NAT OPS BULLETIN

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The purpose of this North Atlantic Operations (NAT OPS) Bulletin is to provide guidance to North Atlantic (NAT) operators on material to be included in pilot and dispatcher training programs and operations manuals with the intent of raising pilot and dispatcher awareness of the importance of following existing procedures where half degree waypoint identifiers are used.

Any queries about the content of the attached document should be addressed to:

ICAO EUR/NAT *Office:* ***icaoeurnat@paris.icao.int***

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NAT OPERATIONS BULLETIN – WAYPOINT INSERTION / VERIFICATION SPECIAL EMPHASIS ITEMS

1.   Introduction

1.1   **Operator attention is directed to Attachment A**. It provides a "quick reference" for the Special Emphasis Items contained in this bulletin. It is intended to be used as a job aid for operators developing pilot and dispatcher training material.

1.2   The following is an explanation of the terms "should", "must" and "shall" as used in this bulletin.

   a)   "Should" is used to indicate a recommended practice or policy that is considered as desirable for the safety of operations.

   b)   "Shall" and "must" are used to indicate a practice or policy that is considered as necessary for the safety of operations.

1.3   **Special Emphasis Items for Operators**. The Special Emphasis Items (SEI) listed below should be incorporated into operator training programs and operations manuals with the intent of raising pilot and dispatcher awareness of the importance of following procedures in an environment where half degree waypoints are applied. Each SEI is followed by an explanation of the factors leading it to be identified as an SEI.

2.   Pilot Training on Map and FMC Displays of half Degree and Whole Degree Waypoints:

2.1   To mitigate misinterpretation of waypoint coordinates, operator initial and re-current training programs and operations manuals must incorporate training and guidance to enable pilots to understand map and FMC displays of half degree and whole degree waypoints regardless of the waypoint format being used for waypoint FMC input.

Explanation

   a)   Map displays and certain FMC pages generally do not display full waypoint degrees **and** minutes, e.g. when the full 13 latitude/longitude characters are used to insert half degree waypoints. See Figure 1 and Figure 2 in **Attachment B**.

3.   Aircraft Navigation Database (NDB) Waypoint Identifiers:

3.1   In 2015, Canada, the United Kingdom (UK), and Iceland published Aeronautical Information Circulars (AIC) strongly advocating that aircraft NDB vendors and flight planning services <u>not</u> provide operators with half-degree waypoint identifiers in the ARINC 424, paragraph 7.2.5. "N-prefix" format (e.g., N5250 = 52°30' NORTH 050°00'WEST). (See Canada AIC 23/15 (23 July 2015), UK AIC 059/2015 (9 July 2015) and AIP Iceland ENR 1.3.1.2).

3.2   NAT operators should use a full latitude/longitude (e.g., 13-character) input for waypoints containing both half-degree and whole degrees of latitude and whole degrees of longitude.

3.3   NAT operators **with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier should ensure that the aircraft NDB vendors and flight planning services use an alternate half-degree of latitude 5-character format such as Hxxyy, where xx = degrees and 30 minutes of NORTH latitude and yy = degrees of WEST longitude (e.g., H5250 = 52°<u>30</u>' NORTH 050°00' WEST). (It is recognized that, for whole degree waypoint inputs, such operators will likely continue using the ARINC 424, 7.2.5 "N-suffix" format (e.g., 5250N = 52° 00' NORTH 050°00'WEST)).

3.4   The CPDLC route clearance will be uplinked in a full Lat/Long format that will be unfamiliar to the flight crews using an ARINC 424, 7.2.5 format. **Operators with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier format need to ensure flight crews are

properly trained on the use of the full Lat/Long waypoint format in uplink messages.   They must also emphasize the necessity for proper waypoint verification procedures.

Explanation

    a)   Half-degree waypoint identifiers in the ARINC 424, paragraph 7.2.5 "N-prefix" format have led to a number of Gross Navigation Errors (GNEs) and Lateral Deviations. The guidance for waypoint insertion in this document is intended to remove the potential for such errors. They occur when a pilot intending to input a waypoint defined by a half-degree of latitude inadvertently loads a waypoint containing a whole-degree of latitude, or vice versa, because the "N" is not loaded in the correct pre-fix or suffix position.

