grid line so that 90^{o} falls on the centerline and the scale extends to the left as shown. Check the accuracy of your placement: 30^{o} latitude should fall 13 divisions left of centerline. Juggle the scale as necessary to provide the greatest accuracy between 30^{o} and 45^{o}.

Figure 12.8. MB-4 Motions Modification.

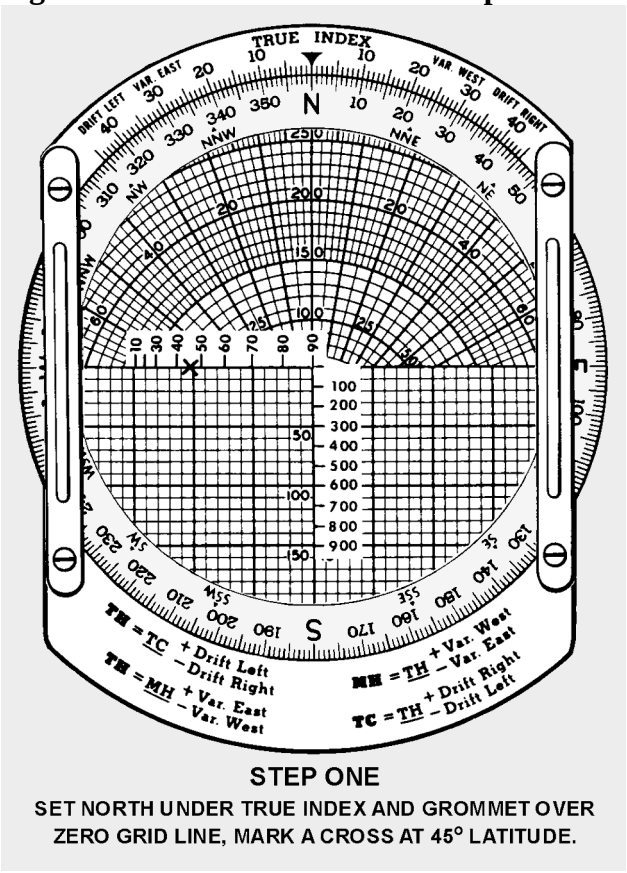


12.10.2. To use the modified MB-4 computer for motion adjustments:

12.10.2.1. Set true north under the index. If computing for grid, set polar angle (PA) under the index. In the NW and SE hemisphere quadrants PA equals convergence angle (CA). In the NE and SW quadrants

PA=360-CA. Next place the grommet over the zero grid line. Mark a cross (+) at the assumed latitude (Figure 12.9).

Figure 12.9. Celestial Motions – Step One.



12.10.2.2. Set track (or grid track) under the index and position the slide so the GS is under the grommet. Place a dot on the zero point of the grid scale (Figure 12.10).

12.10.2.3. Place the Zn (or grid Zn) of the body under the index. Position the slide so the cross or the dot, whichever is uppermost, is on the zero line of the grid (Figure 12.11).

Figure 12.10. Celestial Motions – Step Two.

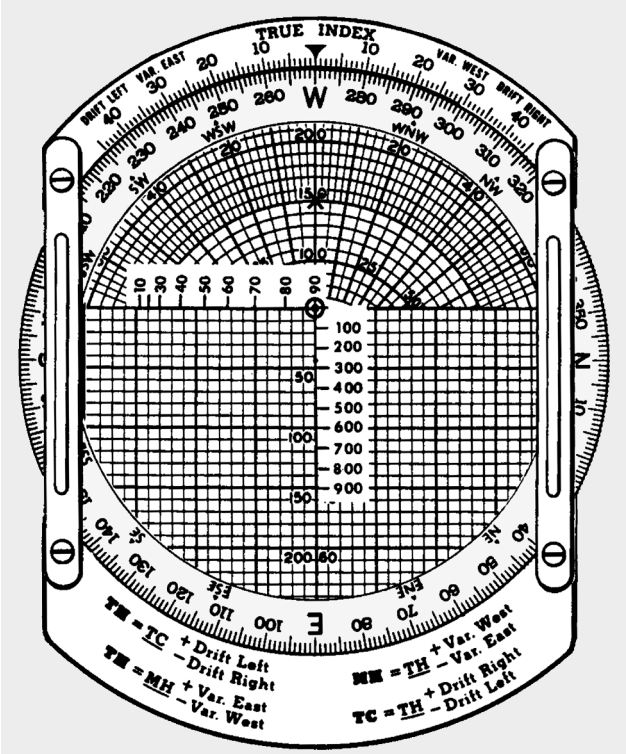
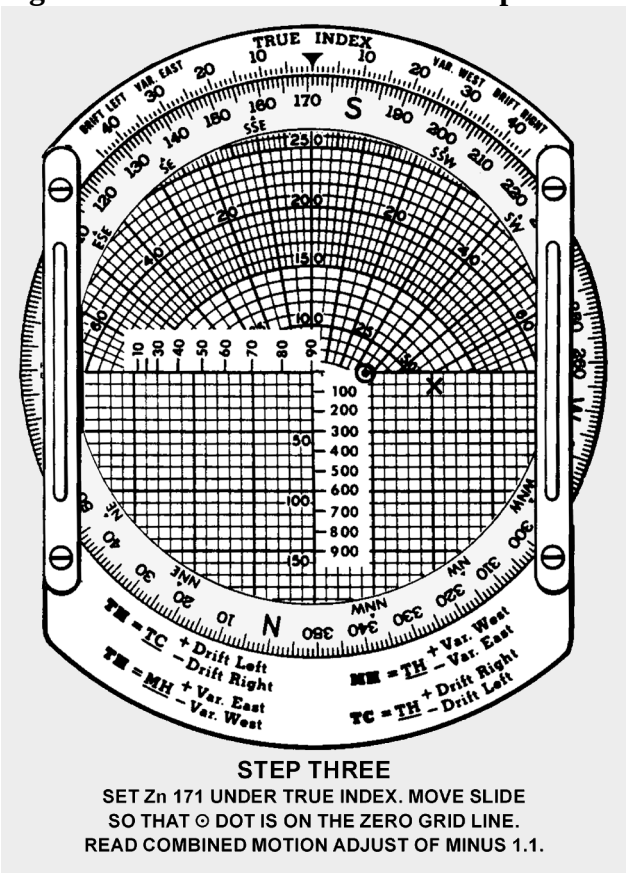


Figure 12.11. Celestial Motions – Step Three.



NOTE: The vertical distance between the zero line and the low mark is the combined 1-minute motion. Each line of the grid equals 1 minute of arc (1 mile). If the cross is on the zero line, the motion is positive. If the dot is on the zero line, the motion is negative. When solving for motions using grid, all directions must be grid directions!

EXAMPLE: Given the following information, find the combined 1-minute motion adjustment.

Assumed Latitude	45° 10' N
True Track	270°
GS	240 knots
True Zn	171°
Answer	+1'

12.11. Combinations of Sun, Moon, and Venus. The moon or Venus are often visible during daylight hours and can be used to obtain an LOP. Always consider fixing using these bodies during daylight celestial flights. When planning the flight, use the sky diagrams in the *Air Almanac* to determine the availability of the moon and Venus. If the bodies are available, they can be readily found by accurately precomputing their altitudes and azimuths.

12.11.1. When looking for Venus, take all the filters out of the sextant and point it at the precise location of the planet. A bright, small pinpoint of light will be visible but hard to detect, unless sky conditions