BRASIL **AIC**
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SUBDEPARTAMENTO DE OPERAÇÕES 02/17
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SUPPLEMENTARY INFORMATION TO AIR NAVIGATION PROCEDURES

Period of validity: from 30 MAR 2017 to PERM.

1 PRELIMINARY ARRANGEMENTS

1.1 PURPOSE

This Aeronautical Information Circular (AIC) aims at disseminating supplementary information to air navigation procedures, in order to facilitate its correct interpretation and assist in the codification of the database and in the operational approval process.

1.2 SCOPE

The provisions set out in this AIC apply to all SISCEAB users who, in the performance of their duties, need to know in more detail the criteria and parameters used in the preparation of the air navigation procedures published by DECEA.

1.3 ATTACHMENT

A – Paramenter Requirements Relating to Coding Tables

1.4 REFERENCES:

- Doc 8168 – *Procedures for Air Navigation Services – Aircraft Operations*;
- Doc 9613 – *Performance-Based Navigation* (PBN) *Manual*;
- ARINC 424 – *Navigation System Database Specification;*
- MACAR – *Aeronautical Chart Manual*.

1.5 CONCEPTS

1.5.1 PATH AND TERMINATOR (PATH TERMINATOR):

A two-letter code that defines the type of path and the type of completion or termination of a particular segment of the air navigation procedure.

1.5.2 SPECIAL PROCEDURES

Air navigation procedures for which criteria or parameters other than those contained in the reference guides or recommended by ICAO have been used, or that have a structure or profile that is difficult to execute and which are therefore subject to stricter operational approval procedure to ensure that adequate levels of safety are met.

1.5.3 DATABASE PROVIDERS

International organizations or companies that operate in the segment of providing navigation data to its users Aeronautical charts that contain air navigation procedures are sent to these institutions for the coding and production of the database used in the Flight Management Systems (FMS) of the aircraft.

1.5.4 CODING TABLE (TAB COD)

Tabular description of all the characteristics of an air navigation procedure, which are used in the coding and preparation of the navigation database.

1.5.5 SPECIAL PARAMETERS TABLE

Table containing the specific values (or parameters) used in the elaboration of special procedures.

1.6 ACRONYMS AND ABBREVIATIONS

AIP - Aeronautical Information Publication
FMS - Flight Management System
IAC – Instrument Approach Chart
NDB – Navigation Database
NOTAM – Notice to Airmen
RNP AR – Required Navigation Performance – Authorization Required
ROTAER – *Manual de Rotas Aéreas* (Air Routes Manual)
SID - Standard Instrument Departure
SISCEAB - Brazilian Airspace Control System
STAR - Standard Instrument Arrival
TAB COD - Coding Table

2 GENERAL GUIDELINES

2.1 FMS used in modern aircraft on-board equipment require that air navigation procedures (IAC, SID and STAR) be properly entered and stored in aircraft NDB so that they can be appropriately used by systems certified for operations based on area navigation (RNAV/RNP).

2.2 The Aeronautical Industry, in order to allow an adequate conversion of the information contained in IAC, SID and STAR into a navigation database, developed the ARINC 424 standard and the "Path and Terminator" or "Path Terminator" concept, among other requirements, which are used by database providers for coding purposes.

2.3 The coding of a procedure is the process of inserting all relevant aeronautical information (fixes, paths, altitudes, distances, headings and turns, among others) so that the FMS can interpret this information and cause the aircraft to perform the air navigation procedure as designed and published. This coding shall be the same for the most varied types of aircraft and for the various types of systems.

2.4 In addition to the coding standards considered, it is important to emphasize that the production task of the navigation database also depends on the correct interpretation of the procedure by the database provider, and the quality, integrity and correctness of the information made available to the database users.

2.5 In this sense, a precise, complete and unambiguous description of air navigation procedures is an essential requirement to assist the database provider in coding the procedure. This is achieved through the publication of the procedure chart, coupled with an additional textual and/or tabular description of this procedure

2.6 The dissemination of supplementary information to air navigation procedures is an ICAO recommendation, as provided for in Doc 8168 (PANS-OPS), and has been adopted by DECEA since 2013, as provided for in MACAR - Aeronautical Chart Manual.

2.7 In Brazil, this information is disseminated to users through supplementary information tables, also called Coding Tables (TAB COD), as they are used by database providers for the coding of air navigation procedures.

2.8 Other important information on air navigation procedures refers to the special criteria or parameters that may have been used in the preparation of a particular procedure.