4.   Pilot Procedures for Verifying Waypoint Degrees and Minutes Inserted into Aircraft Navigation Systems:

4.1   Procedures must be used to display and verify the DEGREES and MINUTES loaded into the Flight Management Computer (FMC) for the "un-named" (Lat/Long) waypoints defining the route contained in the oceanic clearance. (The "Sample Oceanic Checklist" NAT OES Bulletin refers).

4.2   Regardless of FMC waypoint format and entry method, crew procedures should be designed to promote strong crew resource management techniques, to prevent opportunities for error occurring as a result of confirmation bias and to generally maintain an attitude of healthy suspicion. Accordingly, the waypoint verification procedures should be conducted as detailed below.

- During pre-flight long-range navigation system (LRNS) programming, both pilots independently verify the full latitude and longitude coordinates of "un-named" (Lat/Long) waypoints defining the expected route of flight within oceanic airspace as entered in the FMC.

- Upon receipt of a revised oceanic clearance (i.e., one not conforming to the flight planned route), both pilots independently verify the full latitude and longitude coordinates of "un-named" (Lat/Long) waypoints defining the route contained in the revised oceanic clearance.

- Approaching an oceanic waypoint, one pilot should verify the full latitude and longitude coordinates of that waypoint in the FMC, the NEXT and NEXT +1 waypoints, while the other pilot crosschecks the latitude and longitude coordinates against the master flight plan/oceanic clearance.

Explanation

    a)   Due to the factors in the map and FMC display of half degree and whole degree waypoints, it is imperative that pilots follow the procedure in this document to avoid lateral errors caused by incorrect insertion of waypoints.   Verification of the full DEGREES and MINUTES of oceanic waypoints loaded into the FMC is a critical step in ensuring a proper navigational load.

5.   Pilot Track and Distance Check:

5.1   It is strongly recommended that pilot pre-flight and in-flight procedures call for the pilot to compare the track and distance between waypoints shown on the Computer Flight Plan (CFP) to those displayed by the FMC. (The NAT "Sample Oceanic Checklist" Bulletin refers).

5.2   Pilots should be aware that waypoint insertion errors of half degree of latitude may in some cases result in only small differences in track and distance, however, the track and distance check can help prevent waypoint insertion errors of one degree or more that have been observed in oceanic operations.

Note: the currency of magnetic variation tables loaded into aircraft navigation databases and the point at which the track is measured affect the track displayed on the FMC by as much as ±3 degrees.

Explanation

a) This check remains valuable because waypoint insertion errors are **not** limited to half degree errors and waypoint insertion errors of one degree or more have been observed in oceanic operations. Waypoint insertion errors of half degree produce a small difference in leg segment track and distance, however, as noted above, waypoint insertion errors are not limited to half degree.

6. Pilot Action When Notified By ATC of Possible Deviation from Cleared Track:

6.1 Flight crews are advised that, should they be notified that ATC systems indicate the aircraft is not flying the cleared route, they should immediately display the full degrees and minutes loaded into the FMC for the NEXT and NEXT + 1 waypoints, and verify against the cleared route before responding.

Voice message example:

"SHANWICK CONFIRMS YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC. YOUR CLEARED ROUTE IS [route]"

CPDLC message example:

"YOUR POSITION REPORT INDICATES INCORRECT ROUTING. CHECK FULL DEGREES AND MINUTES LOADED INTO FMC. YOUR CLEARED ROUTE IS [route]."

6.2 When ATC notifies the pilot that the aircraft has indicated it has already deviated from the cleared track (UM169f: ADS-C INDICATES OFF ROUTE. ADVISE INTENTIONS), the pilot shall immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint, and verify against the cleared route.

Explanation

a) Due to the factors in the map and FMC display of half degree and whole degree waypoints, it is imperative that pilots follow the procedure in this document to avoid lateral errors caused by incorrect insertion of waypoints. Verification of the full DEGREES and MINUTES of oceanic waypoints loaded into the FMC, when notified by ATC of possible deviation from cleared track, is a critical step in ensuring a proper navigational load.

