



Workshop RNP-AR ABEAR

Cmte. Marcusso

Gerentes de Flight Standards,
Treinamento e Projetos

23/03/2016



Agenda

- ✧ Sobre a LATAM;
- ✧ Histórico do RNP-AR na LATAM;
- ✧ Benefícios dos procedimentos RNP-AR;
- ✧ Visão do operador.



Sobre a LATAM

O LATAM Airlines Group

O LATAM Airlines Group é o maior grupo de companhias aéreas da América Latina, com 53.072 funcionários e uma frota de 327 aeronaves, e um dos maiores do mundo, considerando a sua rede de destinos. O Grupo oferece transporte de passageiros para 135 cidades em 24 países e transporte de carga para 144 localidades em 26 países. Realiza cerca de 1.500 voos diários e transporta 67 milhões de passageiros anualmente. Faz parte da aliança **oneworld** e suas ações são negociadas nas bolsas de valores de Santiago, Nova York e São Paulo. Em 2014, o LATAM Airlines Group se tornou a primeira companhia do setor aéreo da América Latina a integrar o Índice Dow Jones de Sustentabilidade.



O nosso propósito...

“Cuidamos para que os sonhos cheguem ao seu destino”

LATAM é o maior grupo de Cias Aéreas na América Latina



- ✓ 6 Home markets (~90% of regional traffic)
- ✓ ~50% Market share intra-regional flights



Uma das frotas mais modernas da América Latina

Short Haul

	Seats	3Q15	2018
Dash Q200	37	2	✗
A319	144	51	-
A320/N	168-174	155	+
A321/N	220	31	+
Total		239	

Long Haul

	Seats	3Q15	2018
A330	223	10	✗
B767	221-238	38	-
B787-8/9	247	10	+
B787-9	313	6	+
A350	348	0	+
B777	363	10	-
Total		74	

A frota da TAM



Composição da Frota

A350	2
B777-300ER	10
A330-200	4
B767-300	14
A319	27
A320	83
A321	27
Total	167

Histórico do RNP-AR na LATAM

Muitas siglas, muito documentos e muitas dúvidas..



A word cloud of aviation-related acronyms. The most prominent and largest text is 'RNAV' in a bold, black, sans-serif font, oriented vertically. To its right, 'RNP' is also in a large, bold, black font. Below 'RNP' is 'RNP-AR' in a slightly smaller, bold, black font. To the left of 'RNAV', the word 'Advanced' is written in a medium-sized, grey, sans-serif font. Above 'Advanced' is 'GNSS' in a similar grey font. Below 'Advanced' is 'DME' in a bold, black font. Further down and to the left is 'PBN' in a bold, black font. At the very top, above 'GNSS', is 'IRS' in a bold, black font, oriented vertically. The background is white, and the text is arranged in a cluster.

IRS
GNSS
Advanced
DME
PBN
RNAV
RNP
RNP-AR

1996

RNP
Concept

Confuso

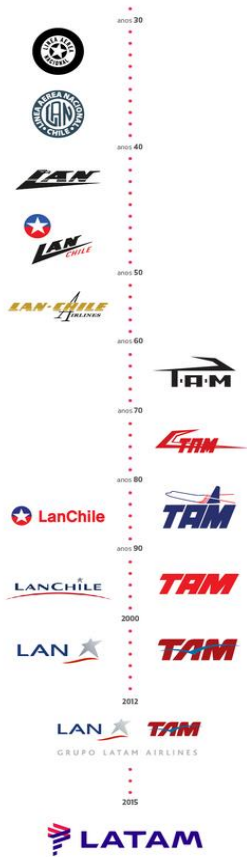
Navigation Performance
and Functions

BRNAV, PRNAV, RNAV 1, RNAV2, RNP4, RNP1, RNP2, RNP 0.3...

2008

PBN
Concept

Mais Claro



- ✈ 2000 - Chegada do Primeiro Airbus A320 na LAN
- ✈ 2006 - Primeira aproximação RNAV em SCL
- ✈ 2008 - Primera aproximação RNP em Cuzco.
- ✈ 2012 - Inicio do Green Skyes of Peru
- ✈ 2012 - Primeiro voo completamente RNP
- ✈ 2015 - 11 procedimentos RNP-AR implementados em parceira no Peru.



- ✈ 1997 - Chegada do primeiro A330 na TAM
- ✈ 1999 - Chegada do primeiro A319
- ✈ 2006 - Primeiras aeronaves certificadas para voos RNAV
- ✈ 2013 - Inicio do Processo de Certificação RNP-AR SDU
- ✈ 2015 - Primeiro voo RNP-AR

Parcerias entre LATAM, ATC e Agências Reguladoras

FEATURE

Green approaches boost flight efficiency in Latin America

Stakeholder collaboration is behind the successful introduction of Performance-Based Navigation in Latin America

With air traffic growth in the Latin America region projected to grow up to 4.4% annually through 2020, aviation stakeholders must work collaboratively to harmonize the region's airspace operations. It is essential to address the operational and environmental challenges the industry faces through cooperative discussions and projects.

As the cornerstone to air traffic modernization efforts, Performance-Based Navigation (PBN) has the ability to bring efficiency, predictability and increased capacity to airspace. This year, the industry has seen two notable PBN projects in the Latin America region where stakeholder collaboration yielded both economic and ecological benefits for the aviation community.

In February 2012, there was a continuously guided flight to landing using PBN in Lima in Latin America. This project, a collaboration between LAN, GE Aviation, GE Aviation, participating airlines or miles, 4,100, 100 and 1,420 pounds of CO₂ emissions per flight.

The second phase of flight executed on July 16 as LAN completed a Request for Information (RFI) to implement PBN in Lima. The landmark flight cut 28 minutes off each flight, saving 100 tons of CO₂ emissions. The RFI approach will land and depart the aircraft landing into the airport, then a 100-ton CO₂ emissions combined. In the case of the RFI, the RFI approach will land and depart the aircraft landing into the airport, then a 100-ton CO₂ emissions combined. In the case of the RFI, the RFI approach will land and depart the aircraft landing into the airport, then a 100-ton CO₂ emissions combined.