2.9 These special requirements are based on flight performance or specific functionalities and are used in some cases to achieve significant benefits such as accessibility or efficiency, which could not be achieved with the general criteria recommended by ICAO.

2.10 Air navigation procedures developed considering special criteria or parameters, different from those contained in the reference guides, are called "Special Procedures" and their specific characteristics must be known by the users, in order to clarify the criteria used and thus ensure that the appropriate operational approval process is carried out by the National Civil Aviation Agency (ANAC)

3 SUPPLEMENTARY INFORMATION TO AIR NAVIGATION PROCEDURES

3.1 The supplementary information to the air navigation procedures is disseminated to the users by means of an electronic file, associated with the respective IAC, SID or STAR, containing the Coding Table (TAB COD) and the Special Parameters Table, if any.

NOTE: The special procedures will be listed in Part xxx of AIP-BRASIL and identified in the corresponding IAC, SID or STAR charts by means of the text “Specific Authorization Required, according to ANAC's legislation.”

Figure 1 – Example of IAC, SID or STAR

3.2 AIR NAVIGATION PROCEDURE CODING TABLE

3.2.1 The national standard used in the preparation of the TAB COD is based on the requirements laid out in Doc 8168 (PANS-OPS), ARINC 424 code and international best practices, in order to meet most of the specifications and needs of several users.

NOTE 1: The database provider may use specific and particular standards for encoding procedures. However, coded procedures may not result in (vertical or lateral) paths or parameters and restrictions (such as minimum altitudes, minimum gradients, speed restrictions, etc.) other than those contained in the procedure charts published by DECEA.

NOTE 2: DECEA does not impose any restrictions on the activities and standards used by database providers, nor is it responsible for the quality, reliability or any characteristics of the products offered by them.

3.2.2 The information contained in TAB COD is complementary to the information contained in the aeronautical charts, as well as to all other aeronautical information published in other sources, such as AIP Brasil, ROTAER, NOTAM, etc.

3.2.3 In this sense, it is important to note that the use of the information contained in the TAB COD does not exempt the database providers from the need to consult other sources for the proper coding of the procedures.

3.2.4 A full description of the requirements and parameters used for the preparation of the TAB COD is attached to this Circular.

Identification	Aerodrome	Chart Code	AIRAC AMDT
STAR RNAV ANSUG 1A RWY 09L/09R	SÃO PAULO / Guarulhos – Gov. André Franco Montoro, INTL (SBGR)	GR01H-10	08 JAN 14

Seq	Transition	Path Terminator	Navaid / Fix / WPT	Function	Flyover (Y/N)	Navaid	Course Mag (True)	Dist (NM)	Turn (L/R)	IAS (KT)	Altitude (FT)	Gradient (%)	Perform.
TRNS TBE													
010	Enroute	IF	TBE	---	N	---	---	---	---	---	---	---	---
020	Enroute	TF	GR301	---	N	---	273 (251.9)	14.0	---	---	-18000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR302	---	N	---	273 (251.9)	10.0	---	---	+15000	---	RNAV 1 or RNP 1
040	Enroute	TF	ANSUG	---	N	---	273 (252.0)	20.1	---	---	-13000	---	RNAV 1 or RNP 1
TRNS MOXEP													
010	Enroute	IF	MOXEP	---	N	---	---	---	---	---	-28000	---	---
020	Enroute	TF	GR303	---	N	---	200 (179.1)	16.9	---	---	-23000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR304	---	N	---	200 (179.1)	9.7	---	---	+20000	---	RNAV 1 or RNP 1

Figure 2 – Excerpt from a Coding Table (TAB COD)

3.3 **SPECIAL PARAMETERS**

3.3.1 “Special” air navigation procedures are the ones prepared taking into account criteria or parameters other than those contained in the reference guides or recommended by ICAO, or those that have a structure or profile that is difficult to execute.

NOTE: They can be of any type (approach, departure or arrival procedure), but are more common in the case of approach procedures based on the RNP AR concept.

3.3.2 The specific criteria or parameters used in the elaboration of special procedures shall be confirmed with the operators to verify that the performance or functional requirements of a given aircraft or set of aircraft may be used for the optimization of the procedure in order to achieve greater benefits.

3.3.3 It should be emphasized, however, that in no case can critical aspects of the elaboration of procedures, such as criteria for construction of protection areas, obstacles assessment or calculation of operational minima, be ignored.

Special procedures should therefore be subject to a more rigorous operational approval process in order to ensure that adequate levels of safety are met. In that sense, information is provided, whenever necessary, on the specific parameters used in the elaboration of the Special Procedure,

in order to assist in the process of operational approval with the competent Aeronautical Authority.

