Customer Services

Advisory Wire

REFERENCE NO:	AW700-34-0327, Rev 08	INFORMATION TYPE:	Operational
ATA:	34-61	EFFECTIVITY:	Global Express / XRS (9002 - 9312, 9314 - 9380, 9384 - 9429) Global 5000 (9127 to 9383, 9389 to 9400, 9404 to 9431 and 9998)
SUBJECT:	**FMS – Anomalies and Associated Navigation Database (NavDB) changes**		

1. REFERENCES:

1.1. Honeywell Service Information Letter (SIL) D201011000003, Revision 26, Reduction of Navigation Database Procedures Content due to FMS Lateral Navigation (LNAV) Display/Guidance Issues, dated 11 Dec 2019

1.2. Bombardier Service Bulletin (SB) 700-31-030 / 700-1A11-31-014, Modification – Integrated Avionics Computer (IAC) System – Batch 3 Software Upgrade

1.3. Bombardier Service Bulletin (SB) 700-31-034 / 700-1A11-31-017, Modification – Integrated Avionics Computer (IAC) System – Batch 3.3 Software Upgrade

1.4. Bombardier Service Bulletin (SB) 700-31-039 / 700-1A11-31-021, Modification – Integrated Avionics Computer (IAC) System – Batch 3.4 Software Upgrade

1.5. Honeywell Service Information Letter (SIL) D201010000079, Revision 3, Flight Management Systems (FMS) does not Correctly Fly Procedures with Arc Legs of 180 Degrees or Greater, dated 28 Oct 2019

References 1.1, 1.2, 1.3, 1.4 and 1.5 are available on the Bombardier Customer Portal: (my.businessaircraft.bombardier.com) > Library > Search by Keyword

1.6. Database Services Bulletin, DSB201505001, Revision H or later, Flight Management System (FMS) Navigational Database Configuration Tables to Allow Operators to Determine Which Navigational Database is Appropriate for a Specific Aircraft Configuration

(http://ads.honeywell.com) > Flight Info > Alerts/Notices

2. INTRODUCTION:

Revision 8 of this Advisory Wire (AW) provides an update to the operators following the release of the Honeywell SIL D201011000003 Revision 26 (Ref. 1.1) on the different procedures reinstated associated with the release of the Batch 3.4 software upgrade (Ref. 1.4). Thus, informing flight crews of remaining software anomaly Item Q with the FMS that may result in undesired guidance in certain specific procedure

designs, as described in the Honeywell SIL D201011000003 (Ref. 1.1). As a result, to mitigate these software anomalies, affected procedures have been modified or removed from the Navigation Database (NavDB) by the supplier.

3. DESCRIPTION:

All Honeywell FMS software versions NZ5.8 and earlier (IC-800, IAC PN 7017300-6100X), software version NZ6.1 post Batch 3 upgrade (Ref. 1.2, IC-810, IAC PN 7017300-61010) and post Batch 3.3 upgrade (Ref. 1.3, IC-810, IAC PN 7017300-61013) and software version NZ6.1.1 post Batch 3.4 (Ref. 1.4, IC-810, IAC PN 7017300-61014) currently installed on Global Express/5000/XRS are affected.

The referenced SILs provide detailed information as well as illustrated operational examples and proposed workaround procedures. It also explains the related changes to the NavDB to preclude these conditions.

The following provided details on each condition and the related FMS software version(s) applicability:

3.1 FMS software version NZ5.8 and earlier – FMS does not correctly fly procedures with arc legs of 180 degrees or greater (Ref. 1.5)

The referenced SIL advises operator and flight crews of a software anomaly that does not allow procedures with arc legs and course changes of 180 degrees or greater to be processed correctly. This may result in the FMS commanding the aircraft to fly published procedures incorrectly. To prevent this condition, affected procedures in the NavDB were modified to have the arc split into two (2) smaller arcs; this has the effect of an additional waypoint showing up on the Control Display Unit (CDU) and the map display which is not shown on the aeronautical charts. The Honeywell SIL D201010000079 Table 2 (Ref. 1.5) identify procedures (airport/identification) with arc legs greater than 180 degrees that were in the NavDB, Cycle 1010 (effectivity date Sep. 23, 2010). Additional procedures maybe added or deleted after NavDB Cycle 1010.

