



International Civil Aviation Organization

**ELEVENTH MEETING OF THE MIDANPIRG AIM SUB-GROUP
(AIM SG/11)**

(Amman, Jordan, 22 – 23 January 2025)

Agenda Item 6: PBN Planning and Implementation in the MID Region

PBN CHARTING: SID/STAR

(Presented by PBN SID AND STAR CHARTING AD HOC WORKING GROUP)

SUMMARY
<p>This Paper presents the outcome of the PBN SID and STAR Charting Ad Hoc Working Group.</p> <p>Action by the meeting is at paragraph 3.</p>
REFERENCES
<ul style="list-style-type: none">- MIDANPIRG/21 meeting Report- AIM SG/10 meeting Report- PBN SG/9 meeting Report

1. INTRODUCTION

1.1 ICAO Doc 8697 Aeronautical Chart Manual doesn't include specimen charts for SID/STAR procedures based on Performance-Based Navigation (PBN). The only available SID/STAR specimen charts are based on conventional navigation, which cannot be used as a reference for procedures based on PBN.

1.2 In 2022, ICAO MID launched a PBN SID/STAR data collection campaign in MID Region for monitoring purposes. It was identified that PBN information is dispersed across various sections of the published charts in States AIPs, contrary to the specific promulgation principles outlined by ICAO. *(Some examples included in Attachment 1).*

1.3 The Twenty First Meeting of the Middle East Air Navigation Planning and Implementation Regional Group and the Eleventh Meeting of the Regional Aviation Safety Group-Middle East (MIDANPIRG/21 & RASG-MID/11) held in Abu Dhabi, UAE from 4 to 8 March 2024 noted the outcomes of the Eighth meeting of the Performance Based Navigation Sub-Group (PBN SG/8) and of the AIM Sub-Group (AIM SG/10) held respectively in Doha, Qatar, from 10 to 11 December 2023 and in Egypt, Cairo at ICAO MID Office from 28 to 29 February 2024 in particular the PBN Charting issues related to SID/STAR.

2. DISCUSSION

2.1 The MIDANPIRG/21 meeting recognized the presence of discrepancies in PBN SID/STAR charts published in the Aeronautical Information Publications (AIPs) of MID States. These disparities were pinpointed through a data collection campaign, encompassing concerns related to chart title, chart identification, and PBN Box.

2.2 It was noted that ICAO State Letter 2023/07 provided requirements in Annex 4 and PANS OPS (Doc 8168) concerning PBN box and charting of PBN SIDs and STARs, however specimen charts were not included. It was noted also that it may still take considerable time until a chart specimen is published in the ICAO Charting Manual (Doc 8967).

2.3 The MIDANPIRG/21 meeting acknowledged that the absence of harmonization in PBN SID/STAR charts poses significant challenges for Airspace Users (AUs), introducing potential confusion for both pilots and Air Traffic Control (ATC). Recognizing the importance of harmonization in enhancing safety, efficiency, and standardization, the meeting decided to the following Decision:

*MIDANPIRG DECISION 21/8: PBN SID AND STAR CHARTING AD HOC
WORKING GROUP*

That a PBN SID and STAR Charting Ad Hoc Working Group,

- a) be established to develop guidance/Specimen of PBN SID and STAR Charts, in coordination with the AIM Sub Group;*
- b) be composed of:*
 - Chairpersons of the PBN SG and the AIM SG*
 - Mr. Taha Mohamed Taha (Egypt)*
 - Rohallah Salehi (Iran)*
 - Mohammad Mahanpour (Iran)*
 - Mr. Raed Ghazawi (Jordan)*
 - Mr. Sulaiman Al Salmi (Oman)*
 - Mr. Suwarn Raj Upadhyay (Oman)*
 - Mrs. Pamela Erice (Qatar)*
 - Mr. Muhammad Aljuhani (KSA)*
 - Mr. Ayed Murfat (KSA)*
 - Mr. Saqr Obaid Al Marashda (UAE)*
 - Mr. Kedari Manthanwar (UAE)*
 - ICAO Secretariat*
- c) presents its outcome to the PBN SG/9 and AIM SG/11 meetings; and*
- d) be dissolved upon the successful completion of its assigned tasks.*

2.4 The PBN SID and STAR Charting Ad Hoc Working Group officially kicked off its work with a virtual meeting held on 24 September 2024.

2.5 The working group elected Mrs. Pamela Erice, Acting Head of AIM at Air Navigation Department QCAA as the rapporteur, recognizing her active involvement in both the AIM SG and PBN SG subgroups.

