

Regional Seminar on MMEL/MEL and Special Operations

[Airbus Amber]

Organized by ICAO Regional Office for Western and Central Africa (WACAF)

Dakar - Senegal - from 30 june to 5 july 2025



EFB (Electronic Flight Bag)

Overview of EFB hardware and software

Jean-Christophe GRANGIER, AIRBUS EFB Flight Ops & Regulations Expert

AIRBUS

Agenda

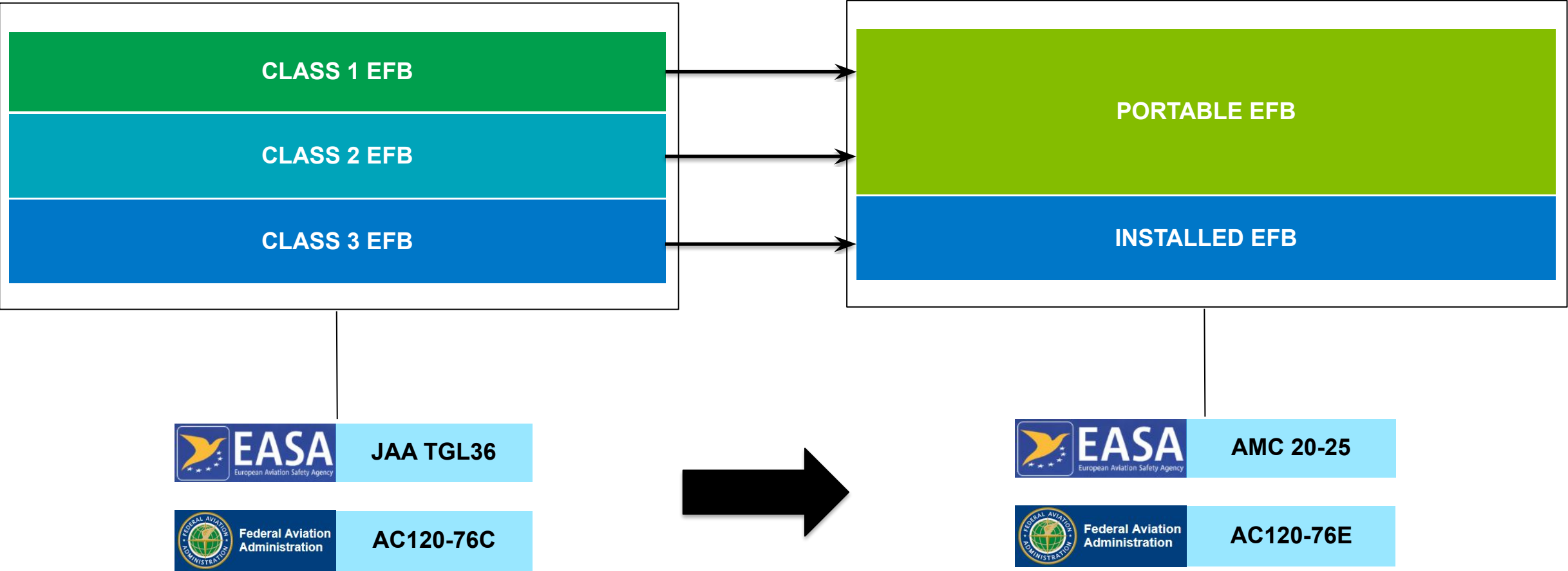
- Introduction of EFB Hardware
- Presentation of Flysmart+
- Presentation of Mission+

Agenda

- **Introduction of EFB Hardware**
- Presentation of Flysmart+
- Presentation of Mission+

EFB Regulations - Hardware classification

[Airbus Amber]



EFB – Approval world

[Airbus Amber]

Airworthiness Approval world



Operational Approval world

Performance
Weight & Balance
Flight Ops doc
Charts
Flight Folder



The use of flight ops data with an EFB and the EFB hardware itself are subject to Ops Approval