3.2 Terminal area procedures using heading legs displayed as “FLY XXX OR AS ASSIGNED”

Information included as Item G of Honeywell SIL D201011000003 (Ref. 1.1), is described in Section 3.3 below.

3.3 Reduction of navigation database procedures content due to FMS Lateral Navigation (LNAV) display/guidance issues (Ref. 1.1)

Applicable to the Global Express/5000/XRS with FMS software version NZ5.8 or earlier in twelve (12) cases, identified as Items C, G, H, I, J, K, M, N, O, P, Q and R in the SIL, which are covered in more details. For FMS software version NZ6.1 included with Batch 3 (Ref. 1.2), nine (9) cases are identified as Items J, K, L, M, N, O, P, Q and R in the SIL. For FMS software NZ6.1 included with Batch 3.3 (Ref. 1.3) and for FMS software NZ6.1.1 included with Batch 3.4 (Ref. 1.4), one (1) case is identified as Item Q in the Honeywell SIL. The Item Q will be evaluated for correction in a future FMS software version which is not identified or planned at this time.

The following table is extracted from the Honeywell SIL (Ref. 1.1) and provides a quick overview on the specific applicability to the Global Express/5000/XRS on the current FMS versions.

Item	A	B	C	D	E	F	G	H	I	J	K	L	M	N	O	P	Q	R
Global Aircraft	"X" Indicates Honeywell SIL items applicable to FMS version																	
FMS version NZ5.X – IC-800 IAC PN 7017300-6100X			X				X	X	X	X	X		X	X	X	X	X	X
FMS version NZ6.1 – IC-810 Batch 3 IAC PN 7017300-61010										X	X	X	X	X	X	X	X	X
FMS version NZ6.1 – IC-810 Batch 3.3 IAC PN 7017300-61013																	X	
FMS version NZ6.1.1 – IC-810 Batch 3.4 IAC PN 7017300-61014																	X	

These are covered in more detail below:

Item C, Standard Instrument Departure/Standard Terminal Arrival Route (SID/STAR) combinations, FMS software version NZ5.8 and earlier:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- SID/STAR combinations, which contain common waypoints between departure, arrival, and/or approach segments
- Course change to common waypoint is 180 degrees or greater

Note that Item C was corrected as part of the Batch 3 upgrade (Ref. 1.2)

Item G, "FLY XXX OR AS ASSIGNED" heading legs, FMS software version NZ5.8 and earlier:

Heading legs with course change, the navigation database specifies the prescribed turn direction. The FMS displays these legs as "FLY XXX OR AS ASSIGNED" on CDU. The LNAV function may incorrectly fly published terminal area procedures when the following condition is present:

- Procedures with course changes of 180 degrees or greater

In this case the heading leg turn direction from database will not be followed by LNAV. FMS will turn in direction of least course change.

Note that Item G was corrected as part of the Batch 3 upgrade (Ref. 1.2)

Item H, Procedure turns less than 10 nautical miles (18.5 km), FMS software version NZ5.8 and earlier:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedure turns less than 10 NM (18.5 km)
- Speeds greater than 200 knots (370 kph) groundspeed

FMS commands a turn that will result in an airspace violation as the aircraft will fly outside of the airspace boundary.

In this particular case, only the affected transitions are removed, not the entire procedure.

Note that Item H was corrected as part of the Batch 3 upgrade (Ref. 1.2)

Item I, Continuous 360 turn, FMS software version NZ5.8 and earlier:

FMS LNAV function may incorrectly fly published procedures, when the following condition is present:

- Procedure containing DF-AF (Direct to a Fix leg – Arc to a Fix leg) combinations

FMS may command a continuous 360-degree turn (left or right) with no attempt to return to the published procedure.

