

Notice of Requirement NTC 91.263

RNAV 1 and RNAV 2 Navigation Specification

Revision 1

Preliminary

The Director of Civil Aviation issues the following requirements (“the requirements”), conditions and restrictions relating to the use of the RNAV 1 and RNAV 2 Navigation Specification under section 28(5) of the Civil Aviation Act 1990 and Civil Aviation Rule 91.263.

Purpose

The purpose of this notice is to specify the requirements for using a RNAV 1 or RNAV 2 navigational procedure or route (RNAV 1 or RNAV 2 operations), determined by the Director under rule 91.263, in relation to the following:

- i. the application of the RNAV 1 or RNAV 2 operations;
- ii. the navigation functionalities the aircraft systems must have;
- iii. requirements for system redundancy, including requirements for conventional navigation equipment;
- iv. continuing airworthiness requirements;
- v. operator procedures; and
- vi. the operational and training requirements for flight crew members.

Rule 91.263(b) requires compliance with the requirements in this notice to ensure the safe operation of aircraft using RNAV 1 or RNAV 2 procedures.

General

Civil Aviation Authority (CAA) notices contain approvals and requirements including the detail about the approvals, standards, conditions, procedures and technical specifications that have been approved or determined by the Director under the Civil Aviation Rules. These details must be complied with by parties to whom it applies. They apply in particular circumstances to particular aviation document holders as specified in the notice.

CAA notices are issued under Civil Aviation Rules in accordance with section 28(5) of the Civil Aviation Act. This section permits the Minister of Transport to make ordinary rules, and to specify any terms and conditions within the rules:

- to require a matter to be determined, or undertaken or approved by the Authority, the Director or another person; or
- to empower the Authority, Director, or another person to impose requirements or conditions as to the performance of any activity, including (but not limited to) any procedures to be followed.

Notices support a performance-based approach to regulation and improve the flexibility and responsiveness of the Civil Aviation Rules. They may be used where performance-based regulation is the appropriate way to achieve the desired regulatory outcome, for example, in circumstances where new technological changes or challenges require more flexibility than prescribing requirements in the rules (and rule - making may get quickly out-dated), or where there is a need to respond to safety issues which the rules do not adequately deal with.

The requirements stated in this notice are mandatory and must be complied with.

Related Rules

Civil Aviation Rules 91.261, 91.263, 91.263B and 91.263C

Effective Date

This notice comes into effect on 21 December 2022.

Issue of CAA Notice



21/12/2022

Signed by
Director of Civil Aviation

Date

Revision History

Revision 1	Original version
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RNAV 1 and RNAV 2 Navigation Specification

1. Application

These requirements apply to:

- (1) every operator of an aircraft operating under instrument flight rules using a RNAV 1 and/or RNAV 2 navigational procedure or route (RNAV 1 or RNAV 2 operations);
- (2) every operation in en-route and terminal airspace with ATS surveillance, or where otherwise implemented; or
- (3) every operation that requires a lateral navigation accuracy full term of TSE (TSE) of 1 nautical mile for RNAV 1 or 2 nautical miles for RNAV 2, to be achieved at least 95 % of the flight time by the population of aircraft operating within the airspace, route or procedure.

2. Operational Approval Requirements

- (a) Description of aircraft equipment:
 - (1) The operator must have a configuration list and, if necessary, an MEL detailing the required aircraft equipment for RNAV 1 and/or RNAV 2 operations.
 - (2) The operator must ensure that relevant documentation acceptable to the Director is available to establish that the aircraft is equipped with an RNAV system with a demonstrated RNAV 1 and RNAV 2 capability.
- (b) Training documentation:
 - (1) An air operator certificated under Part 119 must have a training programme addressing the operational practices, procedures and training phases related to RNAV 1 and/or RNAV 2 operations.
 - (2) A private operator under Part 91 must be familiar with the practices and procedures referred to in clause 7 of this notice.
- (c) Operations manuals and checklists:

