WORLDWIDE FLIGHT SAFETY CONFERENCE

BANGKOK 2018

27TH – 28TH JUNE

ATR

PROPELLING THE NEXT CONNECTION

WORLDWIDE FLIGHT SAFETY CONFERENCE
BANGKOK 2018
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Safety Enhancements:

Product Policy

Stéphane VIALA
Chief Engineer

Cyril CIZABUIROZ
Experimental Flight Test Pilot

ATR
PROPELLING THE NEXT CONNECTION

Agenda / Product evolution

"Armonia"
NAS "-600"
NAS Std.1
NAS Std.2

Certified
Under development

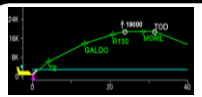
201x | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021

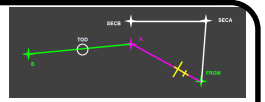
Standard Modifications

Avionic Standard 3

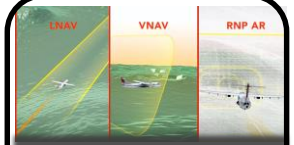
New seat

Standard Modifications



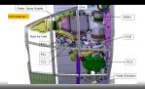


Avionic Standard 4 / MFC NG



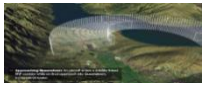
Performance Based Navigation

VMS



New Air Management System

Optional Modifications



RNP AR 0.3/0.3

Optional Modifications

CLEARVISION

Agenda / Product evolution

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NAS "-600"
NAS Std.1
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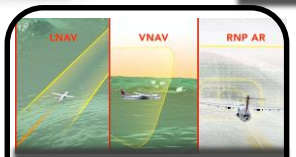


Performance Based Navigation

Standard Modifications

Avionic Standard 3

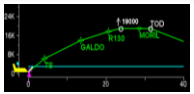
New seat

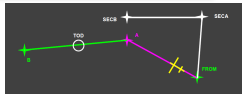
VMS

Optional Modifications

RNP AR 0.3/0.3

Standard Modifications





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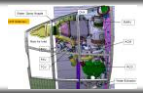

New Air Management System

Optional Modifications

CLEARVISION

Performance Based Navigation (PBN)

- Performance Based Navigation increases flight safety
  - Satellite Based Navigation System
  - VNAV: Vertical NAVigation
  - LPV: Localizer Performance with Vertical guidance
  - RNP AR: Required Navigation Performance Autorisation Required
  - LNAV: Lateral NAVigation

Agenda / Product evolution

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NAS Std.2

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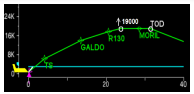
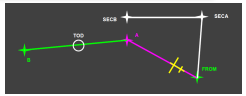
Standard Modifications

Avionic Standard 3

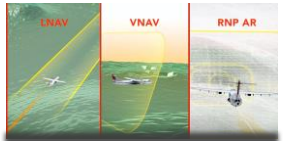
New seat

Standard Modifications



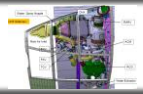


Avionic Standard 4 / MFC NG



Performance Based Navigation

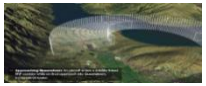
VMS



New Air Management System

Optional Modifications

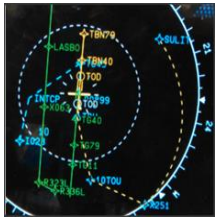
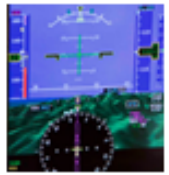
Optional Modifications