National regulations

-
-
-



Regulatory framework



AIR-OPS N°965
AMC 20-25A



AC 120-76E



EFB-based
Operations

Regulatory compliance



AIRBUS



EFB Devices on Airbus

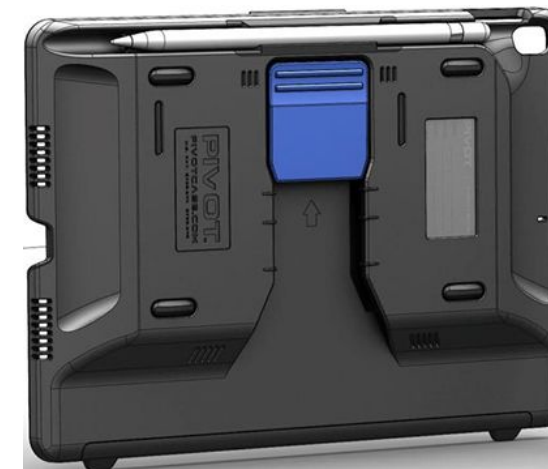
[Airbus Amber]





Mounting brackets (fixed or removable)

[Airbus Amber]







Mounting bracket in EASA Regulations

[Airbus Amber]

Two types of EFB mounting brackets in EASA AIR Ops

- “EFB mounting device”: an aircraft certified part that secures a portable or installed EFB, or EFB system components. 
- “Viewable stowage”: a non-certified device that is attached to the flight crew member (e.g. with a kneeboard) or to an existing aircraft part (e.g. using suction cups), and is intended to hold charts or to hold low-mass portable electronic devices that are viewable by the flight crew members at their assigned duty stations. 





Mounting bracket in FAA Regulations

[Airbus Amber]

Two types of EFB mounting brackets in FAA AC 120-76

- “Installed Mounts” (under Airworthiness approval) EFB mounting devices (or other securing mechanism) may include arm-mounted, cradle, yoke mounts or clips, or docking-stations.
- “Viewable stowage” (under Ops approval) A viewable stowage device is a portable device or component used to secure portable EFB hardware, which allows the crewmember to continue viewing the EFB display (e.g., kneeboards, suction cups, and removable trays).



Mounting bracket Approval

[Airbus Amber]

Two types of approval according to the mounting brackets



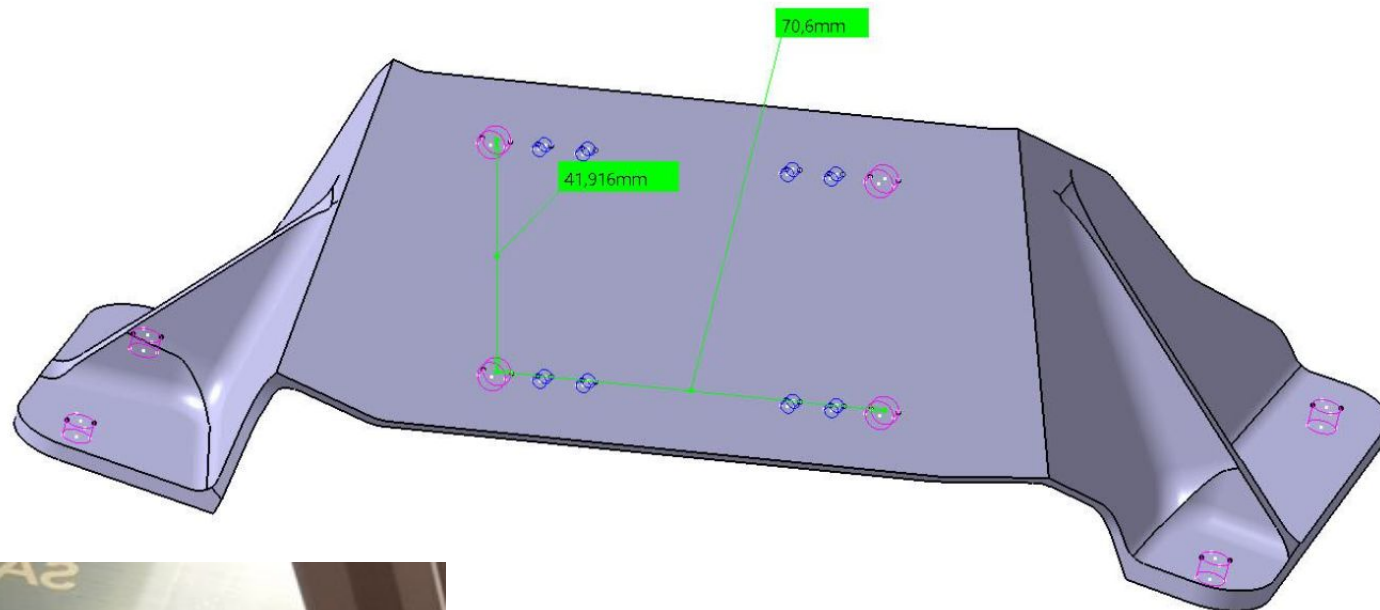
- EASA “Mounting devices” or FAA “Installed Mounts” installed by MOD and STC shall be airworthiness approved by:
 - EASA CS-25 / AMC 20-25
 - FAA 14 CFR Part 25