- (1) An air operator certificated under Part 119 must ensure that the operations manuals and checklists address the operational procedures referred to in clause 6 of this notice.
 - (2) The operator must ensure that appropriate manuals contain navigation operating instructions and contingency procedures.
 - (3) The operator must submit to the Director their manuals and checklists for review as part of the application process.
- (d) Minimum Equipment List (MEL) considerations:
- (1) Any MEL revisions necessary to address RNAV 1 and/or RNAV 2 operations must be approved by the Director.
 - (2) Operators must adjust the MEL, or equivalent, and specify the required dispatch conditions.
- (e) Continuing airworthiness:
- (1) The operator must submit to the Director –
 - (i) the continuing airworthiness instructions applicable to the aircraft's configuration and the aircraft's qualification for RNAV 1 or RNAV 2 operations; and
 - (ii) their maintenance programme, including a reliability programme for monitoring the equipment.
- (f) The operator must ensure that the following aircraft requirements are met:
- (1) Aircraft to be used for RNAV 1 and/or RNAV 2 operations must be fitted with RNAV equipment that automatically determines the aircraft position in the horizontal plane using input from the following types of position sensors:
 - (i) GNSS in accordance with FAA TSO-C145(), TSO-C146(), or TSO-C129() or an equivalent standard acceptable to the Director; or

- (ii) positioning data from other types of navigation sensors may be integrated with the GNSS data provided other position data do not cause position errors exceeding the total system accuracy requirements.
- (2) The use of GNSS equipment approved to TSO-C129 () is limited to those systems which include the minimum functions specified in clause 5 of this notice.
- (3) As a minimum, integrity is to be provided by an ABAS and TSO-C129 equipment is to include the following additional functions:
 - (i) pseudo-range step detection;
 - (ii) health word checking;
 - (iii) DME/DME RNAV equipment complying with the applicable criteria specified in this notice;
 - (iv) DME/DME/IRU equipment complying with the applicable criteria specified in this notice.
- (4) The equipment configuration used to demonstrate the required accuracy must be identical to the configuration specified in the MEL or flight manual.
- (5) The design of the installation must comply with the design standards that are applicable to the aircraft being modified and changes must be reflected in the flight manual prior to commencing operations requiring an RNAV 1 and/or RNAV 2 navigation approval.

3. On-board Performance Monitoring and Alerting

- (a) The operator must ensure that the following requirements regarding accuracy are met:
 - (1) During operations in airspace or on routes designated as RNAV 1, the lateral TSE must be within ± 1 NM for at least 95 % of the total flight time.

- (2) The along-track error must be within ± 1 NM for at least 95% of the total flight time.
- (3) During operations in airspace or on routes designated as RNAV 2, the lateral TSE must be within ± 2 NM for at least 95 % of the total flight time.
- (4) The along-track error must also be within ± 2 NM for at least 95% of the total flight time.

(b) Integrity:

The operator must ensure that the aircraft navigation equipment is designed and installed in a manner that the probability of a major failure condition such as malfunction of the equipment occurring is less than 1×10^{-5} per hour.

(c) Continuity:

Loss of navigation function is classified as a major failure condition for oceanic and remote navigation.

(d) The operator must ensure that the following requirements regarding Signal-In-Space are met:

- (1) During operations in airspace or on routes designated as RNAV 1 if using GNSS, the aircraft navigation equipment must provide an alert if the probability of SIS errors causing a lateral position error greater than 2 NM exceeds 10^{-7} per hour.
- (2) During operations in airspace or on routes designated as RNAV 2 if using GNSS, the aircraft navigation equipment must provide an alert if the probability of SIS errors causing a lateral position error greater than 4 NM exceeds 10^{-7} per hour.
- (3) DME signals meet SIS accuracy tolerances where signals are received, regardless of the published coverage volume, if the ANSP has not declared the NAVAID as not suitable for RNAV.