RNP AR 0.3/0.3

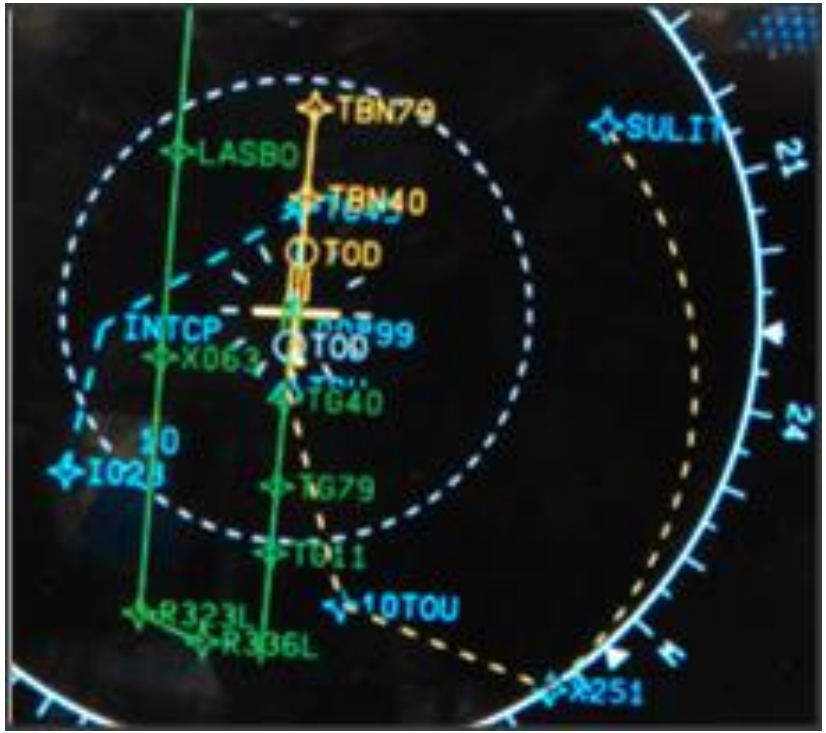
CLEARVISION

New Avionics Suite (NAS) - Standard 3
Key Basic features

Eng out standard instrument departure	Automatic display of eng out procedure	
High and low speed protection	Improve speed display guidance	
Enhanced localizer capture	Improve ILS and LPV interception	
Temporary flight plan display	Ease flight plan verification	

NAS Std 3 - Key features

- **Navigation Display - Basic**
- Temporary Flight Plan on ND with current FPLN.
- Ease crew check before confirmation of FFPL modification.
- Engine-Out Standard Instrument Departure (EOSID) – Basic + Service



NAS Std 3 - Key features

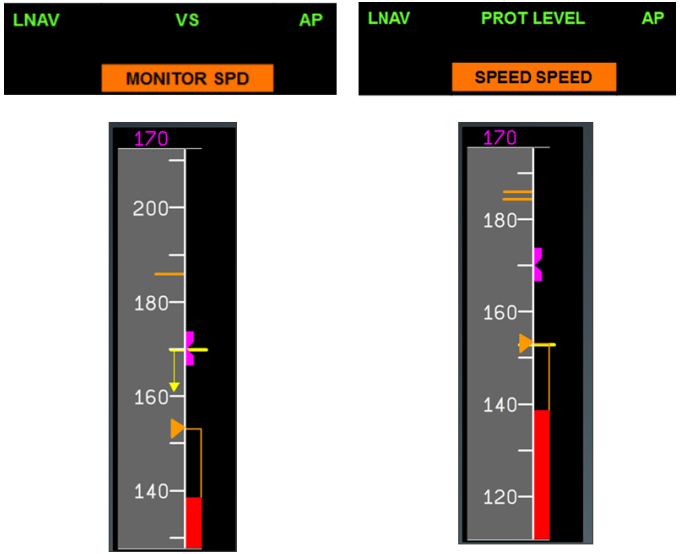
- **High/Low Speed Protection - Basic**

  - With AP engaged, A/C speed maintained at max or min speed through pitch control, with associated alerting