By way of the airport in Lima, Peru, which was previously unused due to terrain concerns, "said Steve Fisher, technical fellow for GE Aviation. "The facility of RNP 40 provides additional capacity allowing for more efficient use of the airspace surrounding the airport."

Traditionally, non-RNP capable aircraft arriving into Lima experience unpredictable operations due to air traffic control vectors required to merge onto the ILS. This can lead to increased workload for the pilots and controllers and additional flight segments that contribute to higher fuel use and unnecessary carbon emissions. By connecting the precise lateral and vertical guidance of the satellite-based RNP 40 approach to the CAT II ILS, approved aircraft can realize the benefits of RNP, including a continuous descent

LAN Peru has implemented PBN paths at 11 Peruvian airports. The PBN paths at Cajamarca alone cut 28 nm and 12 minutes off each flight. Luis Miyahira, operational standards and special projects manager for LAN, attributed the programme's success to the collaborative efforts of the Peruvian aviation stakeholders. "All parties have to participate to gain benefits," Miyahira said. "The programme was designed to benefit all operators in the airspace. The more operators using the paths, the more efficiency is gained; the controllers will benefit too."

passengers per month by 2014, a year in which the country will host the World Cup. In addition, the idea is to host the 2014 Olympics. These events will bring hundreds of thousands of spectators to the region.

By implementing RNP 40 paths, Brazil's air traffic management system will be able to accommodate the increased air traffic while improving flight delays and fuel efficiency.

In May, the Santos Dumont RNP 40 project was completed with the RNP 40 procedures approved for operation and use in Brazil, following a successful validation flight by GOL. Brazil's ANSP, DECEA, designed the RNP 40 procedures, with technical support and assistance from GE Aviation's aviation regulator ANAC, validated and approved

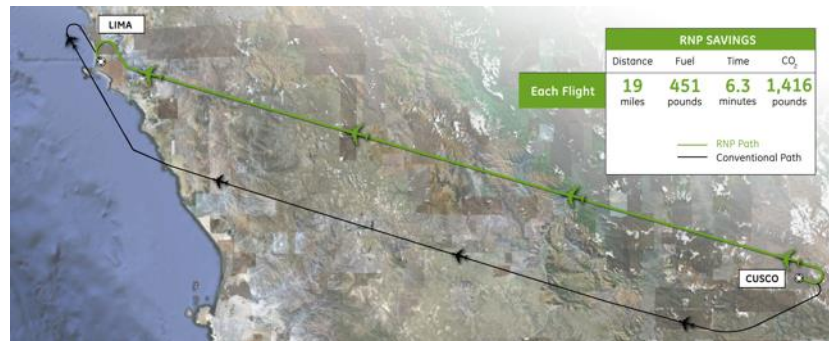
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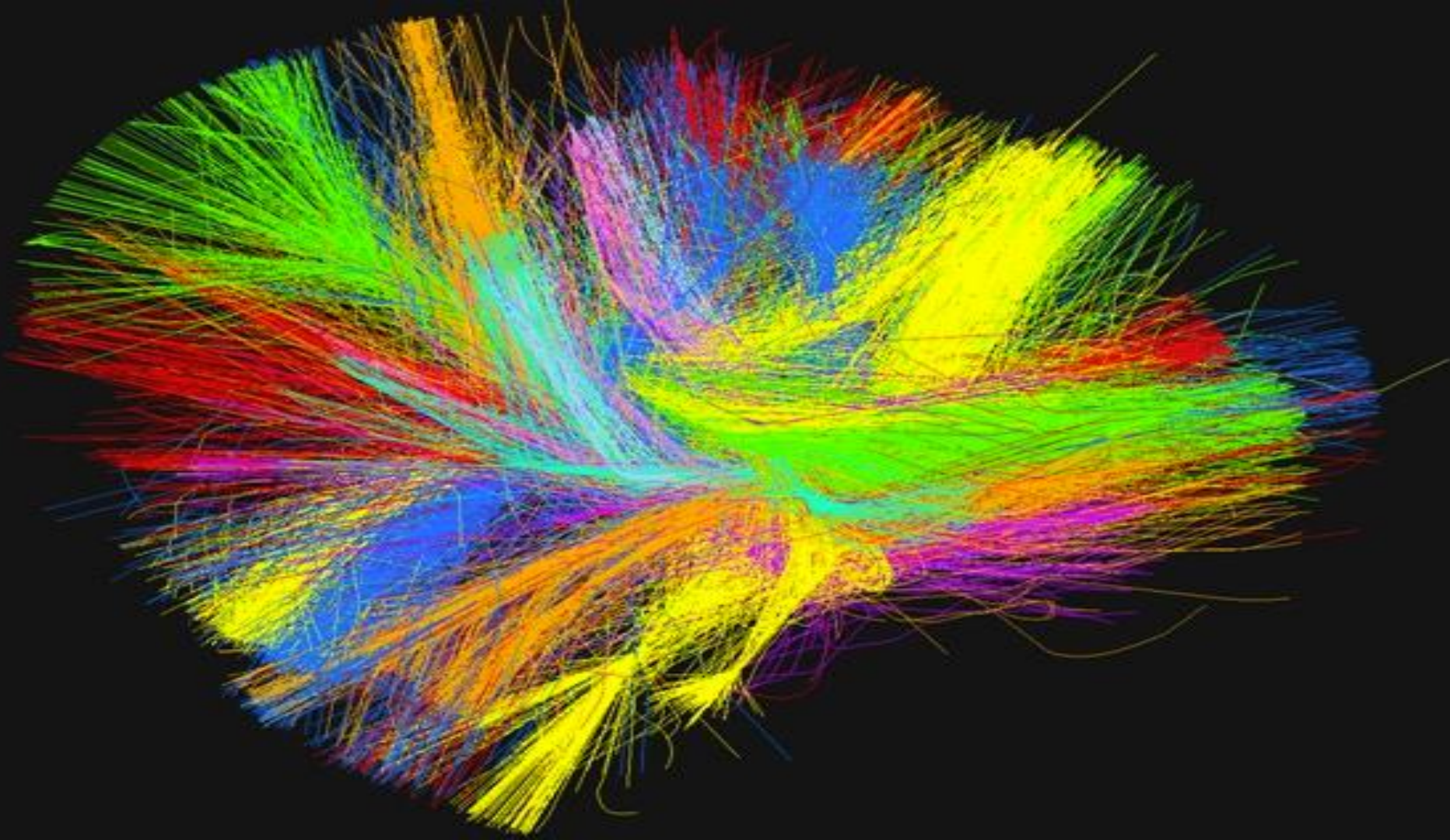
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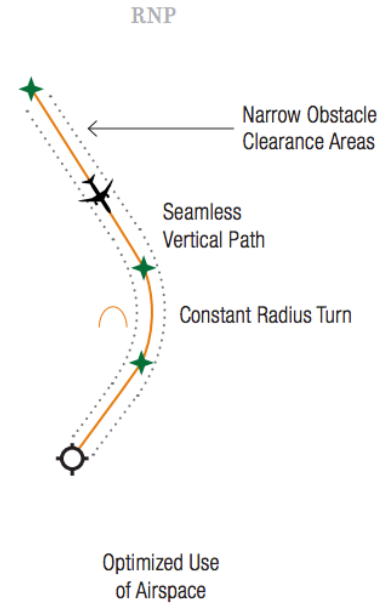
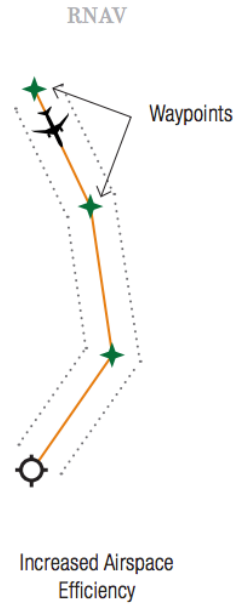
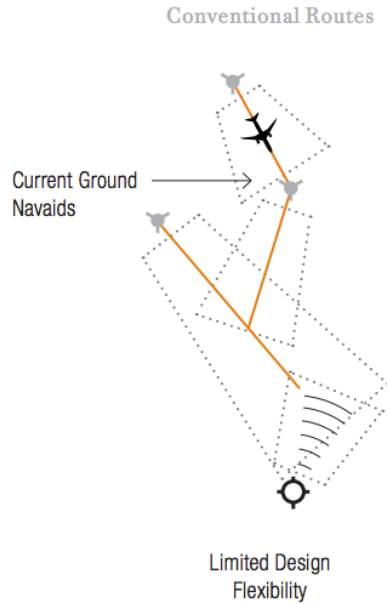
"The Green Skies of Peru project is a joint effort between LAN Airlines, GE Aviation, Peru's air navigation service provider CORPAC and regulator DGAC."