4. Requirements for specific navigation services

- (a) The operator must ensure that the following requirements for GNSS are met:
- (1) The system must meet the accuracy requirements of the RNAV 1 and/or RNAV 2 navigation specification as set out in any of the following -
 - (i) aircraft with TSO-C129/C129a sensor (Class B or C) and the requirements in a TSO-C115b FMS, installed for IFR use in accordance with FAA AC 20-130A, or an equivalent standard acceptable to the Director;
 - (ii) aircraft with TSO-C145() sensor and the requirements in a TSO-C115b FMS, installed for IFR use IAW FAA AC 20-130A or AC 20-138B or an equivalent standard acceptable to the Director;
 - (iii) aircraft with TSO-C129/C129a Class A1, without deviating from the functionality specified in clause 5 of this notice, installed for IFR use IAW FAA AC 20-138 or AC 20-138A or an equivalent standard acceptable to the Director; or
 - (iv) aircraft with TSO-C146(), without deviating from the functionality specified in clause 5 of this notice, installed for IFR use IAW AC 20-138A, or an equivalent standard acceptable to the Director.
 - (2) If the navigation system does not automatically alert the pilot to a loss of GNSS, the operator must develop procedures to verify correct GNSS operation.
 - (3) Positioning data from other types of navigation sensors may be integrated with the GNSS data provided other positioning data do not cause position errors exceeding the TSE budget. Otherwise, means must be provided to deselect the other navigation sensor types.
- (b) The operator must ensure that the following requirements for DME/DME RNAV system are met:

- (1) The DME accuracy required for RNAV 1 and/or RNAV 2 is based on the performance standard required in FAA TSO-C66c or an equivalent standard acceptable to the Director.
- (2) The DME/DME RNAV system must -
 - (i) position update within 30 seconds of tuning DME navigation facilities;
 - (ii) auto-tune multiple DME facilities; and
 - (iii) provide continuous DME/DME position updating.
- (3) A third DME facility or a second pair has been available for at least the previous 30 seconds, there must be no interruption in DME/DME positioning when the RNAV system switches between DME stations/pairs.
- (4) DME/DME RNAV systems must only use DME facilities identified in State AIPs.
- (5) The systems must not use facilities identified by the State as inappropriate for RNAV 1 and/or RNAV 2 operations in the AIP or facilities associated with an ILS or MLS that uses a range offset, which may be accomplished by-
 - (i) excluding specific DME facilities, which are known to have an adverse effect on the navigation solution, from the aircraft's navigation database, when the RNAV routes are within reception range of these DME facilities; or
 - (ii) using an RNAV system that performs reasonableness checks to detect errors from all received DME facilities and excludes these facilities from the navigation position solution, when appropriate.
- (6) When needed to generate a DME/DME position, the RNAV system must use, as a minimum, DMEs with a relative include angle between 30° and 150°.

- (7) The RNAV system may use any valid receivable DME facility listed in the AIP regardless of its location.
- (8) A valid DME facility-
- (i) broadcasts an accurate facility identifier signal;
 - (ii) satisfies the minimum field strength requirements; and
 - (iii) is protected from other interfering DME signals according to the cochannel and adjacent channel requirements.
- (9) When needed to generate a DME/DME position, as a minimum, the RNAV system must use an available and valid terminal (low altitude) and/or en-route (high altitude) DME anywhere within the following region around the DME facility -
- (i) greater than or equal to 3 NM from the facility; and
 - (ii) less than 40 degrees above the horizon when viewed from the DME facility and out to 160 NM.
- (10) When using a minimum of 2 DME facilities meeting the criteria in paragraph (8), and any other DME facilities not meeting that criteria, the 95% position estimation error must be better than or equal to the following equation:

$$2\sigma_{DME/DME} \leq 2 \frac{\sqrt{(\sigma_{1,air}^2 + \sigma_{1,air}^2) + (\sigma_{1,air}^2 + \sigma_{1,air}^2)}}{\sin(\alpha)}$$

Where:

- $\sigma_{sis} = 0.05$ NM
- σ_{air} is MAX {0.085 NM, (0.125 percent of distance)}
- α inclusion angle (30° to 150°)

- (11) The RNAV system must ensure that the use of facilities outside their service volume where the minimum field strength, co-channel and adjacent-channel interference

requirements may not be satisfied, do not cause erroneous guidance.