  - Vs mode : MONITOR SPEED then SPEED SPEED and PROT LEVEL mode

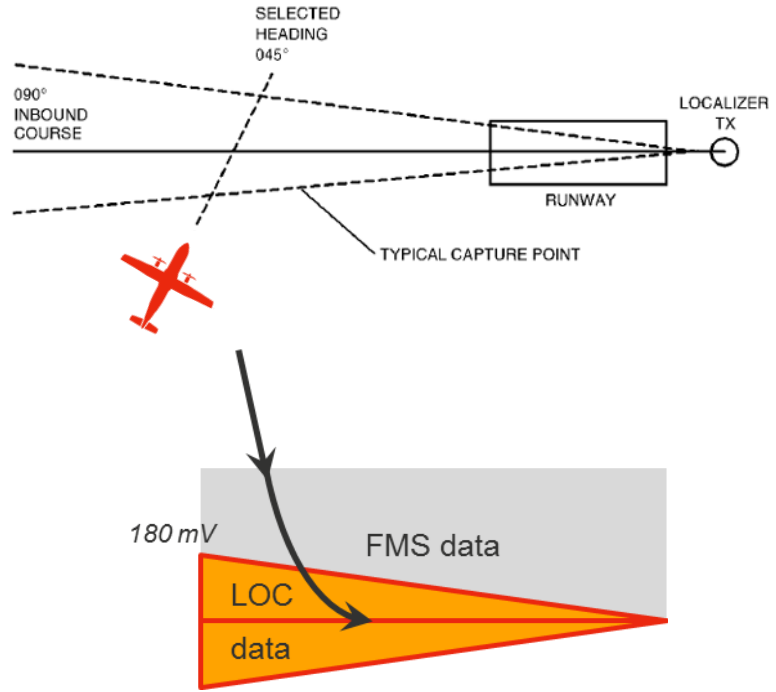
  - Protections only available in « VS/IAS/ALT * » modes and in cruise configuration

  - Will be available AP off in STD 4.

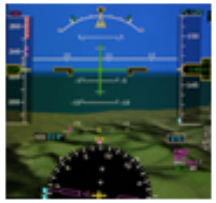


NAS Std 3 - Key features

- **Enhanced LOC capture - Basic**
  - LOC capture capability is improved
  - Reduced overshoot of the axis in high speed/high intercept angle
  - LOC capture is anticipated thanks to FMS trajectory computation
  - Transparent for the aircrew (no pilot action required)

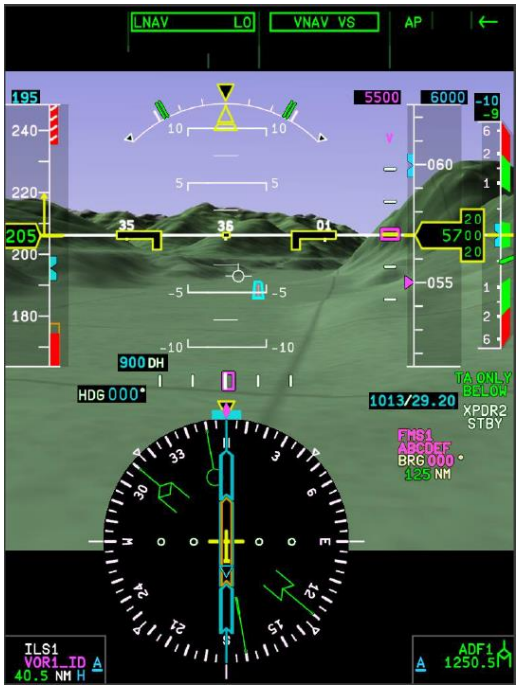


New Avionics Suite (NAS) - Standard 3
Key Optional Features

Synthetic Vision Systems	Improve 3D situation awareness	
RNP AR 0.3/0.3	Approach and departure capabilities	
Company Route	Reduce crew workload	
Customized Check List	Alignment between checklists and SOPs	