O sistema RNP-AR



O RNP-AR



CONVENTIONAL ROUTES COMPARED TO
PBN-BASED ROUTES

O RNP-AR

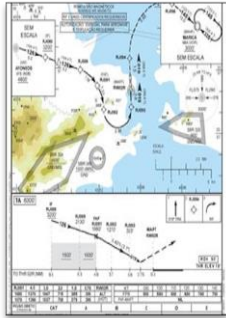


O RNP-AR

RNP-AR é uma aplicação operacional avançada em um contexto único de operação.

Um procedimento RNP-AR não é simplesmente uma aeronave certificada, conduzindo um voo com procedimentos padronizados, mas sim, uma aeronave específica (modelo, avionicos, versão dos softwares, versão dos motores e etc), executando um procedimento customizado e com regras específicas.

O sistema RNP-AR



Procedimento
RNP-AR

Desenhado
por
demanda
de um
empresa

Desenhado
por
demanda
do
Aeroporto

O sistema RNP-AR



Procedimento
RNP-AR

Desenhado
por
demanda
de um
empresa

Desenhado
por
demanda
do
Aeroporto

AIRBUS home services research products resources news company

Sunday, March 20, 2016 Home > News > Press Releases > Quovadis Assists South African Airways w...

news **Press Releases**

Press Releases
Media Coverage
Events

Quovadis Assists South African Airways with Approval of New RNP AR Procedures at Cape Town International Airport

Toulouse, France – 5 March 2013 – The South African Civil Aviation Authority (SACAA) has approved new Required Navigation Performance with Authorization Required (RNP AR) tailored procedures at Cape Town International Airport for South African Airways (SAA). The procedures have been designed in close cooperation between SAA and Quovadis, an Airbus ProSky company, along with SACAA and Air Traffic and Navigation Services (ATNS).

Boeing Develops RNP-AR Procedures for Xiamen Airlines

By Anne Paylor, ATW Daily News | Jan. 14, 2013

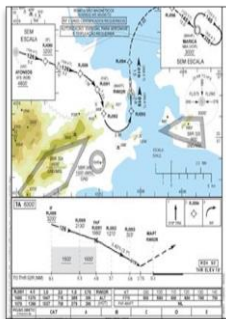
Xiamen Airlines is the first Chinese airline to conduct Required Navigation Performance-Authorization Required (RNP-AR) flight operations using its Boeing 737 fleet.

The aircraft have been approved for RNP 0.3 operation. Boeing Flight Services – together with Boeing subsidiary Jeppesen, the Wuyishan Airport Authority and the Civil Aviation Administration of China (CAAC) – developed new instrument flight procedures for the airline.

Demonstration flights were conducted in December to test these highly tailored RNP-AR procedures at Wuyishan Airport, Fujian Province, in China.

Among other benefits, RNP-AR enables curved approach paths that can avoid terrain or noise-sensitive areas.