SPECIAL PROCEDURE

INITIAL APPROACH SEGMENT

Track	Bank Angle(°) Used / STD	TWC (KT) Used / STD	IAS (KT) Used / STD	TrD (NM) Used / STD	Gradient (%) Used / STD	RNP (NM) Used / STD
All parameters used have default values.						

INTERMEDIATE APPROACH SEGMENT

Track	Bank Angle(°) Used / STD	TWC (KT) Used / STD	IAS (KT) Used / STD	TrD (NM) Used / STD	Gradient (%) Used / STD	RNP (NM) Used / STD
All parameters used have default values.						

FINAL APPROACH SEGMENT

Track	Bank Angle(°) Used / STD	TWC (KT) Used / STD	IAS (KT) Used / STD	Dfrop (NM) Used / STD	TrD (NM) Used / STD	Gradient (%) Used / STD	RNP (NM) Used / STD	TP Altitud (FT)
RJ808-RJ807	27 / 18	41 / 41	140 / 160	---	---	-4.98 / -5.24	0.1 / (0.1 to 0.3)	---
RJ806-RJ804	25 / 03	26 / 26	140 / 160	---	---	-4.98 / -5.24	0.1 / (0.1 to 0.3)	296 / 492
RJ804-RW02R	---	---	140 / 160	0.9 / 3.07	---	-4.98 / -5.24	0.1 / (0.1 to 0.3)	---

Figure 3 – Excerpt from the Special Parameters Table

4 DISSEMINATION OF ADDITIONAL INFORMATION TO THE PROCEDURES

4.1 The electronic file containing supplementary information to the air navigation procedures is made available in two ways:

a) To database provides, through a FTP link;

b) b) To other users, through AISWEB, at http://www.aisweb.aer.mil.br/.

Note: On the AISWEB portal, additional information regarding a procedure can be viewed in the "ICP" column. See the example in Figure 4 below.

Localidade	Tipo	Carta	ICP	Emenda
SBRJ	IAC	RNAV (RNP) X RWY20L 279Kb	RJ01G	28.05.2015
SBRJ	IAC	RNAV (GNSS) Y RWY02R 471Kb	RJ00L	25.06.2015
SBRJ	IAC	RNAV (GNSS) Z RWY20L 364Kb	RJ00J	25.06.2015
SBRJ	IAC	RNAV (GNSS) Y RWY20L 587Kb	RJ00M	25.06.2015
SBRJ	IAC	RNAV (RNP) W RWY20L 172Kb	RJ01H	25.06.2015

Figure 4 – Dissemination of Additional Information to the Procedures at AISWEB

5 FINAL ARRANGEMENTS

5.1 The list of aerodromes having special procedures will be published in AIP-BRASIL.

5.2 Cases not provided for in this AIC shall be settled by the Head of DECEA's Operations Subdepartment.

ATTACHMENT A

PARAMENTER REQUIREMENTS RELATING TO CODING TABLES

1 PRELIMINARY ARRANGEMENTS

This Attachment contains information on the requirements and parameters considered in the elaboration of Coding Tables (TAB COD) of air navigation procedures, which may help database providers in the codification of the procedures.

Identification	Aerodrome	Chart Code	AIRAC AMDT
STAR RNAV ANSUG 1A RWY 09L/09R	SÃO PAULO / Guarulhos – Gov. André Franco Montoro, INTL (SBGR)	GR01H-10	08 JAN 14

Seq	Transition	Path Terminator	Navaid / Fix / WPT	Function	Flyover (Y/N)	Navaid	Course Mag (True)	Dist (NM)	Turn (L/R)	IAS (KT)	Altitude (FT)	Gradient (%)	Perform.
TRNS TBE													
010	Enroute	IF	TBE	---	N	---	---	---	---	---	---	---	---
020	Enroute	TF	GR301	---	N	---	273 (251.9)	14.0	---	---	-18000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR302	---	N	---	273 (251.9)	10.0	---	---	+15000	---	RNAV 1 or RNP 1
040	Enroute	TF	ANSUG	---	N	---	273 (252.0)	20.1	---	---	-13000	---	RNAV 1 or RNP 1
TRNS MOXEP													
010	Enroute	IF	MOXEP	---	N	---	---	---	---	---	-28000	---	---
020	Enroute	TF	GR303	---	N	---	200 (179.1)	16.9	---	---	-23000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR304	---	N	---	200 (179.1)	9.7	---	---	+20000	---	RNAV 1 or RNP 1

Figure 1 – Example of TAB COD

2 GENERAL RULES

2.1 The air navigation procedures coding tables, published by DECEA, have four (04) sets of information:

a) Identification and General Information of the Procedure Chart;

b) Coding Table itself;

c) Fixes/Waypoints Table;

d) Symbol Table

NOTE: The information contained in the TAB COD are published only in English, to optimize the space available for data entry.

