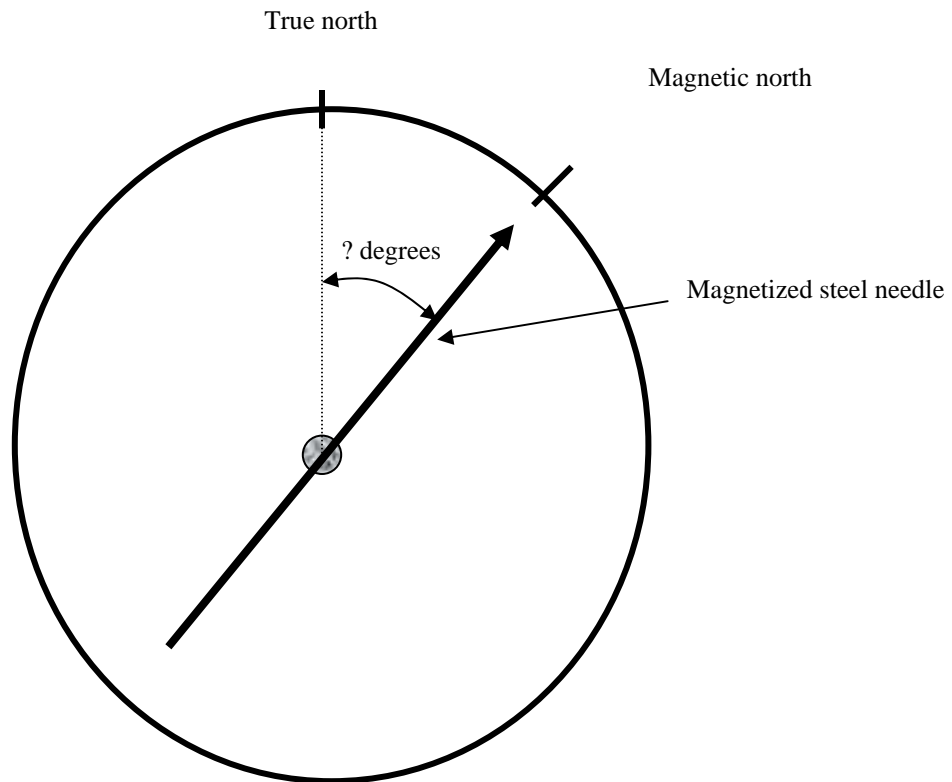


Lecture 6 – The compass

Uses for the compass in modern surveying

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Compass Theory



- The north magnetic pole is considerably south of the true north pole defined by the Earth's horizontal axis.

- The magnetic forces of the Earth will pull the compass needle into a parallel position with the forces.
- Therefore, there is a true meridian which passes through the north pole and a magnetic meridian which passes through the magnetic field in the direction of the magnetic north pole.
- Daily variation amounts to less than $1/7^{\text{th}}$ of a degree.

Magnetic declination

Magnetic declination is the horizontal angle from the true meridian to the magnetic meridian.

Variations in Declination

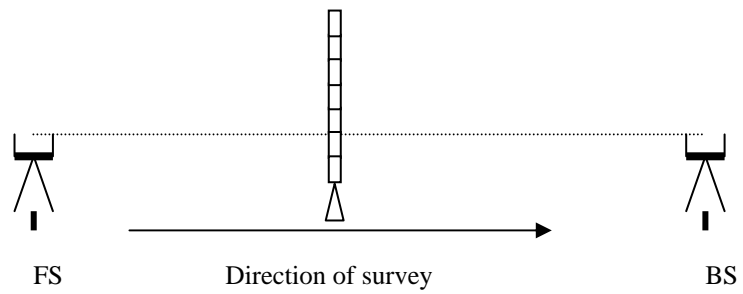
Secular variation

Daily variation

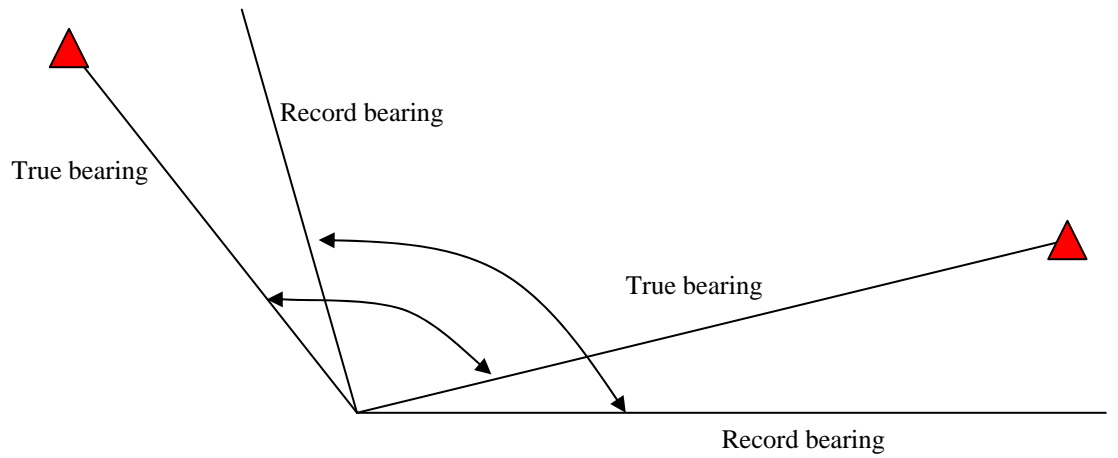
Annual variation

Irregular variation

Local attraction



Compass adjustments for local attraction



Conversion problems

Three situations arise for conversion of compass directions:

Conversion of true bearings to magnetic bearings

Problem

The true bearing of a line from an original 1868 survey is recorded as S $15^{\circ} 30' 00''$ W. The magnetic declination was $18^{\circ} 10'$ E. The magnetic declination now is $18^{\circ} 30'$ E. What are the past and present day magnetic bearings for the line?

Solution

Conversion of magnetic bearings to true bearings

Problem

The true bearing of a line is required for a property line retracement. The original 1885 survey record bearing for the line is $N 27^{\circ} 30' 15'' W$. The magnetic declination was $12^{\circ} 10' W$. What is the true bearing of the line?

Solution

Conversion of magnetic bearings for different declinations

Problem

The magnetic bearing of a line from an original 1891 property line survey is N $27^{\circ} 30' 15''$ W. The magnetic declination was $10^{\circ} 10'$ E at that time. The magnetic declination now is $13^{\circ} 20'$ E. What magnetic bearing must be run to do a retracement of the line?

Solution