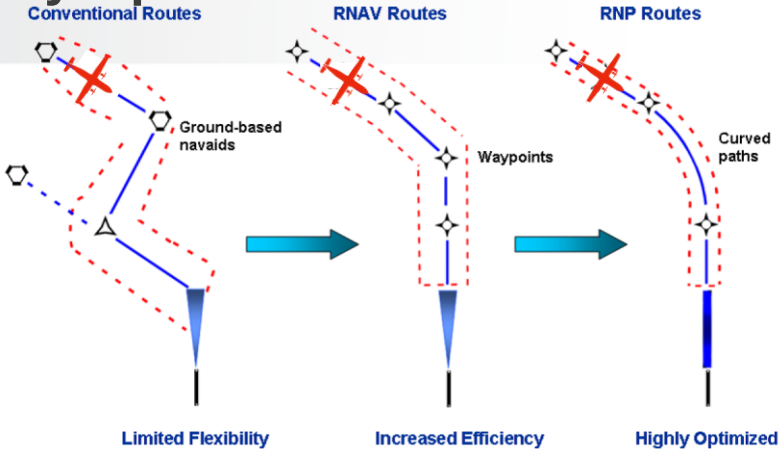
NAS Std 3 - Key Optional features

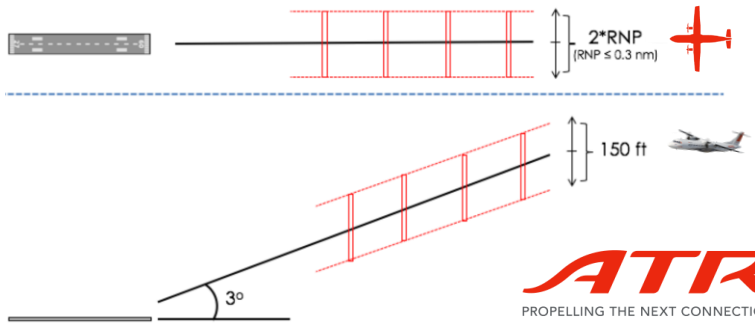
- **Synthetic Vision System (SVS) – Option**
  - On DU1 and DU5 (PFD), depiction of 3D terrain, obstacles, landing areas and large cities.
  - Increased situational awareness
  - SVS databases : Worldwide coverage



NAS Std 3 - Key Optional features

- **RNP-AR 0.3/0.3 - Option**
  - To fly a specific approach path between points in space and obstacles with high accuracy, 0.3 Nm, and integrity
  - STD2 was certified RNP-AR 0.3/1
  - To achieve 0.3 Nm in missed approach, regulation requires installation of one IRS





ATR
PROPELLING THE NEXT CONNECTION

NAS Std 3 - Key Optional features

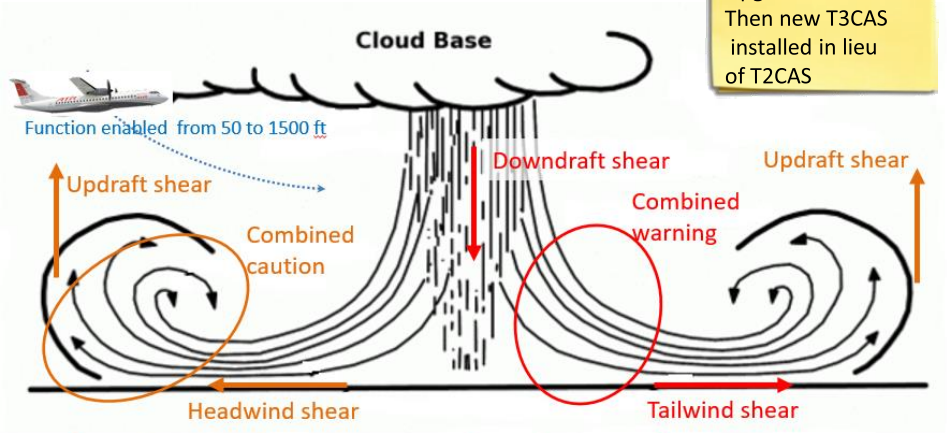
- **Normal Check-lists customization - Option**
  - Airlines can customize a subset of the Normal Electronic Check-Lists
  - Airlines can create new normal procedures that can be manually consulted
  - Using Thales on-line tool (COL)

NAS Std 3 - Key Optional features

- **T3CAS is integrated unit hosting:**
  - TCAS, TAWS and Transponder functions
  - Reactive WindShear feature can also be activated in the unit.
  - T3CAS Entry Into Service available