Note that Item I was corrected as part of the Batch 3 upgrade (Ref. 1.2)

Item J, Direct leg early sequencing, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures and the FMS may command turn in wrong direction when the following conditions are present:

- Course changes greater than 180 degrees
- Small radius of course reversal
- SID and missed approach procedures (MAP)

Note that Item J was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item K, Course to Fix (CF) flight plan legs, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Approach transition selection may result in early sequence of previous leg
- Flight plan leg prior to CF leg has course change of 180 degrees or greater

FMS may command turn in wrong direction.

Note that Item K was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item L, Direct leg back to previous waypoint, FMS software version NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedure with a Direct to a Fix leg (DF) back to the previous waypoint
- Any of the following combinations for the two (2) waypoints: Track/Course/Direct to a Fix (TF/CF/DF) preceding a Direct to a Fix (DF) with a defined turn direction in a terminal area procedure

FMS will remove the second DF leg of the procedure and may command a turn in the wrong direction.

Note that Item L was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item M, Altitude leg sequence, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedure with an altitude leg (Fix to an Altitude [FA]/climb to/proceed to altitude X/turn X when altitude Y has been reached/and others) followed by a Direct to a Fix leg (DF)
- DF leg results in a 180 degrees or greater turn

FMS may drop the DF leg once the FA has sequenced and command a turn in the incorrect direction to the subsequent waypoint.

Note that Item M was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item N, First leg of missed approach is a radius to fix leg, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedure with a Radius to Fix leg (RF) as the first leg of the missed approach procedure

FMS may activate a missed approach after the missed approach point.

Note that Item N was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item O, SID or missed approach with significant turns before and after an altitude leg, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedures with course change of 90 degrees or more prior to the altitude (displayed on CDU as *ALT) leg
- Procedures with a course change of 180 degrees or more after the *ALT leg
- Altitude terminating leg precedes Direct to a Fix leg (DF)
- Aircraft has reached an altitude which is just below the specified altitude constraint prior to sequencing the *ALT waypoint
- Aircraft reaches the specified altitude constraint prior to turning to the inbound course of the *ALT waypoint

FMS may command turn in wrong direction.

Note that Item O was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item P, Tear drop followed by 270 degrees turn, FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedures with leg combinations Direct to a Fix leg-Direct to a Fix leg-Course to Intercept (DF-DF-CI)
- DF-DF with turn flag direction set and CI with turn direction, where the turns are in the same direction
- The DF-DF distance computed by the latitude and longitude of the two (2) DF legs are within 1 NM (1.85 km)

FMS may command turn in wrong direction

Note that Item P was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

Item Q, SID procedures and missed approaches with large course change and altitude legs (also known as Extra 360 degree turn), FMS software version NZ5.8 and earlier, NZ6.1 & NZ6.1.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedures with xA (Course to an Altitude {CA}, Fix to an Altitude {FA}, Heading to an Altitude {VA}) legs that have large course changes
- If aircraft reaches 2,000 ft before making a left turn, the Direct to a Fix (DF) leg become active and the FMS turns right

FMS may command turn in wrong direction

Item R, Next waypoint behind issue affecting SID and approach procedures. FMS software versions NZ5.8 and earlier & NZ6.1:

FMS LNAV function may incorrectly fly published procedures, when the following conditions are present:

- Procedures with xF-CF (Course to a Fix) waypoint and a turn direction on the CF and course change of 135 degrees or more
- The location of the xF leg is not within a 45 degrees window from the CF leg inbound course
- The cross track of xF leg onto the CF leg is more than 3.3 NM (6.11 km) based on 200 knots

FMS may command turn in wrong direction

Note that Item R was corrected as part of the Batch 3.3 upgrade (Ref. 1.3)

For the Section 3.3 above, Items C, G, H, I, J, K, L, M, N, O, P, Q and R the Honeywell SIL (Ref. 1.1) provides a detailed aircraft matrix table identifying the approximate number of procedures or procedures segment removed from the navigation database in reference to the anomaly.

As previously stated for FMS software version NZ6.1 included with Batch 3 (Ref. 1.2), there are nine (9) cases identified as Items J, K, L, M, N, O, P, Q and R in the SIL (Ref. 1.1).