2.6 During the first meeting, the working group was apprised of the work that has been done by the ICAO EUR/NAT Office and Eurocontrol on the subject. The meeting noted that PBN information is dispersed across various sections of SID/STAR charts, varying by country or airport in EUR Region, contrary to the specific promulgation principles outlined by ICAO. This inconsistency prompted Eurocontrol to address the lack of harmonization in European PBN SID/STAR charts in

various stakeholder groups. The need for harmonization was agreed, with the support for creating a factsheet. The meeting was presented with proposed examples through a factsheet, developed by Eurocontrol. The updates provided valuable insights into the progress made so far, allowing the group to align their efforts with the ongoing initiatives and build upon the existing work. This briefing served as an essential foundation for the group's future actions.

2.7 The Ad-Hoc Working Group agreed to adopt the factsheet as a regional guideline and emphasized the need for complementary explanatory guidance to ensure its effective implementation. In this regard, Oman generously developed and provided additional guidance to support the application of the factsheet across the MID Region.

2.8 The PBN SG/9 meeting was briefed on the outcomes of the PBN SID and STAR Charting Ad-Hoc Working Group and with a view to streamlining efforts, promoting Inter-regional harmonization, and aligning with ongoing initiatives, the meeting agreed to the following draft Conclusion:

DRAFT CONCLUSION 9/2: PBN SID/STAR CHARTS HARMONIZED AIP PUBLICATION

That, ICAO MID office:

- a) *promotes the PBN SID and STAR Charting factsheet at **Appendix A** to enhance harmonization in the publication of these procedures across the MID Region, ensuring their widespread dissemination among member states; and*
- b) *monitors the implementation status of PBN SID/STAR charts and the harmonized AIP publication and provides progress reports to the relevant subsidiary bodies of MIDANPIRG.*

2.9 The meeting noted that contributions to the task have so far been limited to Oman, Qatar, Saudi Arabia, Sudan, and the UAE, with several other States yet to participate or provide input. To strengthen collaboration and accelerate progress, the group welcomed Ms. Hind A. Almohameed, an AIS Inspector at GACA Saudi Arabia, as a new member.

PBN SIDs and STARs Charting factsheet Explanatory Guidance

2.10 The meeting may wish to take note also that a detailed explanatory guidance for MID States on the factsheet for PBN SID/STAR charts was developed by Oman. The guidance provided in **Appendix B** aims to support States in understanding the key components and best practices for effective implementation, thereby enhancing the consistency, accuracy, and overall quality of PBN charting across the MID Region.

3. ACTION BY THE MEETING

3.1 The meeting is invited to:

- a) Take note of the information provided;
- b) Review and discuss the PBN SID and STAR Charting factsheet in **Appendix A**, along with the explanatory guidance in **Appendix B**; and
- c) Agree to the PBN SG/9 Draft Conclusion 9/2.

PBN SID/STAR charts published in the AIPs: Chart Title, identification and PBN Box

Chart Title – Examples

**STANDARD DEPARTURE
CHART - INSTRUMENT
(SID) - ICAO
RNAV**

**DEP/ARR
STANDARD RNAV
ROUTES - ICAO**

**RNAV STANDARD
DEPARTURE CHART
INSTRUMENT (SID) - ICAO**

**STANDARD DEPARTURE CHART —
INSTRUMENT (SID) — ICAO**

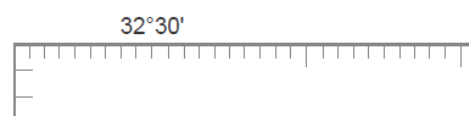


Chart Identification – Examples

**BAHRAIN INTL (OBBI)
RWY 12L/30R
KOBOK 1 ARRIVAL (RNAV1)**

**AMMAN/Marka Intl (OJAM)
STAR RNAV (GNSS) RWY 06**

**DOHA/Hamad Intl. (OTHH)
RNP RWY 16L
ALVEN 2M /LUBET 1M /LUBET 1Y
/TULUB 1M**

**AMMAN/Marka Intl (OJAM)
SID RNAV (GNSS) RWY 24**

**SAYUN /Sayun Intl. (OYS)
RWY
NABUP 1A - NADAK 1A - XALTA 1A - ASLAB
IVINA 1A - XAGAG 1A - DEMNA 1A**

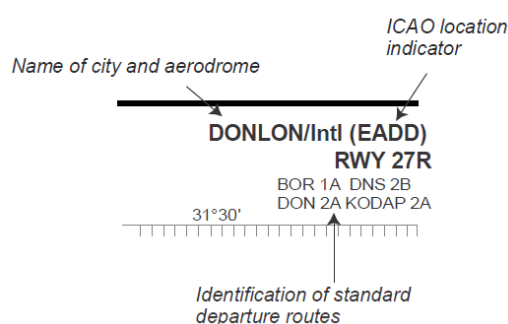
**KUWAIT / Kuwait Intl
STATE OF KUWAIT
RNAV (GNSS) SID RWY 15L/15R**