(forward fit)

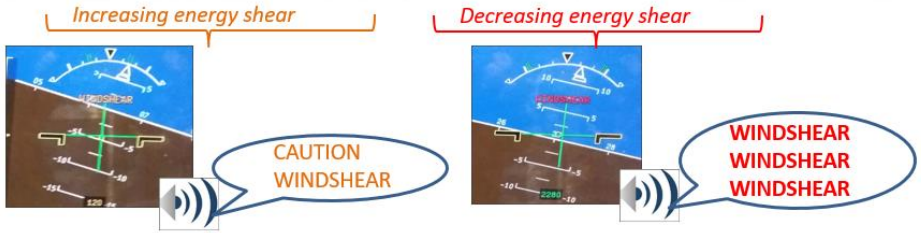
Retrofit possible
Upgrade ST2 to ST3
Then new T3CAS installed in lieu of T2CAS



Function is activated below 1500 ft

Alerts in case of:

- Updraft shear (caution)
- Downdraft shear (warning)



RWS alert = PFD message + audio

Agenda / Product evolution

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NAS Std.1
NAS Std.2

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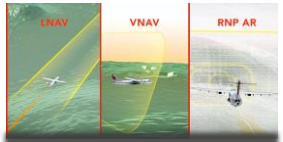
Performance Based Navigation



Standard Modifications

Avionic Standard 3

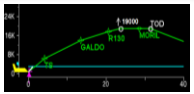
New seat

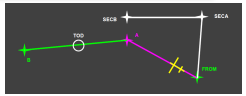
VMS

Optional Modifications

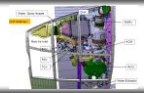
RNP AR 0.3/0.3

Standard Modifications





Avionic Standard 4 / MFC NG



New Air Management System

Optional Modifications

CLEARVISION

Clearvision
Enhanced Vision System on Head Mounted Display

HUD Safety benefit

- Greater Situational and Operational Awareness
- Improved assessment of deviations leading to better trajectory
- Improved Decision Making Tool during Takeoff, Approach and Landing

- According to Flight Safety Foundation – 2009 Report:
  - “HUD: A Powerful Tool for Accident Prevention”
  - The most influential individual HUD safety properties are:
    - Flight Path Vector
    - Flight Path Acceleration
    - Speed Error Tape

Clearvision

Head Mounted Display

Clearvision
Minima Reduction Principle

Performance Based Navigation (PBN)

Divert

No visual reference

Instrumented segment

Published minimum

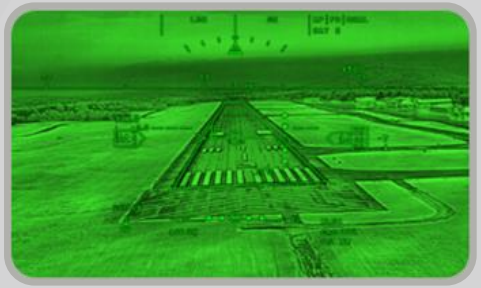
Approach started if ATIS reported RVR is below published RVR

Decision

Visual Segment

EFVS Used in lieu of Natural Vision to descend below published minimum to touch down

Clearvision EIS functional roadmap



CLEARVISION™ ENHANCED VISION SYSTEM (EVS)

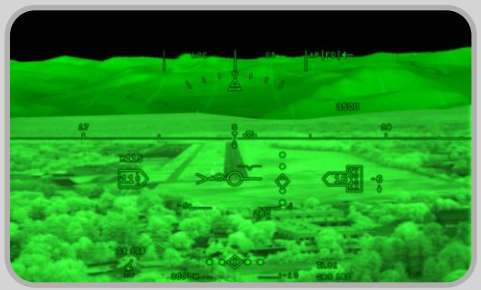
displays the forward topography through the use of imaging sensors

STEP1

available by early 2019

SYNTHETIC VISION SYSTEM (SVS)

generates 3D images from the terrain database



COMBINED VISION SYSTEM (CVS)

combines both EVS and SVS images

STEP2

Agenda / Product evolution

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NAS Std.2

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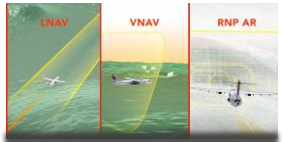
Performance Based Navigation