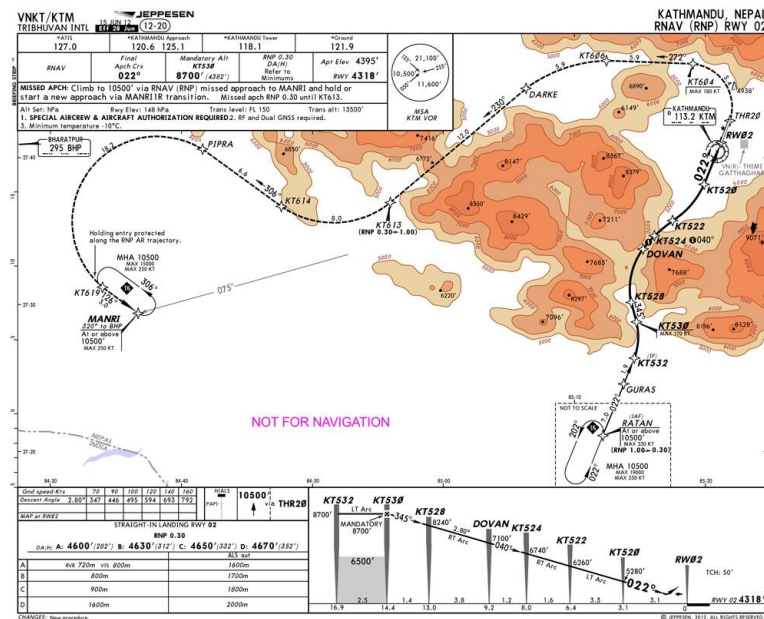
Xiamen Airlines 737-700. By Rob Finlayson



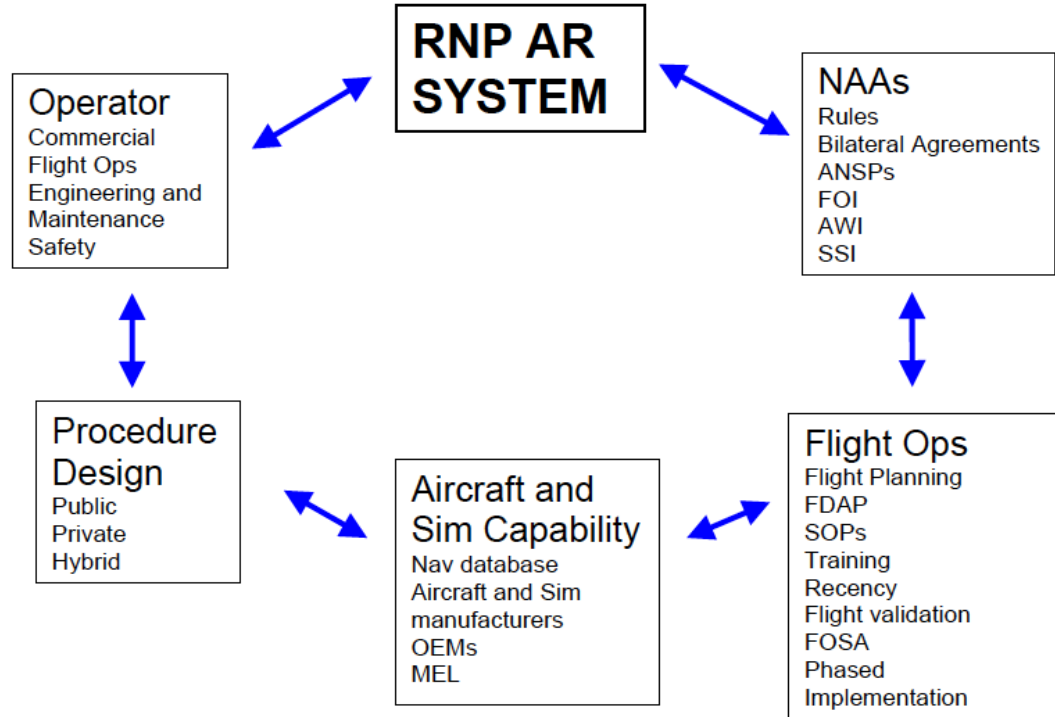
Procedimento RNP-AR

Desenhado
por
demanda
de um
empresa

Desenhado
por
demanda
do
Aeroporto



O sistema RNP-AR





Benefícios do RNP-AR

Benefícios

Principais benefícios do PBN:

- ✈️ Redução do tempo de voo. No novo sistema, as aeronaves voam em rotas mais lineares;
 - ✈️ Menos ruído nos arredores dos aeroportos. O PBN viabiliza uma descida contínua, com velocidade constante, o que diminui o ruído;
 - ✈️ Menos custos. A redução do tempo de voo reduz também o gasto com combustíveis;
 - ✈️ Redução das emissões de CO₂. Como as rotas são mais precisas e flexíveis, as aeronaves possuem velocidade mais constante, o que reduz o gasto de combustíveis.
-

O procedimento RNP-AR na Gestão

Dentro de uma companhia aérea geralmente o RNP-AR nasce com o Departamento de Operações convencendo as áreas de negócio sobre os benefícios de um procedimento RNP-AR.

O procedimento RNP-AR na Gestão

Conversão
RNP 0.1

Configuration	Cost AC USD	A319	A320	A321	Total AC	Total Cost (USD)	Mod	SB + kits (meses)	Execução da EO (meses)	Total (meses)
RNP 0.1	0	17	9	16	42		Aeronaves RNP AR em operação	N/A	N/A	N/A
RNP 0.1 cfg 1a	72,000		9		9	648,000	Modificações Simples	6	6	12
RNP 0.1 cfg 1b	88,000		29	9	38	3,344,000				
RNP 0.1 cfg 1c	105,000		4		4	420,000				
RNP 0.1 cfg 2	132,000		4		4	528,000	CFG 1 + ADIRU	6	12	18
RNP 0.1 cfg 3a	480,000	9	21		30	14,400,000	CFG 2 + LCDU + EGPW	6	24	30 (CHK C)
RNP 0.1 cfg 3b	530,000		2		2	1,060,000				
RNP 0.1 cfg 4	660,000		2		2	1,320,000	CFG 2 + LCDU + EGPW + FMGC	6	24	30 (CHK C)
Upcoming Redelivery		1	3		4		Conversão RNP 0.3			
Total		27	83	25	135	21,720,000				
% AC RNP		63%	11%	64%	31%					

Configuration	Cost AC USD	A319	A320	A321	Total AC	Total Cost (USD)	Mod	SB + kits (meses)	Execução da EO (meses)	Total (meses)
RNP 0.1	0	17	9	16	42		Aeronaves RNP AR em operação	N/A	N/A	N/A
RNP 0.3 cfg 1	63,000		46	9	55	3,465,000	Modificações Simples	6	6	12
RNP 0.3 cfg 2	66,000	9	21		30	1,980,000	CFG 1 + EGPWS	6	24	30
RNP 0.3 cfg 3	116,000		2		2	232,000	CFG 1 + EGPWS + MMR Thales	6	12	18
RNP 0.3 cfg 4	290,000		2		2	580,000	CFG 1 + EGPWS + MMR Thales + FMGC	6	24	30
Upcoming Redelivery		1	3		4		Conversão RNP 0.3			
Total		27	83	25	135	6,257,000				
% AC RNP		63%	11%	64%	31%					

O procedimento RNP-AR na Gestão - Guias da Empresa



1.