2.2 IDENTIFICATION AND GENERAL INFORMATION OF THE PROCEDURE CHART

Identification	Aerodrome	Chart Code	AIRAC AMDT
IAC RNAV (RNP) Y RWY 10	MARINGÁ / Sílvio Name Júnior (SBMG)	SBMG_IAC_00A	18 AUG 16

Figure 3 - Identification and General Information of the Procedure Chart

2.2.1 **Identification:** Identification of the Procedure;

2.2.2 **Aerodrome:** Aerodrome to which the procedure refers;

2.2.3 **Chart Code:** Code used to individualize a given procedure chart.

2.2.4 **AIRAC AMDT:** AIRAC cycle for effectiveness of the procedure chart.

2.3 CODING TABLE

Seq	Transition	Path Terminator	Navaid / Fix / WPT	Function	Flyover (Y/N)	Navaid	Course Mag (True)	Dist (NM)	Turn (L/R)	IAS (KT)	Altitude (FT)	Gradient (%)	Perform.
TRNS TBE													
010	Enroute	IF	TBE	---	N	---	---	---	---	---	---	---	---
020	Enroute	TF	GR301	---	N	---	273 (251.9)	14.0	---	---	-18000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR302	---	N	---	273 (251.9)	10.0	---	---	+15000	---	RNAV 1 or RNP 1
040	Enroute	TF	ANSUG	---	N	---	273 (252.0)	20.1	---	---	-13000	---	RNAV 1 or RNP 1
TRNS MOXEP													
010	Enroute	IF	MOXEP	---	N	---	---	---	---	---	-28000	---	---
020	Enroute	TF	GR303	---	N	---	200 (179.1)	16.9	---	---	-23000	---	RNAV 1 or RNP 1
030	Enroute	TF	GR304	---	N	---	200 (179.1)	9.7	---	---	+20000	---	RNAV 1 or RNP 1

Figure 4 – Coding Table

NOTE: The coding table may not contain empty cells. If there is no information to be provided or if two values are possible, the symbol "---" is inserted.

2.3.1 **Seq:** Sequence of procedure segments.

a) It must contain 3 digits, starting by 010;

b) The values are multiples of 10;

c) The missed approach (IAC) sequence is specific, in order to enable the insertion of several segments, if necessary.

2.3.2 **Transition:** Type of procedure transition:

a) IAC: Initial, Intermediate and Final (Approach) and Missed Approach;

b) SID/STAR: Runway, Common and En-route;

Note: The Common transition not always will be necessary and/or in place. The procedure may contain only Runway or En-route transitions.

c) The Runway transition of a SID does not contain “IF”, that is, the first line starts with the PT defined (CA, CF, etc.). The other transitions start normally as “IF”.

2.3.3 **Path Terminator:** Type of Path Terminator, in accordance with ARINC 424 and Doc 8168:

a) Each transition is started with “IF”, except the first SID segment and Missed Ap transition;

b) The “IF” contains the following information: Seq, Transition, Path Terminator, Navaid/Fix/WPT, Flyover (Y/N), IAS, Altitude and Perform;

c) “HM” is not coded to avoid mandatory execution of holding, except for the missed approach holding;

Note: The "plant” design is maintained;

d) Time is not entered in “HM”, because the rule of 1 minute is respected up to FL140, inclusive, and 1 min and 30 sec above FL140;

e) In the conventional procedures, when there is doubt concerning coding or the possibility of more than one Path Terminator, the symbol “---” is inserted;

f) In ILS IAC, the Path Terminator of the final approach is “CF” and NAVAID is ILS (Ex: ILM);

g) The “FM” contains the following information: Seq, Transition, Path Terminator, Navaid/Fix/WPT, Function, Course Mag ( ), Turn, IAS, Altitude and Perform; and

h) “VA” contains gradient information, even if it should be maintained until after this altitude.

2.3.4 Navaid/Fix/WPT: Navigation aid, fix or waypoint:

a) Identification of the navigation aid, fix or waypoint;

b) In the RNAV procedures, restrictions (altitude, IAS, QNH, etc.) receive alphanumeric identification (Ex.: GL303) and are published in the procedure chart;

c) In the conventional procedures, five-letter identifications will be published for the restrictions (altitude, IAS, QNH, etc.).