**TEHRAN/IMAM KHOMAINI
RNAV1 RWY 29R
RADAL 3X
BOXAM 2X**

**ASWAN / ASWAN
RNAV (VOR/DME or GNSS)
RWY 17**

**RAFIC HARIRI INTL' BEIRUT
BALMA 1R - KUKLA 1R - ELIKA 1R – LEBOR
RNAV (GNSS) STAR RWY 21**

**ABU DHABI / Intl
RNAV 1 STAR RWY 31L/**



PBN Box – Examples

RNAV-1 REQUIRED

RNP 1

RNAV 1 (GNSS) REQUIRED

GNSS required

**GNSS REQUIRED
RNAV 1 OPERATIONS**

NOTE:

DME/DME required

**RNAV 1 WITH
GNSS REQUIRED**



PBN SID/STAR charts Harmonised AIP Publication

v2.0, 28 November 2024



Introduction

EUROCONTROL monitors the implementation of Performance-Based Navigation (PBN) procedures in ECAC using the [PBN Map tool](#), integrating data from national AIPs and implementation plans derived from PBN Transition plans produced by ATM/ANS providers.

Each AIRAC cycle prompts a thorough examination of national AIPs, with a specific focus on identifying new PBN procedures, particularly Standard Instrument Departures (SIDs) and Standard Instrument Arrivals (STARs).

It was identified that PBN information is dispersed across various sections of SID/STAR charts, varying by country or airport, contrary to the specific promulgation principles outlined by ICAO. This inconsistency prompted EUROCONTROL to address the lack of harmonization in European PBN SID/STAR charts in various stakeholder groups. The need for harmonization was agreed, with the support for creating a factsheet, especially given the mandate by the European PBN implementing regulation (EU 1048/2018) that necessitates the implementation of PBN SID/STAR at every instrument runway where these procedures are published.

This factsheet, designed for specialists responsible for chart origination, includes illustrative examples and corresponding references to ICAO documentation. It is essential to note that this resource is intended to enhance understanding and promote harmonization but does not seek to replace or override state regulations or ICAO requirements regarding AIP publication and charting.

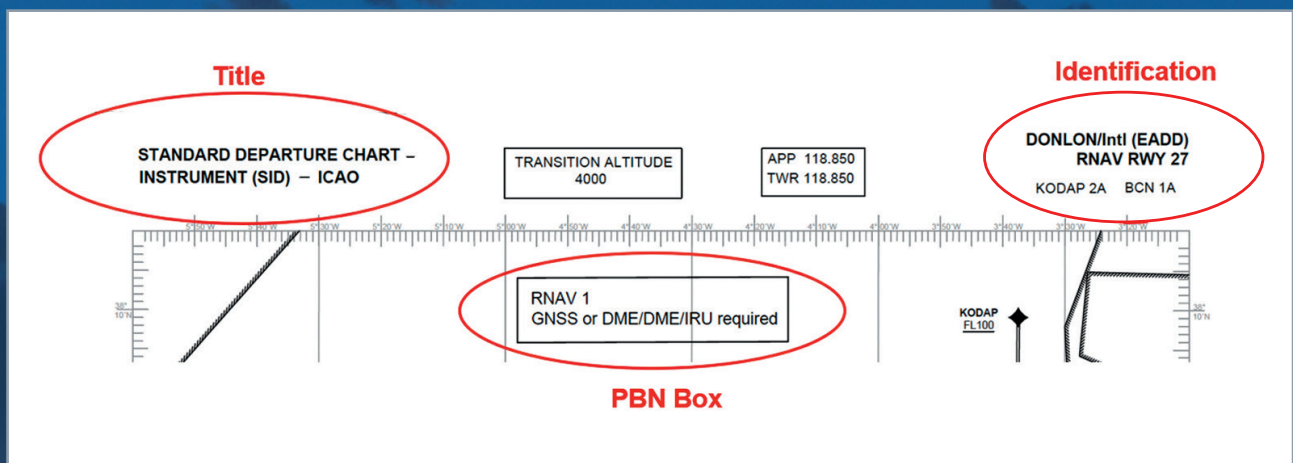


Objective

The development of this factsheet aims to heighten awareness regarding the charting of PBN SID/STAR in accordance with ICAO principles. The primary objective is to foster harmonization in the publication of these procedures across Europe, especially in anticipation of the increased number of PBN SID/STAR charts due to the PBN Implementing Regulation (EU 1048/2018).

