Magnetic Declination: True and Magnetic Azimuths

True azimuth from a magnetic azimuth and declination, and the magnetic azimuth to set out an old line today when the declination has changed (retracement).

Method: Magnetic declination and its secular variation

Input parameters

Unit system: SI

Parameter	Value	Unit
Old magnetic azimuth (from the original survey)	47.500	°
Declination at the original survey (east +)	2.2500	°
Annual change in declination (east +)	-0.10000	°
Years since the original survey	35.000	

Calculated results

Parameter	Value	Unit
True azimuth of the line	49.750	°
Declination now	-1.2500	°
Magnetic azimuth to set today	51.000	°
Change in magnetic azimuth	3.5000	°

Notes for this case

• True azimuth = magnetic azimuth + declination (east declination positive, west negative). Declination drifts with time, so a line described by its old magnetic bearing must be re-run with α_m,now = α_t − δ_now. Get the declination for a date and place from a geomagnetic model (for example the World Magnetic Model); daily and local variations of a few minutes remain.

Formula and method

$$\alpha_t = \alpha_m + \delta, \quad \delta_{now} = \delta_0 + n\dot{\delta}, \quad \alpha_{m,now} = \alpha_t - \delta_{now}$$

Variables

α_m	Old magnetic azimuth (from the original survey)	rad
δ_0	Declination at the original survey (east +)	rad
$\dot{\delta}$	Annual change in declination (east +)	rad
n	Years since the original survey	-
α_t	True azimuth of the line	rad
δ_{now}	Declination now	rad
$\alpha_{m,now}$	Magnetic azimuth to set today	rad
$\Delta\alpha_m$	Change in magnetic azimuth	rad

Method and standards

Declination.

Assumptions and limits

- Uniform annual change; no local attraction.

References

Magnetic declination and its secular variation

Report details

Report reference	FCC-T6BX-J30F (the same inputs always give the same reference)
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Calculator	Magnetic Declination: True and Magnetic Azimuths
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Release checks	3 reference cases of this calculator, computed independently, are checked on every release

Results are for engineering estimation. Verify critical designs against the referenced standards and your own data.

This calculator online

https://calc.firecad.com/civil/surveying/magnetic-declination-bearing

Open this case on calc.firecad.com →

Reopens the calculator with the inputs of this report.