



## **HIGH-LEVEL CONFERENCE ON COVID-19 (HLCC 2021)**

### **SAFETY STREAM**

**Montréal, Canada, 12 to 22 October 2021**

#### **Agenda Item 5: Other issues to be considered by the Safety stream**

#### **CHARTING A PATH FOR THE INCREASED USE OF TRUE NORTH IN AVIATION**

(Presented by Canada and the International Association of Institutes of Navigation (IAIN))

##### **EXECUTIVE SUMMARY**

ICAO Annex 4 — *Aeronautical Charts*, requires bearings, tracks and radials to be published in degrees magnetic except under exceptional circumstances where States may need to align bearings, tracks and radials to true north or grid.

With the switch from analogue to digital aircraft systems, magnetic variation discrepancies have and continue to cause operational errors in performance-based navigation (PBN) procedures, category II/III auto-coupled approaches/landings and Aeronautical Radio, Incorporated (ARINC)-424 coding for all course and heading legs.

Procedures are regularly designed with reference to true north and converted to magnetic, yet air carriers, air navigation service providers and avionics original equipment manufacturers spend millions annually managing magnetic variation.

Technology available today has rendered the use of the magnetic reference system obsolete. The International Association of Institutes of Navigation (IAIN), with help from Canada, has begun charting a path for the increased use of True azimuth in aviation.

#### **1. INTRODUCTION**

1.1 The International Association of Institutes of Navigation (IAIN), as well as Canada, continue to investigate aviation's use of navigation that references true north instead of magnetic north.

1.2 Significant effort is expended to update current aeronautical information with changing magnetic variation (MAGVAR). Modern avionics carry out navigation calculations with reference to true

north, and then convert the information for pilot displays to magnetic (by applying a magnetic variation based on a magnetic model), or true heading or true track, depending on aircraft capability.

1.3 As opposed to maintaining a magnetic reference system, it is proposed that if all operations were referenced to true it would enhance overall safety and save considerable effort by the aviation community.

## 2. BACKGROUND

2.1 At the Twelfth Air Navigation Conference in 2012 (AN-Conf/12), Canada introduced a motion to move from a magnetic to true north reference system (AN-Conf/12-WP/147 refers). Following that presentation, Paragraph 6.5.25 of the AN-Conf/12 yellow cover *“Report of the Committee to the Conference on Agenda Item 6”* (AN-Conf/12-WP/162 refers) stated:

*“6.5.25 The meeting was informed that currently a significant effort is expended to update aeronautical information with changing magnetic variation (MAGVAR). Modern avionics carry out navigation calculations with reference to true north, and then convert the information for pilot displays to Magnetic (by applying a magnetic variation based on a magnetic model), or True heading or true Track, depending on aircraft capability. It was suggested that having all operations referenced to true north would enhance the overall safety floor and save considerable effort in maintaining MAGVAR tables. The meeting noted the information and concluded that any States interested in the matter could conduct further studies of the technical and operational impact of the proposal, and of the expected costs and benefits to all aviation stakeholders.”*

2.2 Over the subsequent years, Canada continued to study the feasibility and benefits of expanding areas where bearings, tracks and radials are aligned to true north and returned in 2018 to AN-Conf/13 with additional details. Following that presentation, Paragraph 3.44 of the AN-Conf/13 yellow cover *“Report Of Committee A to the Conference on Agenda Item 3”* stated:

*“3.44 AN-Conf/13-WP/114, presented by Canada, outlined a proposal regarding the adoption of “True North” as a reference for all operations, citing the ongoing costs of applying magnetic variation to both charts and aircraft systems. The Committee was informed that the Twelfth Air Navigation Conference (2012) had called upon States interested in the matter to conduct further studies on the technical and operational impact of the proposal, as well as on the expected costs and benefits to all aviation stakeholders. The Committee agreed that, in light of the lack of such studies being carried out or reported to ICAO, ICAO should investigate the technical and operational impact and/or merits, as well as the potential cost of the proposed change across the spectrum of aviation activities and across all regions prior to progressing on adoption of “True North” as a global reference.”*

2.3 Furthermore, as a result of the discussion at AN-Conf/13, the report to the Committee also outlined the following recommendation:

***“Recommendation 3.5/4 — True North***

*That ICAO conduct a detailed study into the technical, operational, and economic feasibility of changing to a “True North” reference system.”.*

**3. DISCUSSION**

3.1 After AN-Conf/13, the IAIN took up the initiative to assist the aviation sector in transitioning to true tracks, as was done throughout the maritime sector during the previous century.

3.2 IAIN kicked off their global efforts by presenting at ISPA 2017 and then a paper titled “Changing from Magnetic to True Tracks in Aviation” at the 2020 European Navigation Conference (ENC2020 in Dresden, Germany). That paper introduced the latest results of research and presented coordinating actions that had been initiated with international bodies. The paper outlined the case for converting to true north and identified that the only expected problems would be those of implementation. Although it will take a worldwide effort to make the transition from magnetic to true reference, it is believed that this one-time exercise will make aviation safer and much more efficient. The paper stated in part:

*“The biggest single problem in trying to implement this change worldwide would be inertia – the large number of countries involved and the difficulty of finding the will to all change at once. Some of these countries do not have a sophisticated aviation environment that could deal with this easily, and in others, such as the United States, the sheer extent of the change would be formidable and might meet opposition from a conservative general aviation lobby. A foreseeable way that it could happen would be if a single country were to file a difference with ICAO and change unilaterally. Once they had proved that it worked without problems, we might then expect others to follow progressively.”.*

*“This is not as unprecedented as it sounds. Some countries use feet as the unit for altitude others use metres. Some use hectopascals as the unit for atmospheric pressure, others use inches of mercury and so on. There is no difference in principle if some were to use Magnetic and others to use True.”.*

*“IAIN has established a working group in order to coordinate work on the subject and to gain worldwide exposure. They are now working together with CANSO and individual ANSP’s. They are also working with IATA and ICAO. The goal is to pick a date in the future, e.g. 2030, and progress towards it in a harmonized fashion.”.*

3.3 Due to its proximity to the north pole, a significant portion of airspace managed by Canada has always been designated using True azimuth: *Canadian northern domestic airspace*. Considering this area already operates in True, it seemed appropriate for Canada to lead IAIN’s call for a single country to investigate going first.

3.4 Canada accepted the challenge to develop two documents: a concept of operations (ConOps) followed by an Implementation Plan.

3.5 The ConOps would lay out the current operational situation regarding the use of True and magnetic tracks, introduce a proposed system, explain the operational scenarios, and present a list of requirements should the operational concept receive approval. The ConOps is expected to include topics

related to the technical and/or cost path that would allow expanding the use of True from just Canada's northern domestic airspace to all of Canadian domestic airspace.

3.6 The ConOps is expected to be complete by 2022, at which point Canada will offer the document to ICAO as a potential starting point for discussions on a global scale.

3.7 Once Canada has completed work on the ConOps, efforts will begin on drafting a proposal for implementation in Canadian airspace.

#### 4. **CONCLUSION**

4.1 Technology available today has rendered the use of the magnetic reference system obsolete. The IAIN, with help from Canada, has begun charting a path for the increased use of True azimuth in aviation.

— END —