- (12) VOR may be used by the RNAV system, however, the RNAV system must ensure an erroneous VOR SIS does not affect the position error when in DME/DME coverage.
- (13) The RNAV system must use operational DME facilities. DME facilities listed by NOTAM as unavailable could still reply to an airborne interrogation, therefore non-operational facilities must not be used. An RNAV system may exclude non-operational facilities by checking the identification or inhibiting the use of facilities identified as not operational.
- (14) Operational mitigations such as pilot monitoring of the RNAV system's navigation updating sources, or time-intensive programming/deselection of multiple DME stations, is to be performed before any workload-intensive or critical phase of flight.
- (15) RNAV systems perform a reasonableness check to verify valid DME measurements. Reasonableness checks are very effective against database errors or erroneous system acquisition such as co-channel facilities, and fall into 2 classes:
 - (i) those the RNAV system uses after it acquires a new DME, where it compares the aircraft's position before using the DME to the aircraft's range to the DME; and
 - (ii) those the RNAV system continuously uses, based on redundant information such as extra DME signals or IRU data.

General requirements:

- (16) Instead of using the published service volume of the radio NAVAID, the navigation system must provide checks which preclude the use of duplicate frequency NAVAIDS within range, over-the-horizon NAVAIDS, and use of NAVAIDS with poor geometry.

- (17) When a reasonableness check is used to satisfy any requirement in these criteria, the effectiveness of the check must be tested under stressful conditions.
- (c) The operator must ensure that the following requirements for DME and IRU (DME/DME/IRU RNAV system) are met:
 - (1) Inertial system performance must satisfy the criteria of US 14 CFR Part 121 Appendix G or an equivalent standard acceptable to the Director.
 - (2) Automatic position updating capability from the DME/DME solution is required.
 - (3) Operators and pilots must discern if any annunciation of inertial coasting is suppressed following loss of radio updating.
 - (4) If the aircraft system reverts to VOR/DME-based navigation before reverting to inertial coasting, the impact of VOR radial accuracy, when the VOR is greater than 40 NM from the aircraft, must not affect aircraft position accuracy.

5. Functional Requirements, Navigation displays and functions

- (a) The operator must ensure that the navigation data, including a to/from indication and a failure indicator, -
 - (1) be displayed on a lateral deviation display such as CDI EHSI and/or a navigation map display; and
 - (2) be used as primary flight instruments for the navigation of the aircraft, for manoeuvre anticipation and for failure/status/integrity indication.
- (b) The operator must ensure that the navigation data meets the following requirements -
 - (1) non-numeric lateral deviation display such as CDI or EHSI, with a to/from indication and a failure annunciation, for use as primary flight instruments for navigation of the aircraft, for manoeuvre anticipation, and for failure/status/integrity indication, with the following 5 attributes:

- (i) the displays must be visible to the pilot and located in the primary field of view (± 15 degrees from the pilot's normal line-of-sight) when looking forward along the flight path;
 - (ii) the lateral deviation display scaling to be compatible with any alerting and annunciation limits, if implemented;
 - (iii) the lateral deviation display must have a full-scale deflection suitable for the current phase of flight and must be based on the required total system accuracy;
 - (iv) the display scaling to be set automatically by default logic or set to a value obtained from a navigation database;
 - (v) the full-scale deflection value must be known or must be available for display to the pilot commensurate with en-route, terminal, or approach values;
 - (vi) the lateral deviation display must be automatically slaved to the RNAV computed path; and
 - (vii) the course selector of the deviation display is to be automatically slewed to the RNAV computed path.
- (c) As an alternate means, a navigation map display may give equivalent functionality to a lateral deviation display, with appropriate map scales, and giving equivalent functionality to a lateral deviation display.
- (d) The operator must ensure that the following system functions are required as a minimum for any RNAV 1 or RNAV 2 equipment -
- (1) the capability to continuously display to the pilot flying, on the primary flight instruments for navigation of the aircraft (primary navigation display), the RNAV computed desired path and aircraft position relative to the path;
 - (2) for operations where the required minimum flight crew members are 2 pilots, the means for the pilot not flying to