Specifically, this factsheet concentrates solely on three key chart elements:

- Title
- Identification
- PBN box



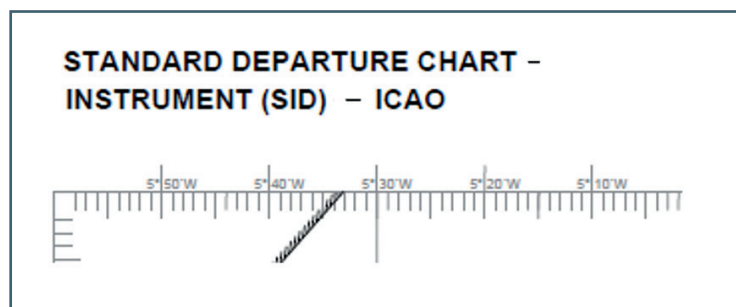
PBN SID/STAR - Chart Title

According to ICAO Doc 8697 Aeronautical Chart Manual, chapter 7.9 (SID):

Title

*"The title must be **"Standard Departure Chart - Instrument (SID) - ICAO"**. Such title must not include "ICAO" unless the chart conforms with all Standards specified in Annex 4, Chapters 2 and 9. The chart title is placed at the top left corner of the chart in bold upper-case type."*

Example:

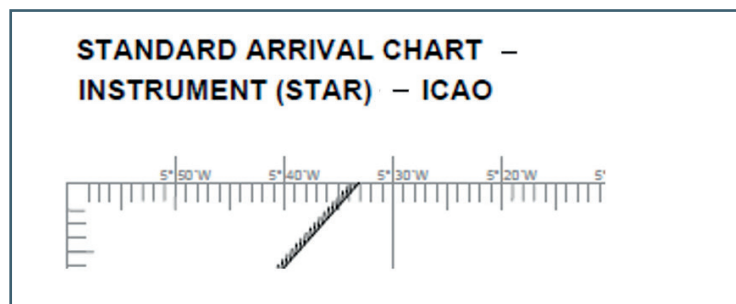


According to ICAO Doc 8697 Aeronautical Chart Manual, chapter 7.10 (STAR):

Title

*"The title must be **"Standard Arrival Chart - Instrument (STAR) - ICAO"**. Such title must not include "ICAO" unless the chart conforms with all Standards specified in Annex 4, Chapters 2 and 10. The chart title is placed at the top left corner of the chart in bold upper-case type."*

Example:



PBN SID/STAR - Chart Identification

According to ICAO Doc 8168 PANS-OPS Vol II, Part III, Section 5, Chapter 1.3.2 "Chart Identification":

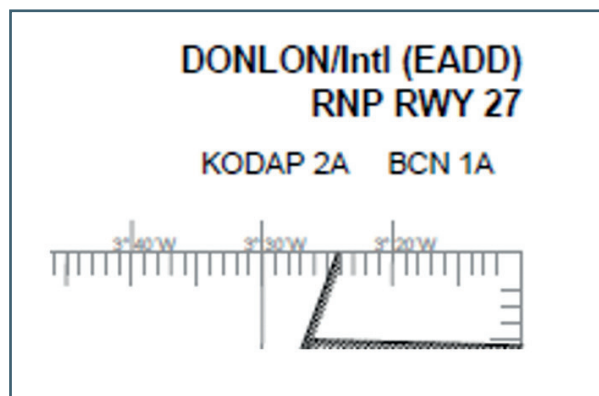
*"The chart shall be identified in accordance with Annex 4, 9.5 for departures and 10.5 for arrivals and **shall include the term RNAV or RNP, depending on the navigation specification.**"*

According to ICAO Doc 8697 Aeronautical Chart Manual, chapter 7.9 (SID) and 7.10 (STAR) "Identification":

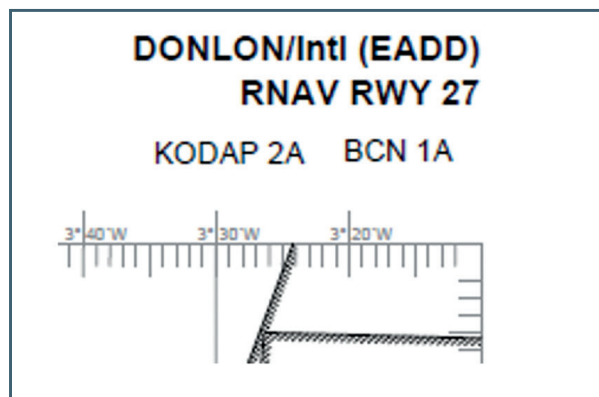
"The chart must be identified by the name of the city or town, or area, that the aerodrome serves, the name of the aerodrome, and the identification of the standard departure/arrival route(s) — instrument as established in accordance with the PANS-OPS, Volume II, Part I, Section 3. The identification of the standard departure/arrival route(s) — instrument is provided by the procedures specialist.

