

**3<sup>rd</sup> NCWG MEETING**  
**ESRI HQ, Redlands, California, USA 16-19 May 2017**

**Paper for Consideration by NCWG**

**Units for quoting annual rate of change for magnetic variation**

<b>Submitted by:</b>	Secretary (on behalf of Estonia)
<b>Executive Summary:</b>	There is an inconsistency in the general rule for quoting bearings and magnetic variation and the specific guidance for quoting magnetic variation and annual rate of change.
<b>Related Documents:</b>	S-4: B-130, B-260 and B-270 onwards
<b>Related Projects:</b>	None

**Introduction / Background:**

1. Estonia asked UK a question:

S-4 says in B-130 (Units) that standard units for bearings, such as for a recommended track or magnetic variation, should be degrees (°) and decimals of a degree. Degrees (°) and minutes (') may be used if appropriate.

In B-270 and forward (Magnetic Data) it says that variation must be given to the nearest 5 minutes and annual change in the minutes.

What is the reason for the latter as in practical navigation the bearings are given in degrees (and decimals of a degree if needed), so it would be more convenient to add or subtract also degrees (or decimals of degrees)?

2. This question was passed to the NCWG Secretary.

**Analysis / Discussion:**

3. I do not know why this inconsistency exists, although it may simply be historical, that is, dating back to bearings being always given in degrees and minutes. Or perhaps it is due to the source of the magnetic information being given in degrees and minutes.
4. All examples shown in S-4 and INT1(Section B) of the official language versions are in degrees and minutes, which is inconsistent with B-130 (noting that magnetic variation is specifically mentioned at B-130).
5. Is anyone aware of any HO which uses decimal degrees for Magnetic Variation or Rate of change?
6. If decimal degrees were used (that is, one tenth of a degree) then over the life time of a chart edition (say 20 years), a 0.1° rate of change would imply a 2° change to magnetic variation. However, if 0.1° really was a rounding of the more refined 4 minutes (0.06°), the change over 20 years would only be 1.3°. In reality, does this matter to the navigator?
7. Is there any value in showing rate of change to two decimal places?

**Conclusion:**

8. It is unlikely to matter to chart users who still use magnetic compasses whether rate of magnetic change is given in minutes or decimals of a degree.

**Recommendation:**

9. Adjust B-270 onwards to allow use of degrees and decimals or degrees and minutes. Show examples of degrees and decimals in S-4 B-260 and INT1 (if that is national practice).

**Justification and Impacts:**

10. For consistency with B-130 and ease of application for the mariner to the units used for bearings. Unlikely to have any impact but will involve some small changes to S-4 (and possibly INT1). It may be considered that the use of degrees and minutes is too well established for what is of diminishing importance to be worth changing.

**Action required of NCWG:**

11. The NCWG is invited to:
  - Consider Estonia's question;
  - advise whether to clarify S-4 B-260 onwards, to allow use of degrees and decimals as well as degrees and minutes for magnetic variation and annual rate of change;
  - Advise whether rate of change should be shown to 2 decimal places.