CHAPTER 6

COMPASS ERROR

DETERMINING COMPASS ERROR USING (PUB. NO. 229) SIGHT REDUCTION TABLES FOR MARINE NAVIGATION

600. Compass Error

One of the more frequent applications of sight reduction tables is their use in computing the azimuth of a celestial body for comparison with an observed azimuth in order to determine the error of the compass. In computing the azimuth of a celestial body, for the time and place of observation, it is normally necessary to interpolate the tabular azimuth angle as extracted from the tables for the differences between the table arguments and the actual values of declination, latitude, and local hour angle. The required triple interpolation of the azimuth angle is effected as follows:

1. The main tables are entered with the nearest integral values of declination, latitude, and local hour angle; for these arguments, a base azimuth angle is extracted.
2. The tables are reentered with the same latitude and LHA arguments but with the declination argument 1° greater or less than the base declination argument depending upon whether the actual declination is greater or less than the base argument. The difference between the respondent azimuth angle and the base azimuth angle establishes the azimuth angle difference (Z Diff.) for the increment of declination.
3. The tables are reentered with the base declination and LHA arguments but with the latitude argument 1° greater or less than the base latitude argument depending upon whether the actual (usually DR) latitude is greater or less than the base argument to find the Z Diff. for the increment of latitude.
4. The tables are reentered with the base declination and latitude arguments, but with the LHA argument 1° greater or less than the base LHA argument depending upon whether the actual LHA is greater or less than the base argument to find the Z Diff. for the increment of LHA.
5. The correction to the base azimuth angle for each increment is Z Diff. $\frac{\text{Inc.}}{60'}$.

Example.-In DR Lat. 13°24.0'N, the azimuth of the Sun is observed as 070.3° pgc. At the time of the observation, the declination of the Sun is 20°13.8'N; the local hour angle of the Sun is 276°41.2'. The error of the gyrocompass is found as follows:

Actual		Base Arguments	Base Z	Tab* Z	Z Diff	Increments	Correction (Z Diff Inc. 60)
Dec.	20°13.8′N	20°	71.8°	70.8°	–1.0°	13.8′	–0.2°
DR Lat.	13°24.0N	13° (Same)	71.8°	71.9°	+0.1°	24.0′	0.0°
LHA	276°41.2′	277°	71.8°	71.6°	–0.2°	18.8′	–0.1°
						Total Corr.	-0.3°

Base Z	71.8°
Corr.	(-) 0.3°
Z	N71.5°E
Zn	071.5°
Zn pgc	070.3°
Gyro Error	1.2°E

* Respondent for two base arguments and1° change from third base argument, in vertical order of Dec., DR Lat., and LHA.