- verify the desired path and the aircraft position relative to the path must also be provided;
- (3) a navigation database, containing current navigation data officially promulgated for civil aviation, which can be updated in accordance with the AIRAC cycle and from which ATS routes can be retrieved and loaded into the RNAV system;
 - (4) the stored resolution of the navigation data must be sufficient to achieve negligible PDE. The database must be protected against pilot modification of the stored data;
 - (5) the means to display the validity period of the navigation data to the pilot;
 - (6) the means to retrieve and display data stored in the navigation database relating to individual waypoints and NAVAIDs, to enable the pilot to verify the route to be flown; and
 - (7) the capacity to load from the database into the RNAV system the entire RNAV segment of the SID or STAR to be flown.
- (e) The operator must ensure that the means to display the following items, either in the pilot's primary field of view, or on a readily accessible display page –
- (1) the active navigation sensor type;
 - (2) the identification of the active (To) waypoint;
 - (3) the ground speed or time to the active (To) waypoint; and
 - (4) the distance and bearing to the active (To) waypoint.
- (f) The operator must ensure that the aircraft has -
- (1) the capability to execute a “direct to” function;
 - (2) the capability for automatic leg sequencing with the display of sequencing to the pilot;

- (3) the capability to execute SIDs or STARs extracted from the on-board database including the capability to execute fly-over and fly-by turns;
- (4) the capability to automatically execute leg transitions and maintain tracks consistent with the following ARINC 424 path terminators, or their equivalent -
 - (i) IF
 - (ii) CF
 - (iii) DF
 - (iv) TF;
- (5) the capability to automatically execute leg transitions consistent with VA, VM and VI ARINC 424 path terminators, or must be able to be manually flown on a heading to intercept a course or to go direct to another fix after reaching a procedure-specified altitude;
- (6) the capability to automatically execute leg transitions consistent with CA and FM ARINC 424 path terminators, or the RNAV system must permit the pilot to readily designate a waypoint and select a desired course to or from a designated waypoint;
- (7) Except as provided in paragraph (10), the capability to load an RNAV SID or STAR from the database by route name, into the RNAV system;
- (8) the capability to display an indication of the RNAV system failure, including the associated sensors, in the pilot's primary field of view;
- (9) for multi-sensor systems, the capability for automatic reversion to an alternate RNAV sensor if the primary RNAV sensor fails, which does not preclude providing a means for manual navigation source selection; and
- (10) Despite paragraph (7), if all or part of the RNAV SID or STAR is entered through the manual entry of waypoints from the navigation database, the paths between a manually

entered waypoint and the preceding and following waypoints must be flown in the same manner as a TF leg in terminal airspace.

6. Operating Procedures:

(a) The operator must ensure that the following requirements for pre-flight planning are met:

- (1) The appropriate ICAO flight plan designation specified for the RNAV route must be used.
- (2) The on-board navigation data must be current and appropriate for the region of intended operation and must include the NAVAIDs, waypoints, and relevant coded ATS routes for departure, arrival, and alternate airfields.
- (3) The availability of the NAVAID infrastructure, required for the intended routes, including any non-RNAV contingencies, must be confirmed for the period of intended operations using all available information.
- (4) The availability of GNSS integrity such as RAIM or SBAS signal as required by ICAO Annex 10 must be determined as appropriate.
- (5) For aircraft navigating with SBAS receivers, appropriate GPS RAIM availability in areas where the SBAS signal is unavailable must be checked.

(b) ABAS availability:

The operator relying on GNSS must have the means to predict the availability of GNSS fault detection such as ABAS RAIM to support operations along the RNAV 1 and or RNAV 2 route or procedure.