- EASA/FAA “Viewable stowage” (suction cup) not permanently installed i.e. removable equipment or portable equipment should be operationally approved by:
 - Rules for Air Operations (Regulation (EU) No 965/2012)
 - FAA AC 120-76E



- Equipping sliding windows frames with brackets
- Mounting a base plate on these brackets under lining
- Weight impact : +0.5 kg



A320



Airbus EFB mounting device

[Airbus Amber]

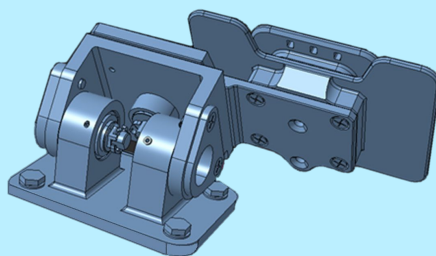
(PIVOT casing)



EFB Tablet



SFE



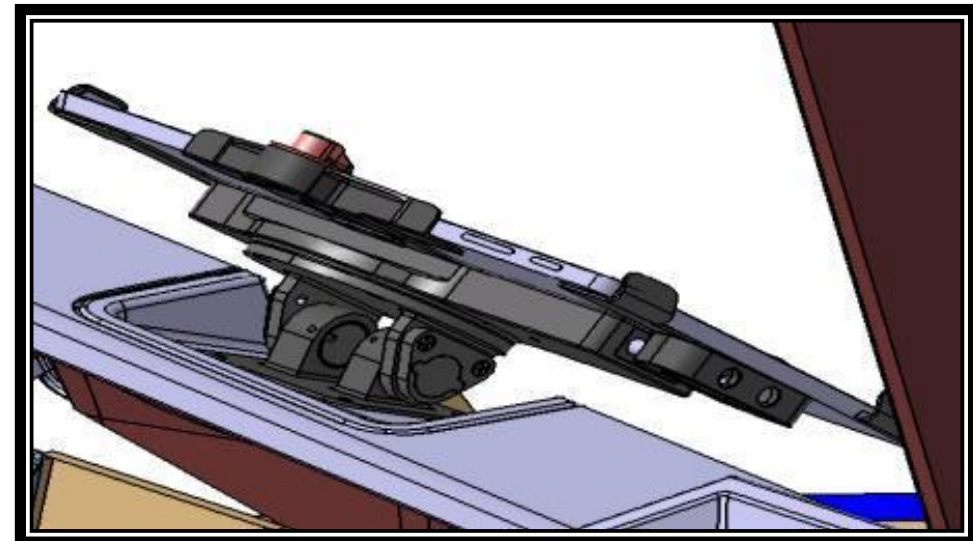
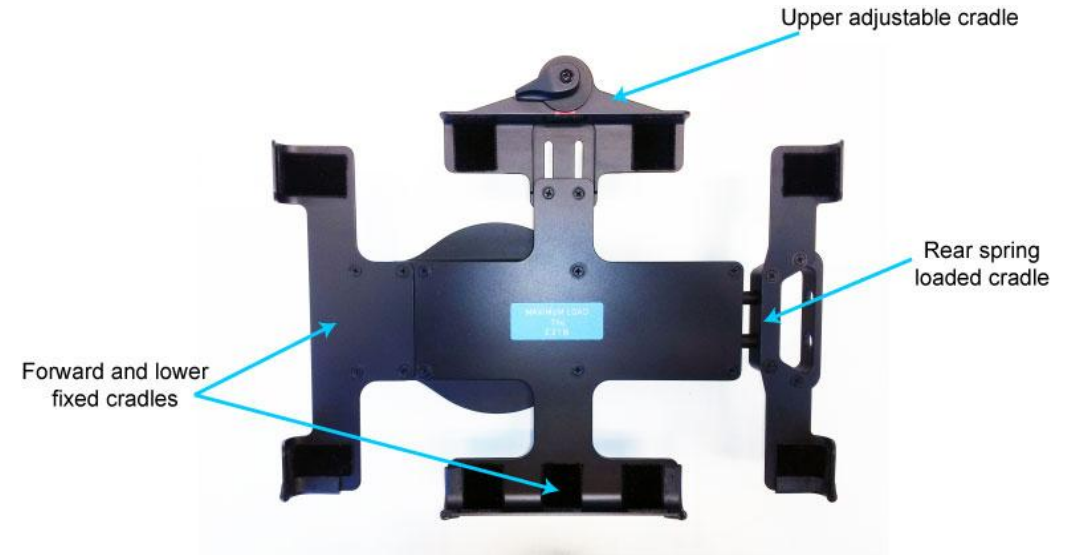
AIRBUS Mount

A330



Airbus EFB mounting device

[Airbus Amber]





Airbus EFB mounting device

[Airbus Amber]

Remove
placard
cover



1

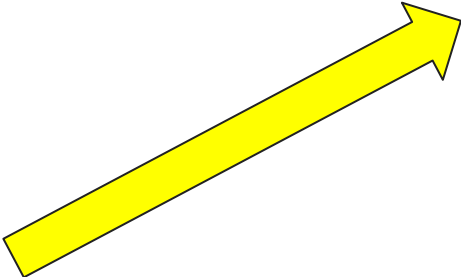
Airbus
mechanical
provision for
Mount
(A828 std)