7. Websites

7.1 The ICAO EUR/NAT Office Website is at: **www.icao.int/eurnat**. Click on **EUR & NAT Documents** >> **NAT Documents** to obtain NAT Operations Bulletins and related project planning documents.

8. Contacts

8.1 The following may be contacted for information or to provide feedback: **icaoeurnat@paris.icao.int**

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ATTACHMENT A – SUMMARY OF SPECIAL INTEREST ITEMS
CONTAINED IN THIS NAT OPS BULLETIN

1.   *Aircraft Navigation Database (NDB) Waypoint Identifiers:*

Canadian AIC 23/15, UK AIC 059/2015 and AIP Iceland ENR 1.3.1.2 strongly advocate that aircraft NDB vendors and flight planning services **not** provide operators with **half-degree** waypoint identifiers in the ARINC 424, paragraph 7.2.5 "N-prefix" format (e.g., *N5250 = 52°30' NORTH 050°00'WEST).*

NAT operators should use a full latitude/longitude (e.g., 13-character) input for waypoint coordinates. NAT operators **with an operational need to populate the aircraft NDB** with a 5-character waypoint identifier should ensure that the aircraft NDB vendors and flight planning services use an alternate half-degree of latitude 5-character format e.g., H5250 = *52°30' NORTH 050°00' WEST* (paragraph 3 refers)

2.   *Pilot Training on Map and FMC Displays of half Degree and Whole Degree Waypoints:*

Operator initial and re-current training programs and operations manuals must have incorporated training and guidance to enable pilots to understand map and FMC displays of half degree and whole degree waypoints (paragraph 2 and **Attachment B** Figure 1 and Figure 2 refer).

3.   Pilot Procedures for Verifying Waypoint Degrees and Minutes Inserted into Aircraft Navigation *Systems:*

Pilot Pre-flight and In-flight procedures must call for each pilot to independently display and verify the DEGREES **and** MINUTES loaded into the Flight Management Computer (FMC) for the "un-named (Lat/Long) waypoints defining the cleared route of oceanic flight. This procedure is necessary regardless of the FMC waypoint input format being used. Procedures must call for both pilots to independently verify the waypoint coordinates inserted and concur on their accuracy prior to route activation.

4.   *Pilot Track and Distance Check:*

It is strongly recommended that pilot pre-flight and in-flight procedures call for the pilot to compare the track and distance between waypoints shown on the Computer Flight Plan (CFP) to those displayed by the FMC.

Pilots should be aware that waypoint insertion errors of half degree of latitude may in some cases result in only small differences in track and distance, however, the track and distance check can help prevent waypoint insertion errors of one degree or more that have been observed in oceanic operations.

Note: the currency of magnetic variation tables loaded into aircraft navigation databases and the point at which the track is measured affect the track displayed on the FMC by as much as +/- 3 degrees.

**5.**   *Pilot Action When Notified By ATC of Possible Deviation From Cleared Track:*

When ATC notifies the pilot that ATC systems indicate that the aircraft is not flying the cleared track, the pilot shall immediately display the full DEGREES and MINUTES loaded into the FMC for the NEXT waypoint, and verify against the oceanic clearance.

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**ATTACHMENT B – EXAMPLE FMC AND MAP DISPLAYS (PARAGRAPH 2 REFERS)**

Note: Figure 1 *and* Figure 2 *are intended to support paragraph 2 (Pilot training on Map and FMC Displays of half and Whole Degree Waypoints).* **The figures emphasize that** f**or a large number of aircraft, the input of waypoints containing whole degrees of latitude and waypoints containing half-degrees of latitude will result in identical 7-character FMC and waypoint map displays.**