Standard Modifications

Avionic Standard 3

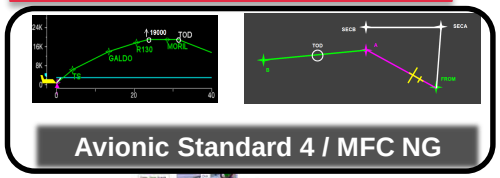
New seat

VMS

Optional Modifications

RNP AR 0.3/0.3

Standard Modifications



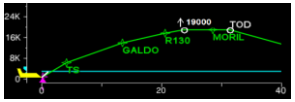
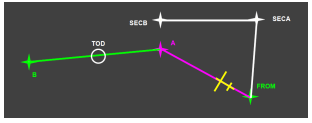
Avionic Standard 4 / MFC NG

New Air Management System

Optional Modifications

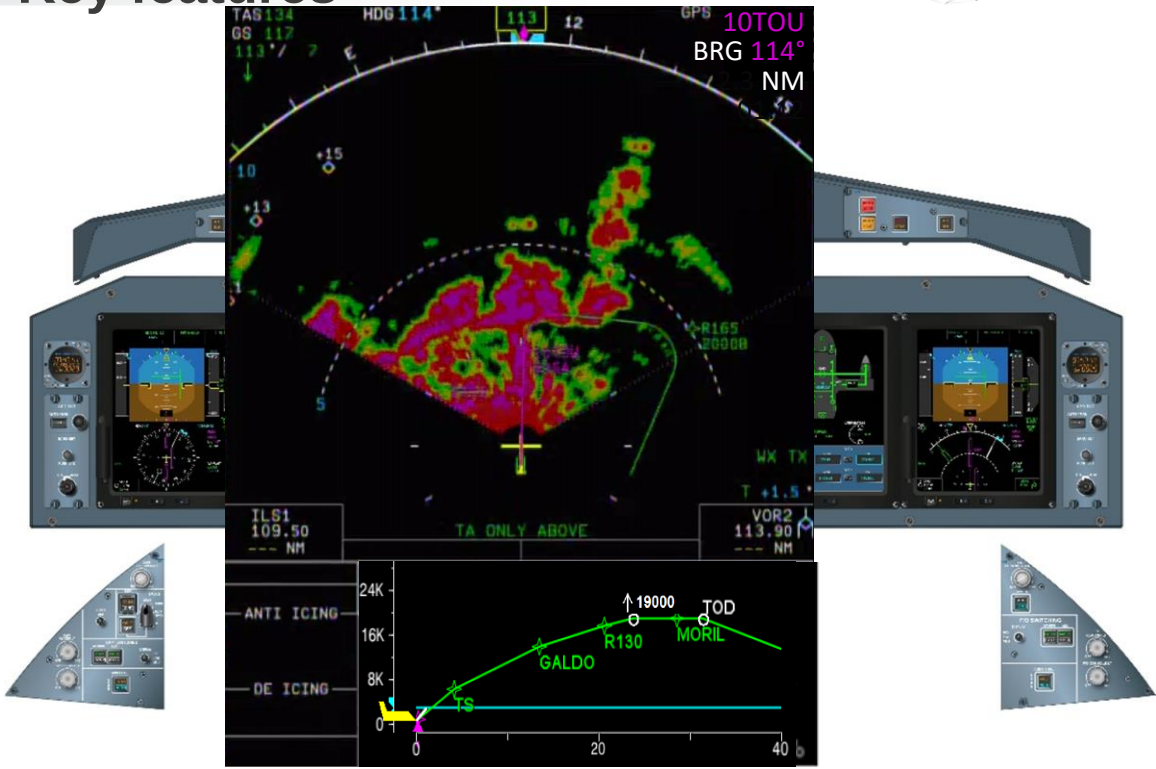
CLEARVISION

New Avionics Suite (NAS) - Standard 4
Key features

Vertical Situation Display	Supports enhanced crew awareness 
Secondary Flight Plan displayed on ND	Supports enhanced crew awareness 
automatic transition from RNP to ILS	Smarter operations 
Go-Around with AP engaged	Smarter operations 