Segurança



2. Ser

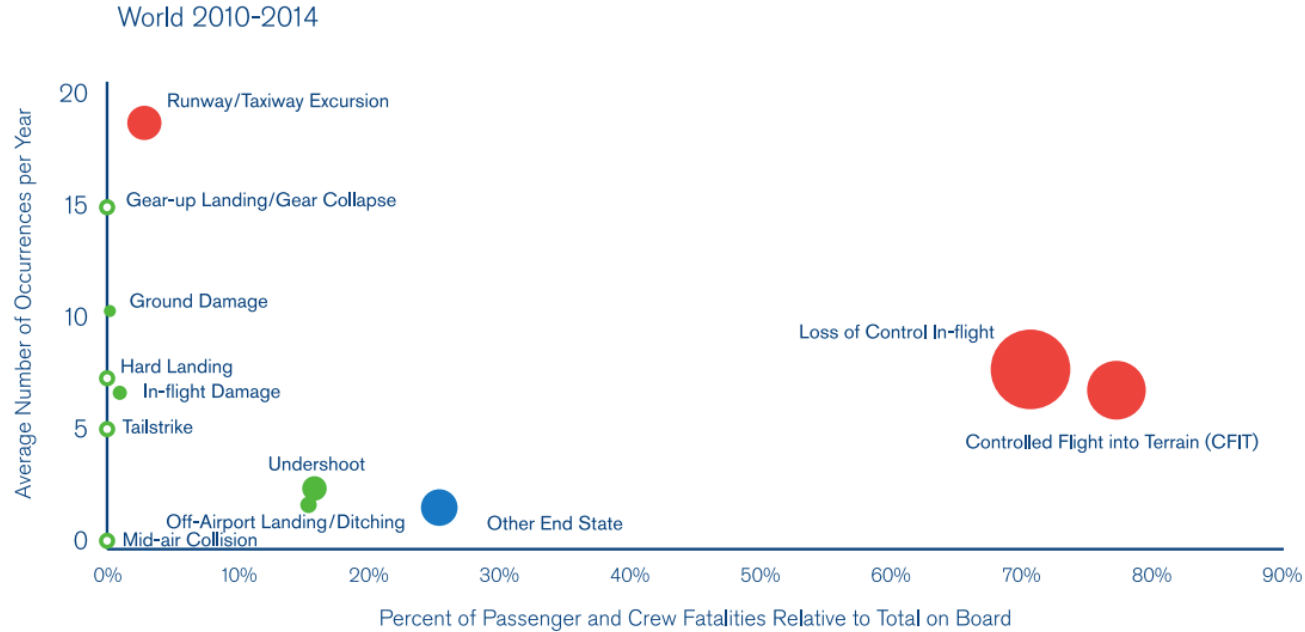
**Atencioso
(foco no
cliente)**



3.

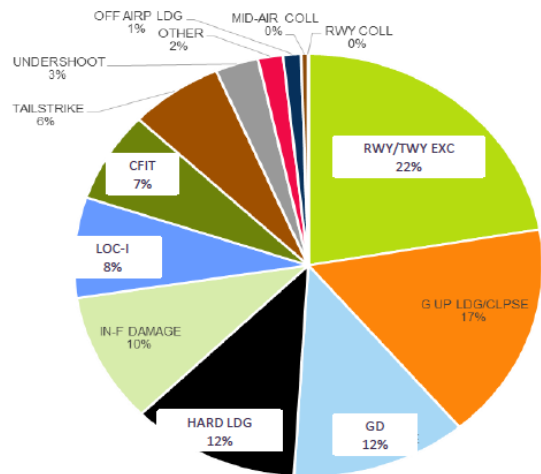
Eficiência

RNP-AR na Segurança

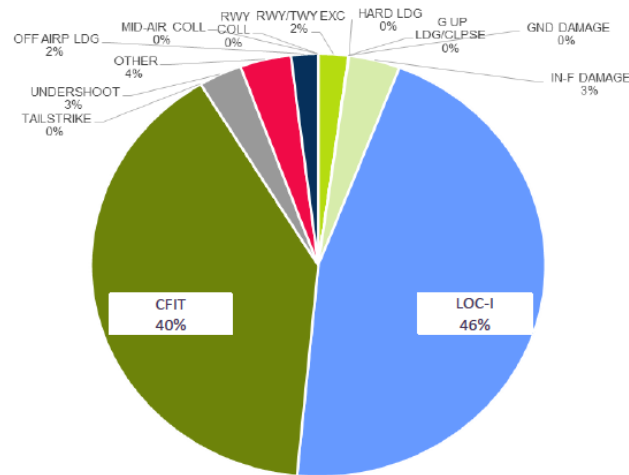


RNP-AR na Segurança

Accidents Distribution



Full-Loss Eq. Distribution



RNP-AR na Segurança

✈ Os procedimentos RNP-AR podem fornecer significantes vantagens operacionais e de segurança em relação aos procedimentos NPA/RNAV.

Os procedimentos RNP-AR permitem a utilização de uma navegação lateral e vertical precisa, reduzindo significativamente o risco de CFIT. Apesar de ser possível o desenvolvimento de procedimentos RNP-AR com diversos requisitos de performance (RNP 0.3, RNP, 0.2, RNP 0.1), os designers só devem utilizar requisitos menores do que 0.3 quando esse representar um benefício operacional.

RNP-AR na Segurança

“ICAO controlled flight into terrain (CFIT) studies have shown that runway-aligned approaches (LNAV only) are 25 times safer than circling approaches, and that once some form of vertical guidance is added to approaches the safety margin is increased again by a factor of 8” [1]

RNP-AR na Eficiência

Na média um procedimento RNP-AR traz uma redução aproximada de 3nm de trajetória por voo.