2



STC EFB
Mount

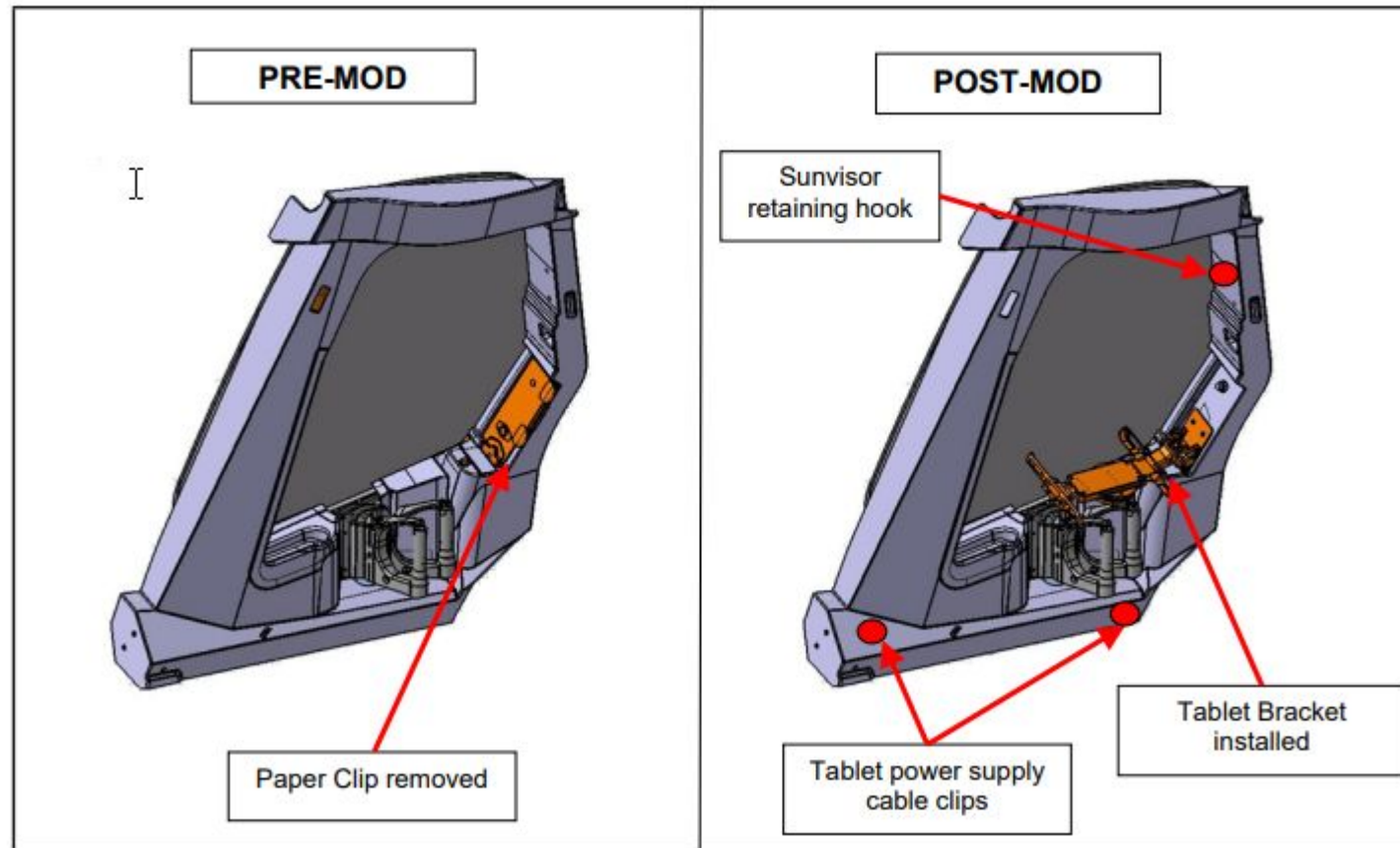


3

Secure the
iPad in the
Mount



4



EFB – Hardware

[Airbus Amber]

Portable EFB
With or without viewable stowage

*available all flight phases with
viewable stowage*

*EFB software & hardware : not an
aircraft part
(only Operational Approval is required)*



Drawback:

*Terminal charts and Checklists not
available for critical flight phases except
when the EFB is without viewable
stowage*

Cockpit configurations

Portable EFB
with **installed resources**

- aircraft part
- Mod certified

*EFB software & hardware : not an aircraft part
(only Operational Approval is required)*

Typical config



*Composed of mounting device
+ electrical supply*

available all flight phases

*EFB software & hardware :
aircraft certified part*

(Operational Approval also required)

ex: A350



*or remote display plugged on a tablet
stowed in a docking station*

Link with avionics also possible (basic on A350)

Installed EFB

ex: A380



Drawback:

*Very costly and rigid development,
slow evolutions (hardware & software)*

AIRBUS

Regulatory information the pilots need for a flight ?