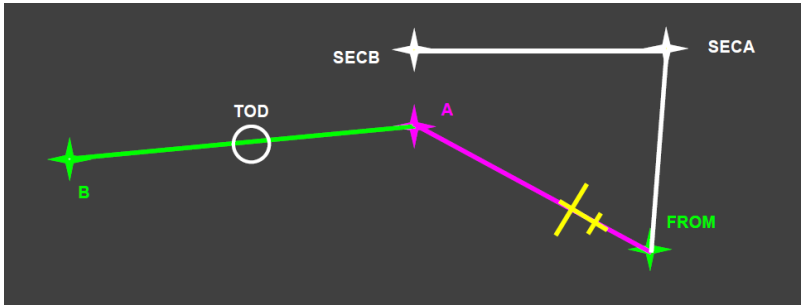
NAS Std 4 - Key features

- **Vertical Situation Display**
  - Increase vertical navigation awareness
  - 3D trajectory reconstruction
  - A/C energy awareness
  - Conformity with ND



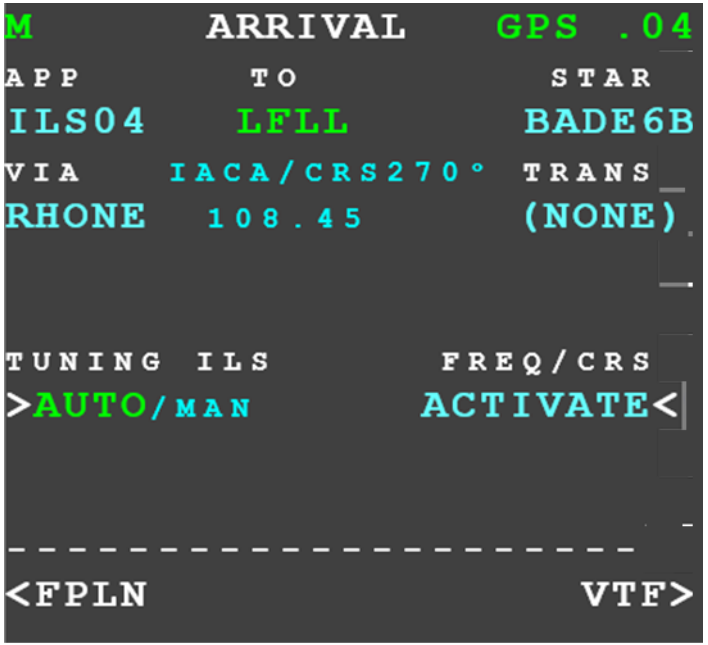
NAS Std 4 - Key features

- **SEC FPLN on ND - Basic**
  - Increases crew awareness during SEC FPLN construction
  - Provides crew with the complete picture



NAS Std 4 - Key features

- **RNP to ILS automatic transition - Basic**
  - Once ILS approach is inserted in the FPLN, associated FREQ & CRS are automatically tuned at 40NM from destination.
  - Manually arming the approach mode, the aircraft is guided to the FAF following the FPLN, then automatically transitions to an ILS guidance type down to the decision point.
  - Decrease crew workload.