For FMS software version NZ6.1 included with Batch 3.3 (Ref. 1.3) and FMS software version NZ6.1.1 included with Batch 3.4 (Ref. 1.4), there is only one (1) case identified as Item Q in the SIL (Ref. 1.1).

To prevent the problems from occurring, Honeywell is analyzing and removing procedures from the navigation database that can cause incorrect guidance. As further analysis is performed, additional procedures may be removed from the database from one release cycle to another.

A list of all removed or modified procedures is posted on the Honeywell website on the page where databases are available for downloading at http://www.honeywellaes.com > Sign in > "Software & Data Services" select Go to My Downloads > For the applicable navigation database, select "Associated Documents" and the "Detailed Report". If you do not download the database from the above website or do not have a login, the list of all removed or modified procedures for non-tailored databases is available for downloading at http://www.honeywellaes.com > NavDB > Flight Info > Content/Procedures > search by Database ID and select the "Associated Report".

Furthermore, Honeywell's position is to remove the fewest published procedures from the NavDB, in order to minimize the effect of issues from one FMS product to another. It is Honeywell's intention to introduce different NavDBs for the different FMS versions. Additional information on Navigational Database Configuration to be used can be found in the Services Bulletin DSB201505001 (Ref 1.6).

FMS software version NZ6.1 included with Batch 3 (IC-810, IAC PN 7017300-61010) is requiring a specific NavDB (PN: N65 and CDU identifier WRLD3L5 from Honeywell/Jeppesen). This specific database will have the affected procedures reinstated for SIL Items C, G, H and I and the affected procedures removed for SIL Items J, K, L, M, N, O, P, Q and R.

FMS software version NZ6.1 included with Batch 3.3 (IC-810, IAC PN 7017300-61013) is requiring a specific NavDB (PN: N6A and CDU identifier WLD3ALT from Honeywell/Jeppesen). This specific database will have the affected procedures reinstated for SIL Items J, K, L, M, N, O, P and R and the affected procedures removed for SIL Item Q.

FMS software version NZ6.1.1 included with Batch 3.4 (IC-810, IAC PN 7017300-61014) is requiring the same NavDB (PN: N6A and CDU identifier WLD3ALT from Honeywell/Jeppesen) as Batch 3.3 does and the affected procedures removed for SIL Item Q.

In order for you to receive or access the correct NAV database, you must notify Honeywell Database Services of the upgrade by emailing AISAccountServices@Honeywell.com with the new IC-810 configuration of your aircraft.

4. ACTION:

Operators and flight crews should be familiar with the Honeywell SILs (Ref. 1.1 and 1.5) and use the following procedures:

- Verify availability of procedures in the database during pre-flight planning
- Compare and monitor the charted procedure with the active flight plan
- Monitor the aircraft guidance to ensure turn direction is consistent with the published procedure

- Ensure that aircraft with FMS software version NZ5.X (IC-800, IAC PN 7017300-6100X) are using the associated NavDB PN YA5 and CDU identifier WORLD3 from Honeywell/Jeppesen.
- Ensure that Batch 3 aircraft with FMS software version NZ6.1 (IC-810, IAC PN 7017300-61010) are using the associated NavDB PN N65 and CDU identifier WRLD3L5 from Honeywell/Jeppesen.
- Ensure that Batch 3.3 / 3.4 aircraft with FMS software version NZ6.1 (IC-810, IAC PN 7017300-61013 / -61014) are using the associated NavDB PN N6A and CDU identifier WLD3ALT from Honeywell/Jeppesen.
- At each navigation database cycle update, operators should download the list ("Detailed Report") containing all removed or modified procedures for that cycle. This list is posted on the Honeywell website on the page where databases are available for downloading at http://www.honeywellaes.com > Sign in > "Software & Data Services" select "Go to My Downloads" > For the applicable navigation database, select "Associated Documents" and the "Detailed Report".

Should you have any queries pertaining to this Advisory Wire (AW), please contact your Bombardier Field Service Representative (FSR) or the Customer Response Center (CRC).