*The ICAO location indicator may also be included with the name of the aerodrome. **The chart identification is placed at the top right corner of the chart in bold upper-case type.**"*

Example for PBN SID/STAR based on RNP:



Example for PBN SID/STAR based on RNAV:

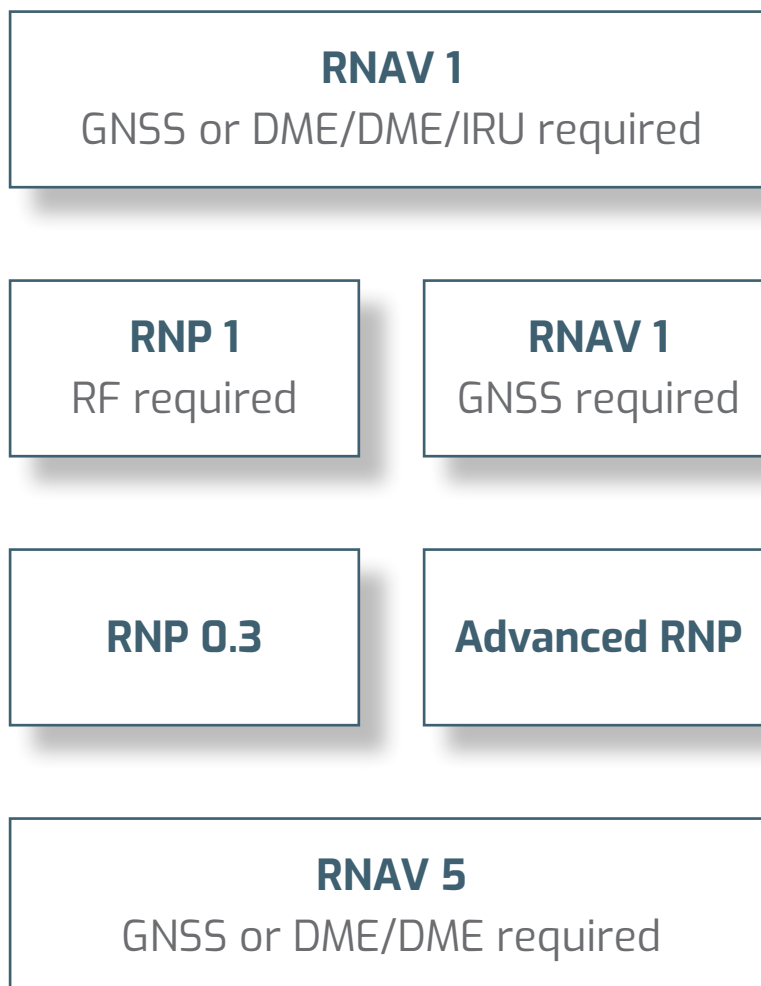


PBN SID/STAR – PBN BOX

According to ICAO Doc 8168 PANS-OPS Vol II, Part III, Section 5, Chapter 1.3.4 “Chart notes”:

*“Additional procedure requirements shall be provided as chart notes. **PBN items shall be separated out and published in a PBN requirements box and shall include the identification of the navigation specification used in the procedure design, as well as any additional functionality that is optional within the navigation specification, but required for the specific procedure. When a limitation to the sensors allowed within the navigation specification exists, the sensor limitation shall also be identified within the PBN requirements box (e.g. GNSS required, GNSS or DME/DME/IRU required).**”*

Examples of PBN boxes:

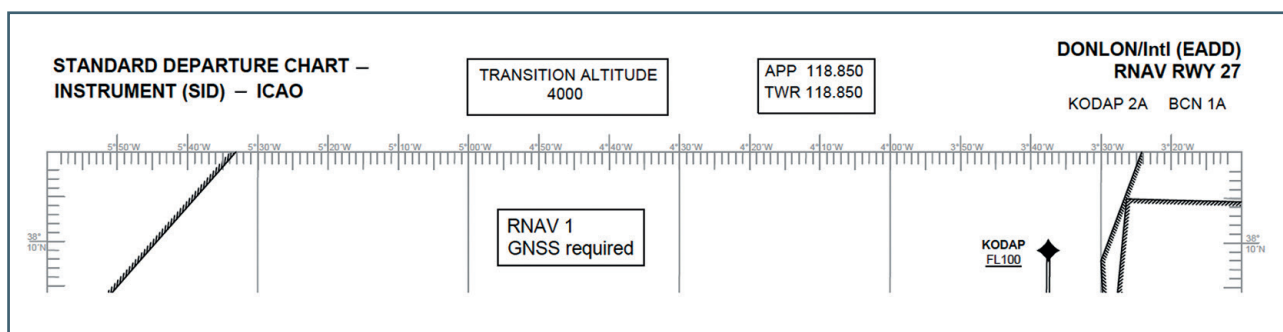


PBN SID/STAR EXAMPLES

Navigation specification: **RNAV 1**

Navigation sensor limitations: **GNSS required** (DME/DME is not available)