Aeroporto	NM	Flight Time	Fuel (Kg)	Fuel (Gl)	Voos ano	Savings ano (Gl)
CWB	4.2	1.4	58	19,2	9900	189.000
POA	4,1	1,3	56	18,5	9300	172.000
FLN	2,4	0,8	34,8	11,5	6800	79.000

Potencial = 440 mil gl/ano

R\$ 3.2 Milhões

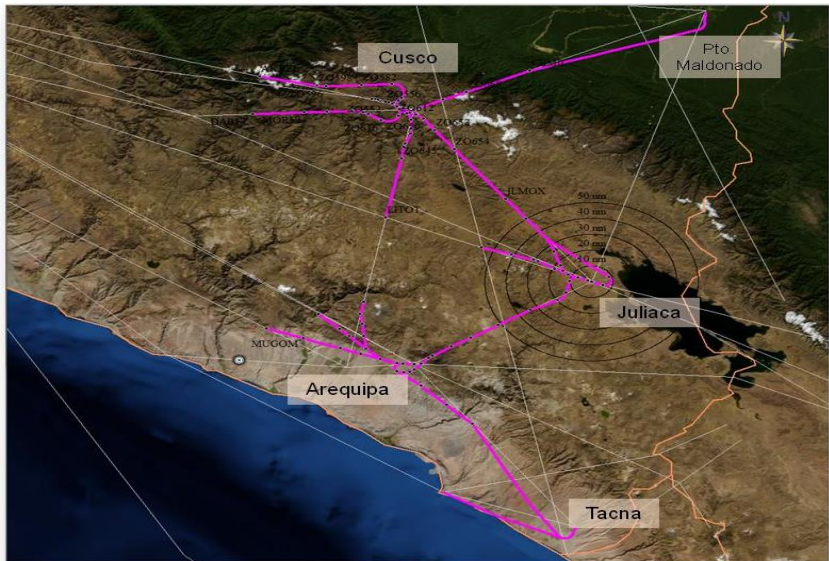
RNP- AR para o cliente

Os procedimentos RNP-AR tem o potencial de reduzir o mínimos meteorológicos de aproximação em relação as NPAs.

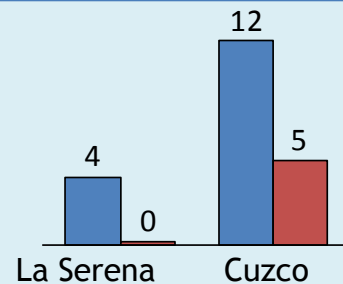
Consequentemente tornando esses aeroportos mais acessíveis e com menores períodos de fechamento.

RNP-AR para o cliente

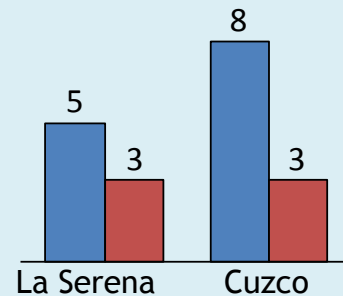
Implantação no Peru, conectando todas as cidades da região sul do país permitindo beneficiar mais de 30.000 passageiros por mês...



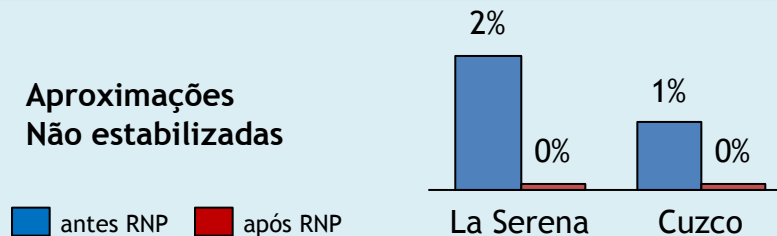
Cancelamentos por meteorologia



Atrasos por meteorologia



Aproximações Não estabilizadas



Visão do Operador

Perspectiva da LATAM

- ✍ "RNP-AR é uma excelente ferramenta de segurança e eficiência. É nossa visão termos esses procedimentos disponíveis e implementados em todas as nossas operações".
-

O que nos faz ter esse pensamento....

- ✍ A gestão da segurança operacional é responsabilidade do operador;
 - ✍ Os custos de implementação de um RNP-AR não são muito maiores que o de um procedimento RNP.
 - ✍ RNP-AR é um substituto natural do ILS.
 - ✍ Devido a extensão de nosso país e infraestrutura, a auto-suficiência embarcada é um grande facilitador;
 - ✍ Em relação aos procedimentos RNP convencionais, apenas o RNP-AR (RF legs) os torna mais competitivos.
-

RNP-AR Santos Dumont

AERO
MAGAZINE

Aeromazine Seções - Outras áreas - **Aeromazine** Mídia Kit

Aeromazine - Notícias

Aviação Comercial

Pousos no Santos Dumont serão por navegação via satélite

Parte da frota de A319 da TAM já é capaz de operar através do sistema RNP-AR no aeroporto carioca

Da redação em 8 de Janeiro de 2016 às 12:38



A Tam foi formalmente autorizada pela ANAC para adotar o sistema RNP-AR (Required Navigation Performance) em todas as aproximações para pouso no aeroporto Santos Dumont, no Rio de Janeiro. O voo de homologação operacional foi realizado no dia 21 de dezembro de 2015.

QUEM SOMOS EVENTOS GALERIAS ASSINATURAS

O que você procura?

AVIAÇÃO MILITAR/GERAL AVIAÇÃO EXECUTIVA

Galeria

Página Inicial > Aviação Civil > NOTÍCIAS > TAM já pode utilizar

Compartilhar:

TAM já pode utilizar navegação por satélite em pousos no Aeroporto Santos Dumont



A companhia aérea TAM recebeu a autorização da Agência Nacional de Aviação Civil para adotar o sistema de Performance de Navegação Requerida (RNP-AR) em todas as aproximações para pouso no Aeroporto Santos Dumont, no Rio de Janeiro. Atualmente, 14 aeronaves Airbus A319 contam com a tecnologia de bordo para aderir ao novo procedimento.


Janeiro: O voo de homologação operacional foi realizado pela companhia em 21 de dezembro do ano passado.