Provides the list of failed equipments and associated maintenance and operations conditions with which an aircraft can still be operated

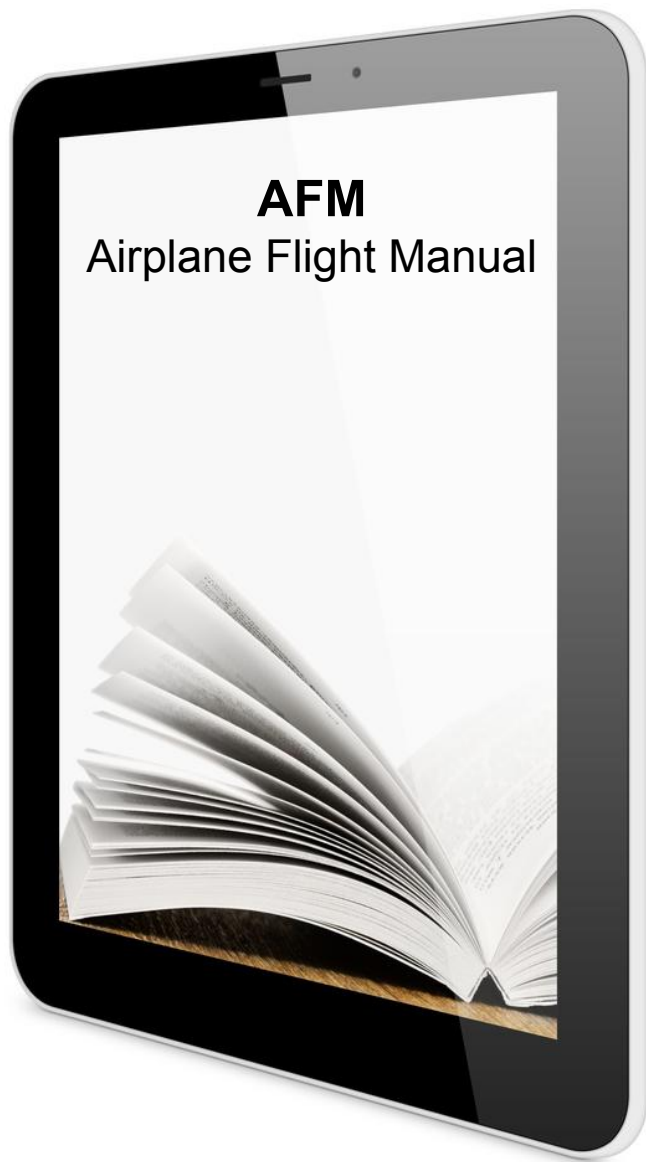
Airbus publish the **Master Minimum Equipment List**



Airlines must customize it (**Minimum Equipment List**) and get Ops Approval



Regulatory information



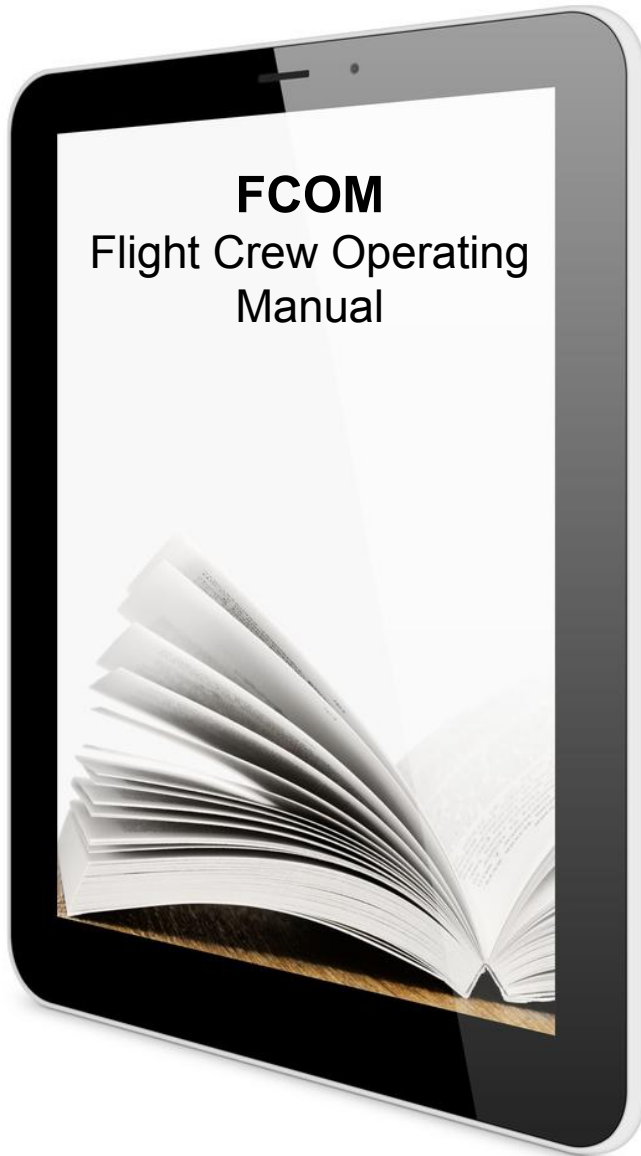
Reference document
Specific to a given aircraft model