2.3.5 **Function:** Navigation aid, fix or waypoint function in the procedure.

a) IAF, IF, FAF, MAPt, MAHF, SDF, FROP, LTP and FTP;

b) FTP is informed in the approach procedures with final approach course not aligned with the runway center line. This point is identified as “FTPXX”, in which XX is the threshold.

2.3.6 **Flyover (Y/N):** Information on whether the fix/waypoint is of the flyover ("Yes") or fly-by ("No") type.

2.3.7 **Navaid:** Navigation aid:

a) Three-letter acronym of the navigation aid providing positive navigation guide of the corresponding position;

b) When there are two NAVAIDs with the same three-letter acronym, an additional comment is added (Ex.: CPN VOR and CPN NDB).

2.3.8 **Course Mag (True):** Magnetic Course and True Course:

a) Magnetic course in integer values and, between brackets, the true to the nearest one-tenth of a degree;

b) The true course is not informed for conventional procedures.

Note: The brackets with a “( )” interval is maintained to demonstrate that the magnetic course is out of the brackets.

2.3.9 **Dist (NM):** Distance:

a) Distance covered in NM tenths;

b) For the “RF” segments, the turn radius value is informed in NM to the nearest one-hundredth.

c) There is no need to inform the DME arc distance, only the “AF” segment fix coordinates.

2.3.10 **Turn (L/R):** Direction of the turn: L = Left or R = Right:

Note: The symbol “---” is inserted when there is the possibility of left or right turns.

2.3.11 **IAS:** Indicated Speed Restriction (IAS) in the beginning of the segment. Ex.: IAS MAX 210Kt is represented as: - 210.

2.3.12 **Altitude (FT):** Altitude in feet:

a) Only one altitude is inserted, preferably the recommended altitude.

b) In the final segments of the IAC, the threshold crossing altitude (THEL + RDH) is informed;

c) When there are two procedures in the same chart (Ex.: ILS/LOC), the threshold crossing altitude (THEL + RDH) is inserted in the Approach transition;

d) The altitude window information is represented as follows:

Ex.: Between levels 100 and 150 = -15000 W +10000.

2.3.13 **Gradient (%)**: Gradient:

a) In the IAC, it is inserted in the initial and intermediate approach segments, when different from the standard gradient;

b) Insert in the final approach segment, regardless of the value;

c) Insert at go-around when different from 2.5%; and

d) It will be included in the SID only if the Minimum Gradient is different from 3.3%.

a) **Perform.:** Navigation Performance, only inserted for RNAV and RNP procedures.

2.4 FIXES/WAYPOINTS TABLE

IDENT	Latitude / Longitude (WGS84) DD:MM:SS.SS
GEGIM	S 23:34:33.63W 51:56:33.68
MG102	S 23:34:33.76W 52:03:05.55
MG103	S 23:31:04.21W 52:05:58.57
MG104	S 23:29:06.34W 52:03:43.09
MG100	S 23:31:48.22W 52:03:05.50
RWY10	S 23:28:41.11W 52:01:35.46
MG367	S 23:25:16.60W 51:44:26.30

Figure 5 – Fixes/Waypoints Table

a) **IDENT:** Identification of fixes/waypoints:

b) **Latitude/Longitude (WGS84) DD:MM:SS.SS:** Coordinates of the fixes/waypoints.

NOTE: In the instrument departure procedures the coordinates of the departure end of the runway (DER) are also informed:

DER	Latitude / Longitude (WGS84) DD:MM:SS.SS	Elevation (FT)
27L	S 23:26:19.67W 46:29:13.31	2449.80
27R	S 23:26:03.96W 46:29:02.15	2444.88

Figure 6 – DER Information Table

2.5 SYMBOL TABLE

SYMBOLOGY

EXCEPT RNP AR

COD	Meaning
+	AT OR ABOVE
-	AT OR BELOW
=	MANDATORY
	RECOMMENDED
SDF	STEPDOWN FIX
Y	YES
N	NO
L	LEFT
R	RIGHT

RNP AR

COD	Meaning
+	AT OR ABOVE
-	AT OR BELOW
=	MANDATORY
	RECOMMENDED
Y	YES
N	NO
L	LEFT
R	RIGHT
FROP	FINAL APPROACH ROLL-OUT POINT
LTP	LANDING THRESHOLD POINT

Figure 7 – Symbol Table

a) COD: Symbol used in the coding table;

b) Meaning: Meaning of the symbols used in the coding tables.