Figure 1 Example FMC Display: Full Waypoint Latitude and Longitude (13-characters) inserted into FMC
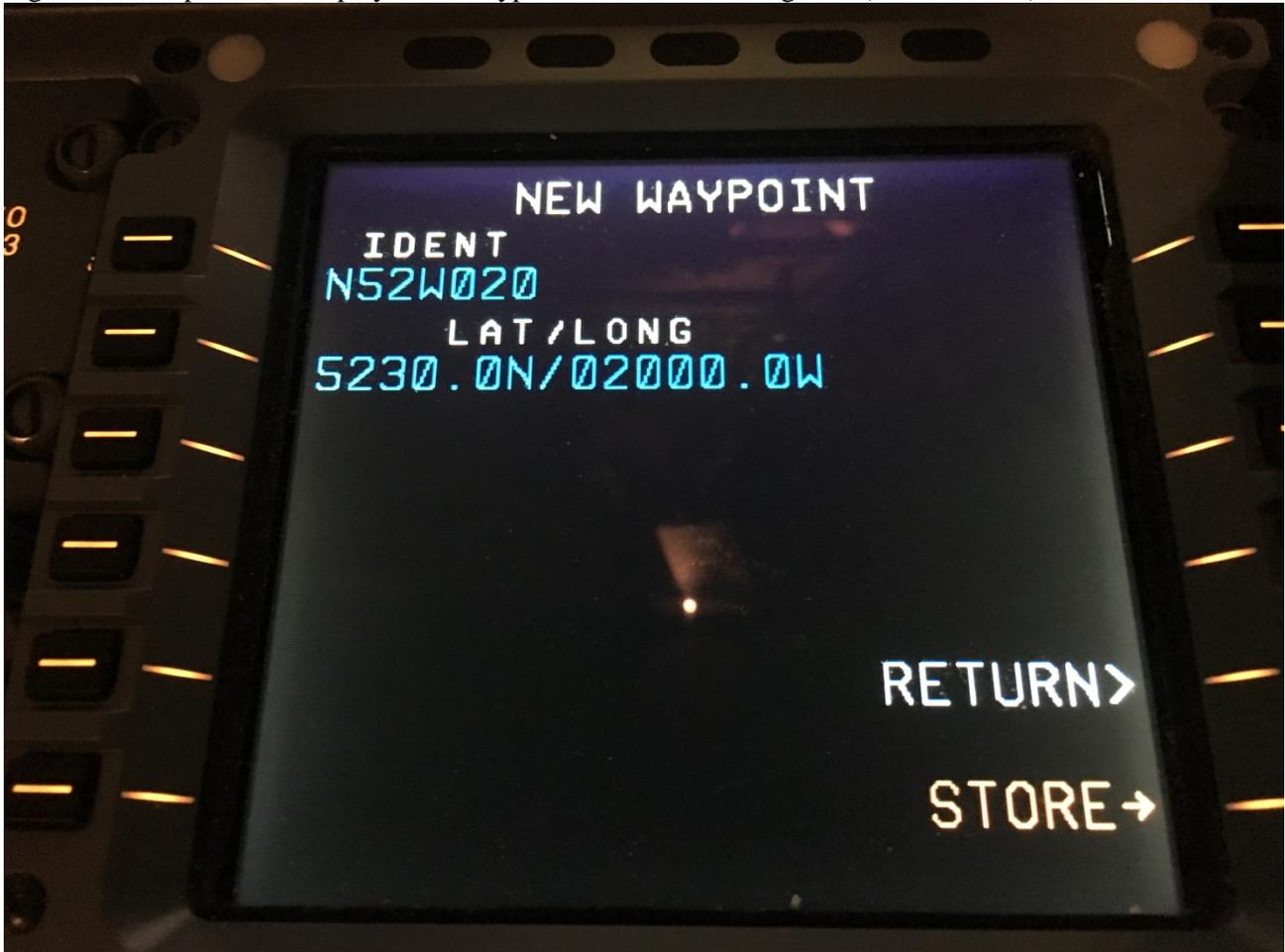
1.   52 degrees-30 minutes North latitude, 20 degrees West longitude inserted into the FMC using full latitude and longitude degrees, minutes and seconds (i.e., 13 characters)