(c) DME availability:

- (1) For navigation relying on DME, pilots must –
 - (i) check NOTAMs to verify the condition of critical DMEs; and

- (ii) assess their capability to navigate potentially to an alternate destination if critical DME fails while airborne.
- (d) General operating procedures:
 - (1) The pilot must comply with any instructions or procedures identified by the manufacturer as necessary to comply with the performance requirements in this navigation specification.
 - (2) Operators and pilots must not request or file RNAV 1 and RNAV 2 routes unless they satisfy all the criteria in the relevant State documents.
 - (3) If an aircraft which does not meet all the criteria referred to in paragraph (2) receives a clearance from ATC to conduct an RNAV route, the pilot must advise ATC that he or she is unable to accept the clearance and must request alternate instructions.
 - (4) At system initialisation, pilots must –
 - (i) confirm the navigation database is current and verify that the aircraft position has been entered correctly;
 - (ii) verify proper entry of their ATC assigned route upon initial clearance and any subsequent change of route; and
 - (iii) ensure that the waypoints sequence, depicted by their navigation system, matches the route depicted on the appropriate chart(s) and their assigned route.
 - (5) Subject to paragraph (9), pilots must not fly an RNAV 1 or RNAV 2 SID or STAR unless it is retrievable by route name from the onboard navigation database and conforms to the charted route.
 - (6) The route may subsequently be modified through the insertion or deletion of specific waypoints in response to ATC clearances.

- (7) Pilots must not manually enter or create new waypoints of latitude and longitude or rho/theta values or change any RNAV SID or STAR database waypoint type from a fly-by to a fly-over or vice versa.
- (8) Except as provided in paragraph (9), RNAV 1 and RNAV 2 routes in the en-route domain are to be extracted from the database in their entirety.
- (9) Pilots may –
 - (i) select and insert individual or named fixes/waypoints from the navigation database, if all fixes along the published route to be flown are inserted; or
 - (ii) modify the route by inserting or deleting specific waypoints in response to ATC clearances.
- (10) Pilots must –
 - (i) cross-check the cleared flight plan by comparing charts or other applicable resources with the navigation system textual display and the aircraft map display, if applicable;
 - (ii) confirm the exclusion of specific NAVAIDs, if required;
 - (iii) for RNAV 2 routes, use a lateral deviation indicator, flight director or autopilot in lateral navigation mode; and
 - (iv) for RNAV 1 routes, use a lateral deviation indicator, flight director, or autopilot in lateral navigation mode.
- (11) Pilots may use a navigation map display with equivalent functionality as a lateral deviation indicator referred to in paragraph 10(iv), without a flight director or autopilot.
- (12) Pilots of aircraft with a lateral deviation display must ensure that lateral deviation scaling is suitable for the navigation accuracy associated with the route or procedure.

- (13) Pilots must maintain route centre lines, as depicted by on-board lateral deviation indicators and/or flight guidance during all RNAV operations described in this notice, unless authorised to deviate by ATC or under emergency conditions.
 - (14) For normal operations, cross-track error/deviation which is the difference between the RNAV system computed path and the aircraft position relative to the path is to be limited to $\pm\frac{1}{2}$ the navigation accuracy associated with the procedure or route.
 - (15) Pilots may briefly deviate from the standard for normal operations during and immediately after procedure/route turns, up to a maximum of one times the navigation accuracy, which is 1.0 NM for RNAV 1, 2.0 NM for RNAV.
 - (16) If ATC issues a heading assignment taking the aircraft off a route, the pilot must not modify the flight plan in the RNAV system until a clearance is received to rejoin the route or the controller confirms a new route clearance.
 - (17) When the aircraft is not on the published route, the accuracy requirements specified in this notice does not apply.
- (e) RNAV SID specific requirements:
- (1) The pilot must –
 - (i) before commencing take-off, verify the aircraft's RNAV system is available, operating correctly, and the correct airport and runway data are loaded;
 - (ii) before flight, verify that the aircraft navigation system is operating correctly and the correct runway and departure procedure including any applicable en-route transition are entered and properly depicted;
 - (iii) if assigned an RNAV departure procedure and subsequently receive a change of runway, procedure