OTAS

PROFISSIONAL DE TURISMO

navegação por satélite no SDU

0 comentário(s)



formalmente autorizada pela Anac a adotar o sistema de Performance de todas as aproximações para pouso no aeroporto Santos Dumont, no Rio de Janeiro.

Lessons Learned
recognise mistakes
observe what works
document them
share them



Processo de certificação - RNP-AR Santos Dumont

- ✍ Apesar de os manuais do fabricantes informarem sobre a capacidade da aeronave, nem sempre é plug-and-play. Muitas vezes existe a necessidade da incorporação de algum boletim ou modificação.
 - ✍ Nem todos os dispositivos de treinamento (simuladores) estão capacitados para os requisitos do RNP-AR;
 - ✍ Um certificação prevista para levar perto de 1 ano levou quase 3 anos;
 - ✍ O processo inicial de análise dos documentos acabou tomando mais tempo do que o previsto;
 - ✍ Diversas mudanças de escopo e stakeholders com visões distintas sobre um mesmo tema.
-

Processo de certificação - RNP-AR Santos Dumont

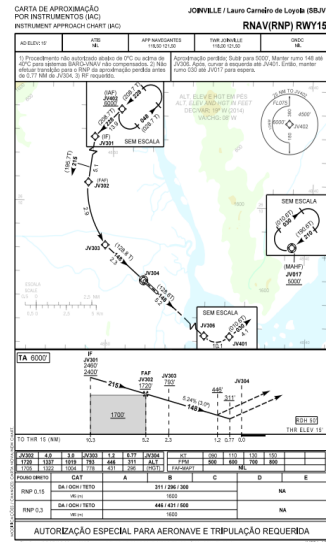
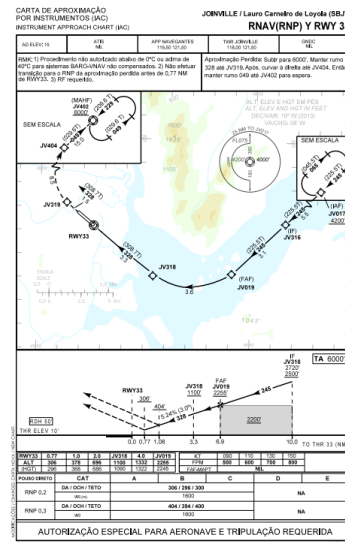
- ✍ Processo de desenvolvimento do FOSA;
- ✍ Ajustes no programa de treinamento em função da evolução da certificação;
- ✍ Apesar do esforço da OACI, ainda temos muitos documentos com conceitos e siglas usadas com significados distintos em alguns documentos.

Apesar de todas as dificuldades foi um projeto de aprendizado mútuo e de grande valor para empresas, DECEA, ANAC e demais stakeholder.



O futuro

ICAO: Initial approvals can be complex, take advantage of previous approvals in same aircraft.



Desenho de procedimentos...

Já está previsto em regulamentos do FAA a participação de entidades privadas na elaboração de procedimentos RNP-AR.

The image shows the front cover of an FAA Advisory Circular. At the top left is the FAA logo and the text 'U.S. Department of Transportation Federal Aviation Administration'. To the right, the title 'Advisory Circular' is prominently displayed. Below this, the subject, date, and initiation details are listed. The subject is 'Instrument Flight Procedure Service Provider Authorization Guidance for Required Navigation Performance Authorization Required Procedures'. The date is '02/19/2015' and it was initiated by 'AFS-460'. The AC number is '90-110A'. The main body of the cover contains three numbered sections: 1. Purpose, 2. Audience, and 3. Applicability. Section 1 states the purpose is to provide guidance for IFP developers to become authorized by the FAA. Section 2 identifies the primary audience as non-FAA IFP Service Providers. Section 3 details the applicability for Instrument Flight Procedure Service Providers. At the bottom, there is a signature of John S. Dungan, Director, Flight Standards Service.

U.S. Department of Transportation
Federal Aviation Administration

Advisory Circular

Subject: Instrument Flight Procedure Service Provider Authorization Guidance for Required Navigation Performance Authorization Required Procedures
Date: 02/19/2015
Initiated by: AFS-460
AC No: 90-110A

1. **Purpose.** This advisory circular (AC) provides guidance for Instrument Flight Procedure (IFP) developers, hereinafter referred to as "IFP Service Providers," to become authorized by the Federal Aviation Administration (FAA) to develop Title 14 of the Code of Federal Regulations (14 CFR) Part 97 Required Navigation Performance IFPs with Authorization Required (RNP AR).

2. **Audience.** The primary audience for this AC is non-FAA IFP Service Providers, who desire FAA authorization to develop 14 CFR Part 97 RNP AR IFPs. The secondary audience for this AC is FAA Flight Standards Service (AFS) personnel, directly associated with the procedure development process and/or charged with the responsibility to authorize and provide oversight of non-FAA IFP Service Providers.

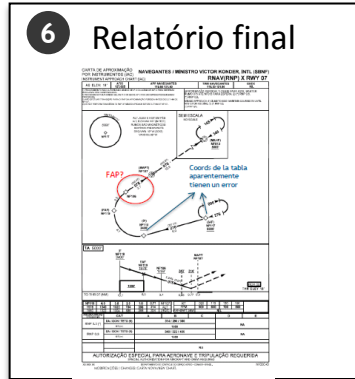
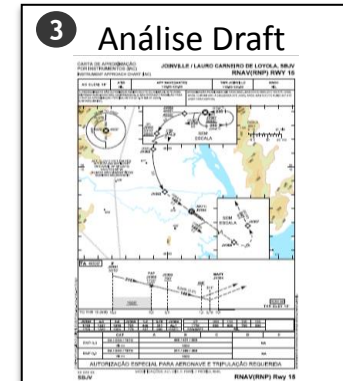
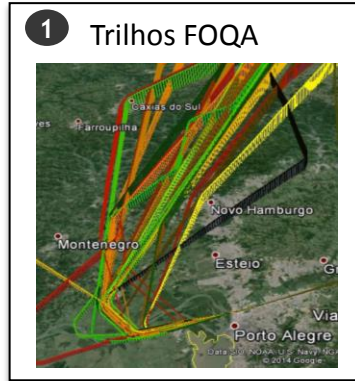
3. **Applicability.**

a. **Instrument Flight Procedure Service Providers.** They may elect to use guidance in this AC or an alternative method provided the method is approved by the FAA.

b. **Mandatory terms used.** In this AC, terms such as "must" denote compliance and are the only means authorized when applying this AC. This AC does not change, add, or delete regulatory requirements or authorize deviations from regulatory requirements.