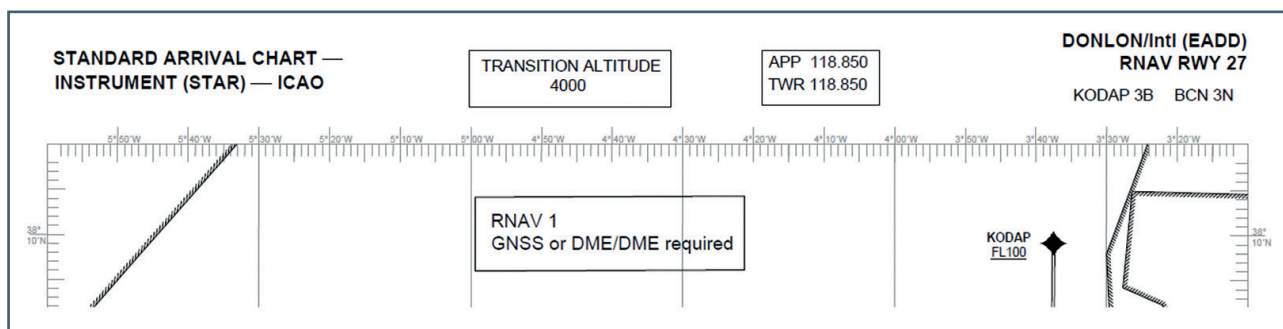
Functional requirement: **None**



Navigation specification: **RNAV 1**

Navigation sensor limitations: **None** (GNSS and DME/DME are available)