NAS Std 4 - Key features

- **Go Around with AP engaged - Basic**

  - Go Around is a critical flight phase
  - Objective is to decrease crew workload
  - Auto pilot remains engaged

  - Combined
    - Pitch order (tuned to represent current pilot go around behaviour)
    - Target speed VGA,
    - Min Flight Path Angle 0.5°

  - Remains available AEO and OEI

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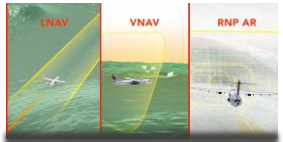
Performance Based Navigation

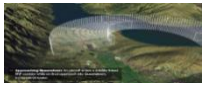


Standard Modifications

Avionic Standard 3

New seat

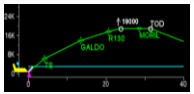
Optional Modifications

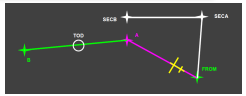


RNP AR 0.3/0.3

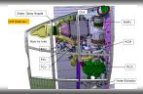
VMS

Standard Modifications





Avionic Standard 4 / MFC NG



New Air Management System

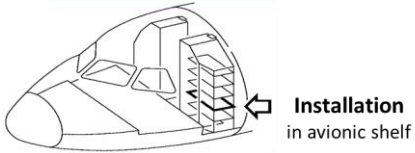
Optional Modifications

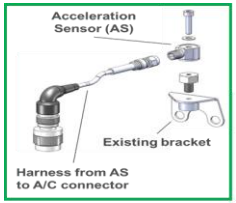
CLEARVISION

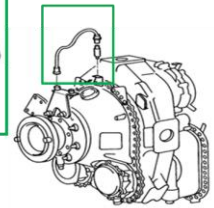
Vibration Monitoring System (VMS)

Certified on Q3 2017
Retrofitable

- Adequate propeller balancing contributes to:
  - Enhanced cabin comfort
  - Increased equipment reliability
  - Reduced DMC







- VMS Features :
  - On-board equipment permanently installed
  - Automatic measurement and balancing solution computed
  - VMS communication through:
    - ACMS for production aircraft and retrofit on -600 a/c
    - Laptop GSE or MCDU for retrofit aircraft pre -600 a/c

ATR
PROPELLING THE NEXT CONNECTION

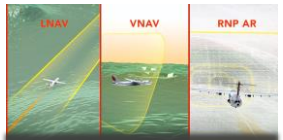
Agenda / Product evolution

"Armonia" NAS "-600" NAS Std.1 NAS Std.2

Certified | Under development

201x | 2015 | 2016 | 2017 | 2018 | 2019 | 2020 | 2021

Performance Based Navigation



Standard Modifications

Avionic Standard 3

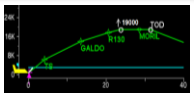
New seat

VMS

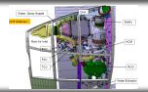
Optional Modifications

RNP AR 0.3/0.3

Standard Modifications



Avionic Standard 4 / MFC NG



New Air Management System

Optional Modifications

CLEARVISION

Constant support to in-service aircraft

ATR Retrofit programmes – Regulatory requirements

Retrofit Subject	Aircraft Model concerned	Installation on aircraft	2017				2018				2019				2020			
			Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4
ADS-B Out V2 for ATR -500 EASA	Legacy only	ATR SB (ref. to be defined)							Sep	Nov						06/07		
ADS-B Out V2 for ATR -500 FAA	Legacy only	ATR SB (ref. to be defined)							Sep	Nov				31/12				
ADS-B out V2 for ATR -600 (FAA and EASA)	- 600 only	ATR42-34-0200 ATR72-34-1146												31/12 FAA		06/07 EASA		
2 hours recording CVR (non magnetic support but solid state recording)	All	ATR42-23-0065 ATR72-23-1047									01/01							
CVR compatible with data link	All	ATR42-23-0095 ATR72-23-1098																
CVR with underwater location device (ULD)	All	ATR42-23-0065 ATR72-23-1047						16/06										
FDR with underwater location device (ULD)	All	ATR42-31-0101 ATR72-31-1104						16/06										

Federal Aviation Administration

Federal Aviation Administration

EASA

EASA

Standard on new aircraft

Modification approval

Retrofit deployment

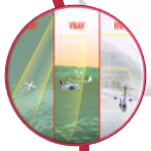
First retrofit kit/part available

Deadline

ATR PROPELLING THE NEXT CONNECTION

Key Messages

Significant investment from ATR



Retrofit and upgrade to PBN and VMS

Upgrade to latest Avionic standard

Invest in System knowledge and training