John S. Dungan
Director, Flight Standards Service

O desenho de procedimentos já é uma realidade na LATAM



O desenho de procedimentos já é uma realidade na LATAM

O aeroporto de São Carlos abriga o centro de manutenção da LATAM no Brasil.

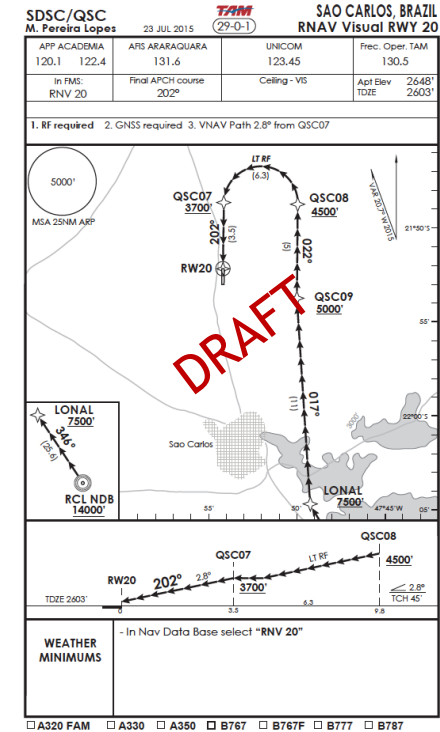
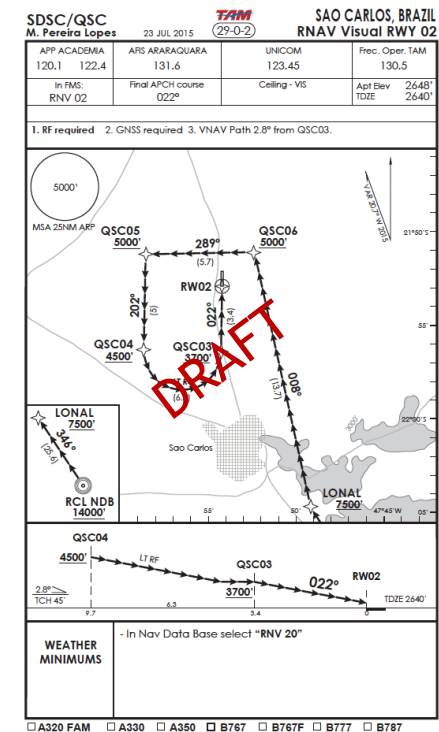


Titolivio de Oliveira ©

O desenho de procedimentos já é uma realidade na LATAM

Algumas características:

- ✈ Operação apenas visual;
- ✈ Não há controle ATC;
- ✈ Algumas aproximações não estabilizadas em função do perfil do voo;
- ✈ Acesso limitado para operadores internacionais.



O desenho de procedimentos já é uma realidade na LATAM

KJFK / JFK
KENNEDY INTL

NEW YORK, NY
RNAV Visual Approaches

AMDT 2 / 21 AUG 14

ATTENTION ALL USERS OF KJFK RNAV VISUALS

- This procedure is intended to be used at KJFK when "VOR or GPS Rwy13L/R" approach is in use. This is a customized approach, for particular operators only. Its use will not be announced on the ATIS.
- Select "RNAV V 13L" or "RNAV V 13R" in Nav Data Base. This procedure should not be confused with the RNP Approaches.
- Do NOT manually load these approaches; they must be loaded from the FMS Navigation Data Base.
- Crews must brief the procedure prior to requesting it from the ATC.
- On initial contact with ATC (NY Approach) "Request RNAV Visual RWY 13L/R".
- The approach should be loaded in preparation for the procedure. Once cleared to "join" the RNAV Visual, pilots must close any route discontinuities that exists between arrival and approach and must fly the lateral guidance unless otherwise instructed by ATC.
- Autopilot usage required, if available.

DRAFT

☐ A318 ☐ A319 ☐ A320 ☒ A330 ☒ B767 ☐ B767F ☒ B777 ☐ B787

Change New procedure

KJFK / JFK
KENNEDY INTL

NEW YORK, NY
RNAV Visual RWY 13L

AMDT 2 / 21 AUG 14

D-ATIS Active 128.72	NEW YORK Approach (R) 128.12	KENNEDY Tower 119.1 (Rwy 4L/22L & 13L/31R) 123.9 (Rwy 4L/22R & 13R/31L)	Ground 121.9
In FMS: RNAV V 13L	Final APCH course 130°	Calling - VIS 2500 - 5	Appt Bar 13' 13'

Missed APCH: as cleared by ATC Trans level: FL180 Trans alt: 18000'

1. RF required 2. GNS required 3. Radar required 4. If B767: Pegasus Only
5. VGSi and RNAV GP not coincident 6. VNAV Path 3°

WEATHER MINIMUMS
 Ceiling - VIS
2500 - 5

- In Nav Data Base select "RNAV V 13L"
- On initial contact with ATC "Request RNAV Visual RWY 13L"
- Advise ATC "Airport or preceding aircraft in sight" ASALT
- After DVETO/COVIR waypoint expect direct to ASALT
- VGSi and RNAV GP angle not coincident
- Missed APCH: as cleared by ATC

☐ A318 ☐ A319 ☐ A320 ☒ A330 ☒ B767 ☐ B767F ☒ B777 ☐ B787

Change New procedure

Para o futuro....

- ✈ RNP-AR não apenas para chegadas;
- ✈ RNP-AR para separação de tráfegos;
- ✈ Advanced RNP-AR...



Gosto mais dos sonhos do futuro do que da história do
passado.

(Thomas Jefferson)

Obrigado

Cmte. Marcusso

Gerente de Flight Standards,
Treinamento e Projetos

23/03/2016