2.   The waypoint IDENT is truncated to 7 characters with **no display of minutes of latitude.**

Figure 2 Example Map Display: 13-characters Inserted into FMC (Full Waypoint Latitude and Longitude)
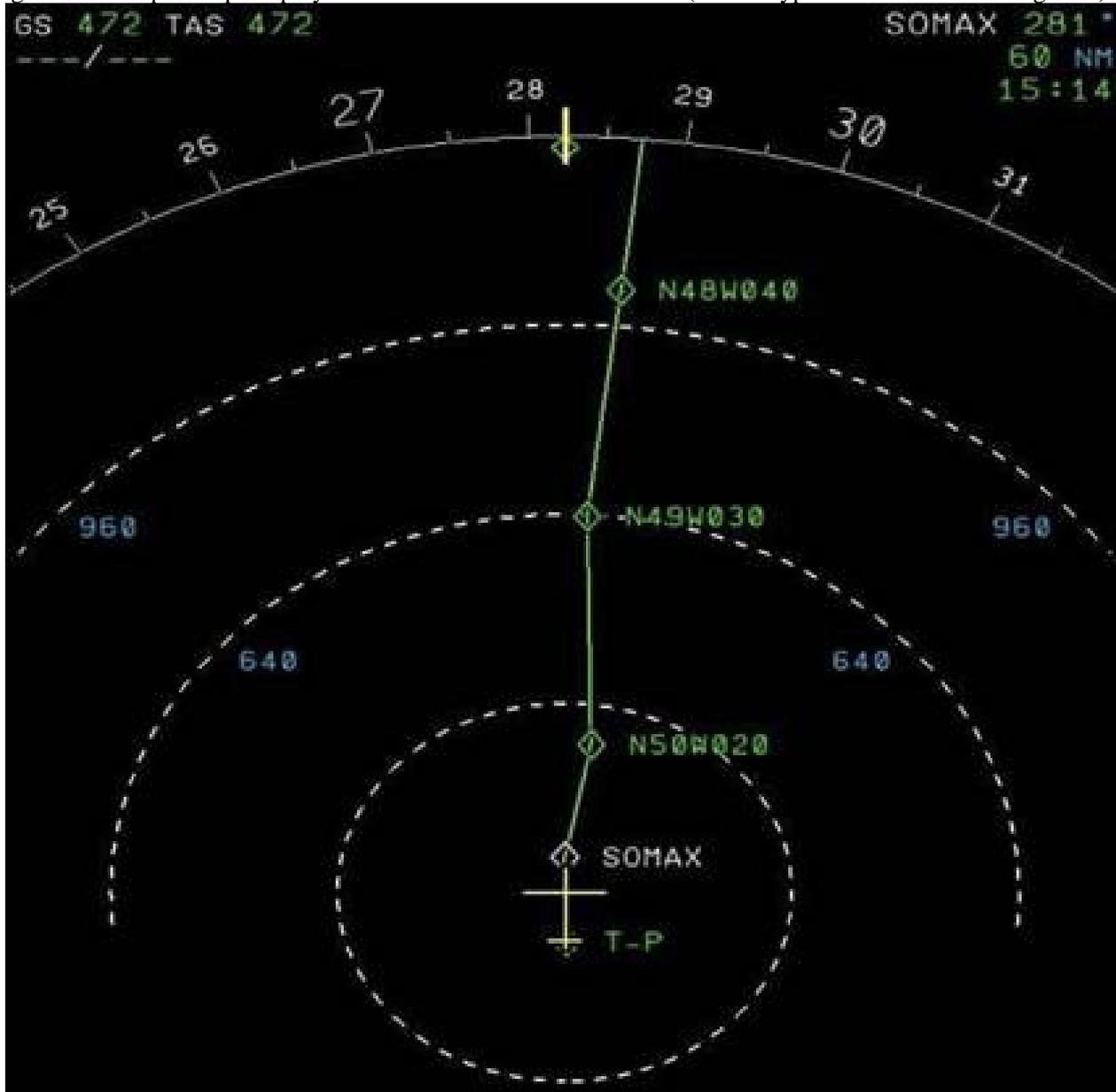
1.   50 degrees-<u>30 minutes</u> North, 20 degrees West is displayed in <u>7 characters</u> (N50W020).

2.   **Minutes of latitude <u>are not displayed.</u>**

3.   The Map display <u>would be the same</u> for 50 degrees-<u>00 minutes</u> North, 20 degrees West.

— **END** —