- or transition, verify the appropriate changes are entered and available for navigation prior to take-off;
- (iv) carry out a final check of proper runway entry and correct route depiction, shortly before take-off;
 - (v) be able to use RNAV equipment to follow flight guidance for lateral navigation; and
 - (vi) use an authorised method such as lateral deviation indicator/navigation map display/flight director/autopilot to achieve an appropriate level of performance for RNAV 1.
- (2) Pilots of aircraft without GPS, using DME/DME sensors without IRU input, must not use their RNAV system until the aircraft has entered adequate DME coverage.
 - (3) Pilots of aircraft without GPS, using DME/DME RNAV systems with an IRU (DME/DME/IRU), must ensure that the aircraft navigation system position is confirmed, within 304 m (1 000 ft) (0.17 NM) of a known position, at the starting point of the take-off roll.
 - (4) A navigation map may be used to confirm aircraft position, if the pilot procedures and the display resolution allow for compliance with the 304 m (1 000 ft) tolerance requirement.
 - (5) When using GNSS, the signal must be acquired before the take-off roll commences.
 - (6) For aircraft using TSO-C129/C129A equipment, the pilot must ensure that the departure airport loaded into the flight plan in order to achieve the appropriate navigation system monitoring and sensitivity.
 - (7) For aircraft using TSO-C145a/C146a avionics, if the departure begins at a runway waypoint, then the departure airport does not need to be in the flight plan to obtain appropriate monitoring and sensitivity.
- (f) RNAV STAR specific requirements

- (1) Before the arrival phase, the pilot must –
 - (i) verify that the correct terminal route has been loaded;
 - (ii) check the active flight plan by comparing the charts with the map display, if applicable, and the MCDU;
 - (iii) confirm the waypoint sequence, reasonableness of track angles and distances, any altitude or speed constraints, which waypoints are fly-by and which are fly-over;
 - (iv) if required by a route, check to confirm that updating will exclude a particular NAVAID; and
 - (v) if the contingency procedure requires reversion to a conventional arrival route, necessary preparations must be completed before commencing the RNAV route.
- (2) The pilot must not –
 - (i) use a route if doubt exists as to the validity of the route in the navigation database; or
 - (ii) create new waypoints by manual entry into the RNAV system; or
 - (iii) manually modify the loaded route using temporary waypoints or fixes not provided in the database.
- (3) Pilots must verify their aircraft navigation system is operating correctly and the correct arrival procedure and runway, including any applicable transition, are entered and properly depicted.
- (4) Pilots must ensure that published altitude and speed constraints are observed.

7. Pilot knowledge and training

- (a) The operator must ensure that pilots are trained and have appropriate knowledge of the topics contained in AC91-21, and

AC 61-17 if applicable, the limits of their RNAV 1 and/or RNAV 2 navigation capabilities, the effects of updating, and RNAV 1 and/or RNAV 2 contingency procedures where specified.

- (b) Pilots must be appropriately licensed, rated and endorsed on the specific equipment to be used for RNAV 1 and/or RNAV 2 operations, including knowledge of specific organisational standard operating procedures, if applicable.

8. Navigation database

- (a) The operator must ensure that the navigation database complies with RTCA DO 200A/EUROCAE document ED 76, Standards for Processing Aeronautical Data, or an equivalent standard acceptable to the Director.
- (b) The operator must –
 - (1) report any discrepancies that invalidate the RNAV 1 and RNAV 2 route to the navigation database supplier;
 - (2) inform the pilots of the discrepancies; and
 - (3) prohibit the pilots from using the affected route; and
 - (4) conduct periodic checks of the operational navigation databases to ensure that existing quality system requirements are met.

9. Operator to comply with requirements before carrying out RNAV 2 operations

An operator must not carry out RNAV 1 or RNAV 2 operations unless the operator complies with all the applicable requirements of this notice.