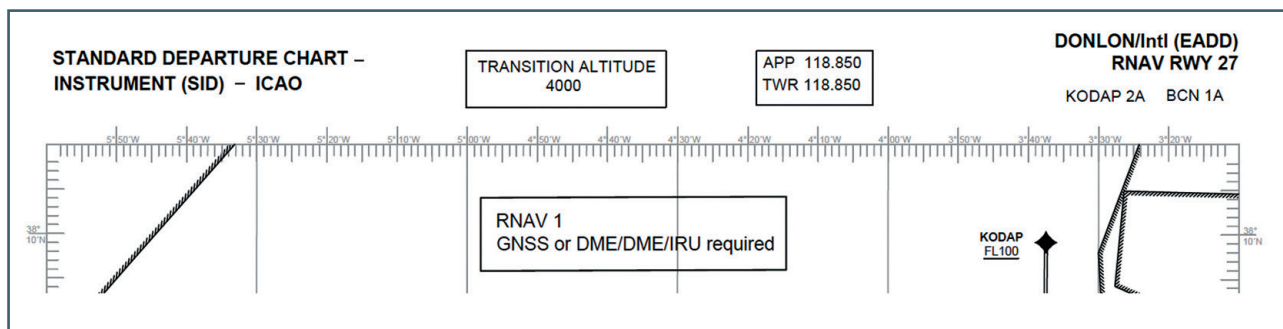
Functional requirement: **None**



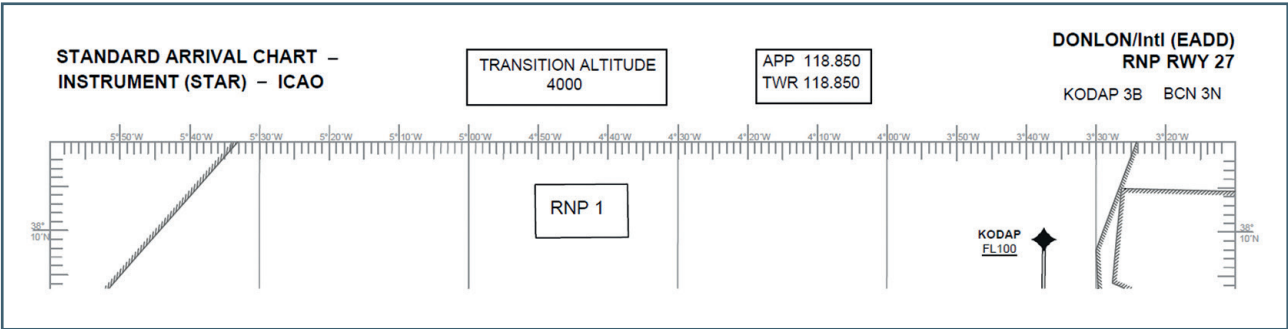
Navigation specification: **RNAV 1**

Navigation sensor limitations: **GNSS or DME/DME/IRU required.**

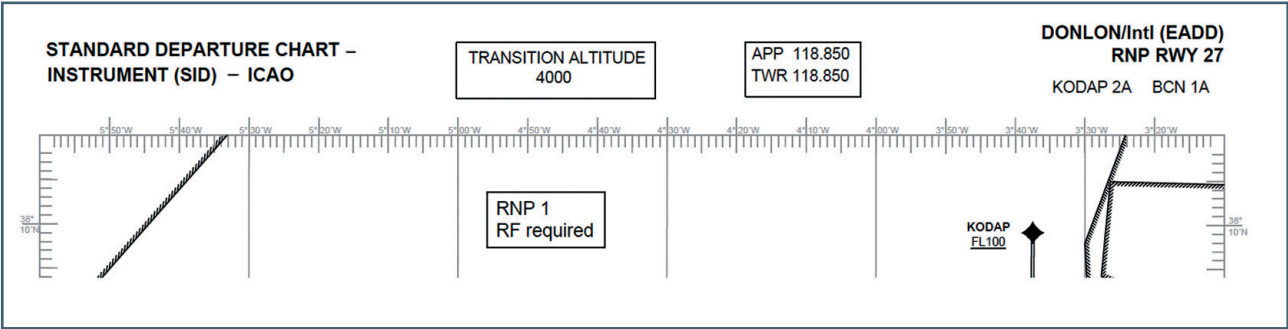
Functional requirement: **None**



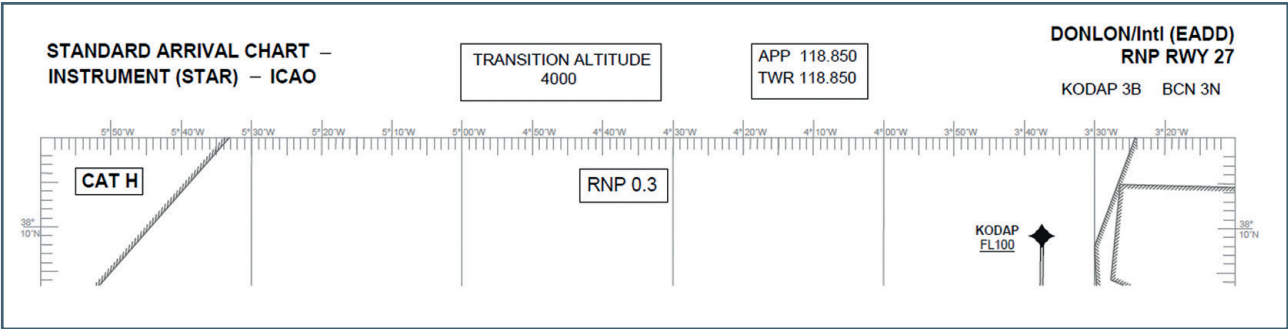
Navigation specification: **RNP 1**
Navigation sensor limitations: **None** (GNSS required)
Functional requirement: **None**



Navigation specification: **RNP 1**
Navigation sensor limitations: **None** (GNSS required)
Functional requirement: **RF required**



Navigation specification: **RNP 0.3 (CAT H)**
Navigation sensor limitations: **None** (GNSS required)
Functional requirement: **None**



Glossary

AIP	Aeronautical information publication
ANS	Air navigation services
ATM	Air traffic management
DME	Distance measuring equipment
GNSS	Global navigation satellite system
IRU	Inertial reference unit
PBN	Performance-based navigation
RF	Radius to fix
RNAV	Area navigation
RNP	Required navigation performance
SID	Standard instrument departure
STAR	Standard instrument arrival

Further Information

The EUROCONTROL Navigation Steering Group (NSG) coordinates the activities necessary for the implementation of PBN procedures in ECAC.

For more information, please contact kleber.arguello@eurocontrol.int or visit our website:
<https://www.eurocontrol.int/communications-navigation-and-surveillance>





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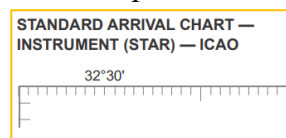
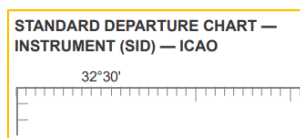
APPENDIX B

ICAO Charting Provisions

1. ICAO Provisions for Chart Titles:

References: ICAO Annex 4, Doc 8697 and Doc 8168 Vol. II

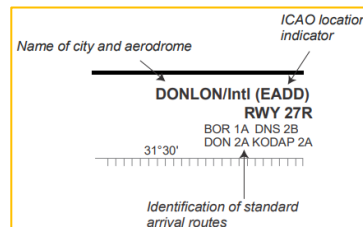
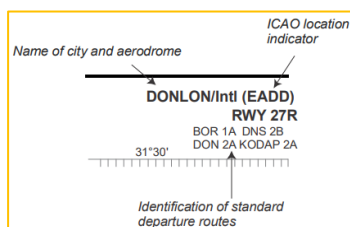
- Chart shall be titled in accordance with Annex 4 specifications.
- The chart title shall not include “ICAO” unless the chart conforms with all ICAO Standards mentioned in the Annex.
- The title must be “Standard Departure Chart — Instrument (SID) — ICAO” for SID and “Standard Arrival Chart — Instrument (STAR) — ICAO” for STAR.
- The chart title is placed at the top left corner of the chart in bold upper-case type.



2. ICAO Provisions for Chart Identifications:

References: ICAO Annex 4, Doc 8697 and Doc 8168 Vol. II

- The chart shall be identified in accordance with Annex 4 requirements and shall include the term RNAV or RNP, depending on the navigation specification.
- The chart should include an identifier which is unique for that aerodrome and which may include reference to either a runway, fix or NAVAID.
- The chart shall be identified by the name of the city or town or area which the aerodrome serves, the name of the aerodrome, and the identification of the SID or STAR.
- The ICAO location indicator may also be included with the name of the aerodrome.
- The chart identification is placed at the top right corner of the chart in bold upper-case type.



3. ICAO Provisions for PBN Requirement Boxes:

Reference: Doc 8168 Vol. II

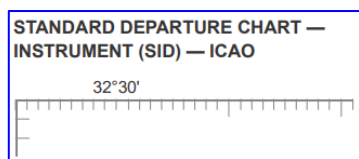
- a. The provision of PBN requirement boxes is missing in Annex 4 and Aeronautical Chart Manual and specification charts except for those in Doc 8168, Vol. II.
- b. PBN items shall be published in a PBN requirements box.
- c. The PBN requirements box shall include:
 - the identification of the navigation specification used in the procedure design, such as RNAV 5, RNAV 2, RNAV 1, A-RNP, RNP AR and RNP 1.
 - any navigation sensor limitations, such as GNSS required, DME/DME required.
 - any required functionalities that are described as options in the navigation specification, such as RF required.

Guidance for Chart Harmonization:

1. Standardizing Chart Titles:

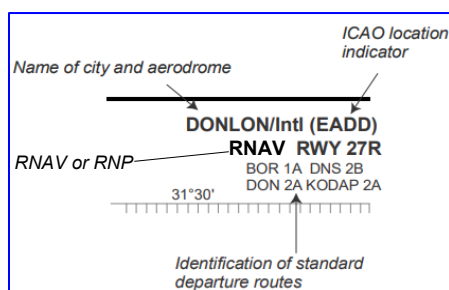
- a. Ensure all SID charts are titled as “Standard Departure Chart - Instrument (SID) - ICAO” and all STARs charts as “Standard Arrival Chart - Instrument (STAR) - ICAO”.
- b. The title should be placed at the top left corner of the chart in bold upper-case type.
- c. Do not use ICAO in the chart title if the chart does not meet the Annex 4 charting criteria.
- d. Do not use any other things, such as PBN, RNAV, RNP or DEP/ARR, in the chart titles.

Example:



2. Consistent Chart Identification:

- a. Identify charts by the name of the city or town, the aerodrome name, and the identification of the standard departure/arrival routes.
- b. Include the ICAO location indicator with the name of the aerodrome.
- c. The chart identification should be placed at the top right corner of the chart in bold upper-case type.
- d. Use 'RNAV' or 'RNP' based on the navigation specification used in designing the SIDs or STARs. For example, use 'RNAV' for an RNAV1 SID or STAR, and use 'RNP' for an RNP1 SID or STAR, before the runway designation.



Example:

3. Requirements for PBN Boxes:

- a. Include PBN items in the PBN requirements box, preferably on the plan view of the chart, not obscuring the chart information. Do not use such information in any places other than PBN requirement box.
- b. The PBN box should contain the navigation specification (e.g., RNAV 1, RNP 1 or A-RNP) that is used for the design of PBN SID or STAR.
- c. Clearly specify any sensor limitations (e.g., GNSS required or DME/DME required) within the PBN box, as required.
- d. Include any additional functional requirements (e.g., RF required) in the PBN requirement box, as applicable.

Example 1: With sensor limitations and functional requirement	<div> <div>Navigation Specification</div> <div>Sensor Limitations</div> <div>Functional Requirements</div> </div> <div> <div>> RNP 1</div> <div>> GNSS and DME/DME required</div> <div>> RF required</div> </div>
Example 2: No sensor limitations, but with a functional requirement for RF	<div> <div>A-RNP</div> <div>RF required</div> </div>
Example 3: GNSS or DME/DME/IRU only allowed, with no functional requirements	<div> <div>RNAV 2</div> <div>GNSS or DME/DME/IRU required</div> </div>
Example 4: GNSS only allowed, with no functional requirements	<div> <div>RNAV 1</div> <div>GNSS required</div> </div>
Example 5: No sensor limitations and functional requirements	<div> <div>RNAV 5</div> </div>

- END -