Not operational

CDL

Configuration
Deviation
List

Operational documentation



Provides all necessary operating limitations, procedures, performance and system information the flight crew needs to safely and efficiently operate an aircraft during normal, abnormal and emergency situations

Can be customized, and is published by the airline's Doc Department

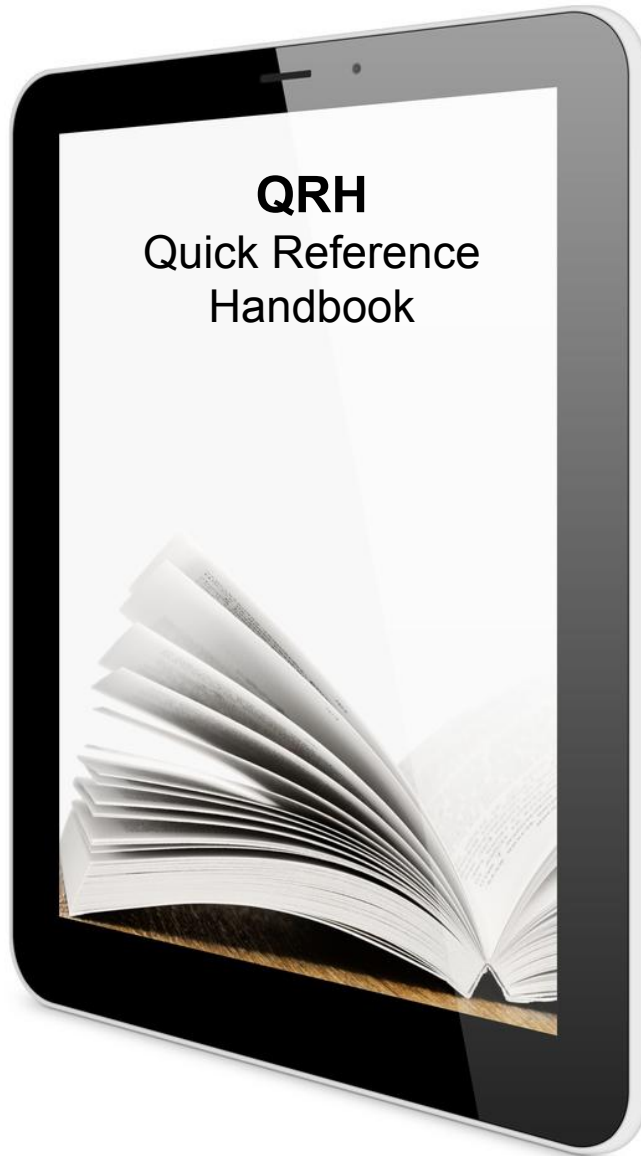
Not designed to teach piloting skills or basic techniques (no information considered as basic airmanship), designed for qualified and proficient pilots

Complements the AFM. If FCOM differs from AFM, AFM is the reference

Is studied thoroughly at initial training, transition to captain or another aircraft type, sometimes consulted in anticipation, and barely used in operations

The FCOM is the manual that helps the crew in flight, if time permits...

Operational documentation

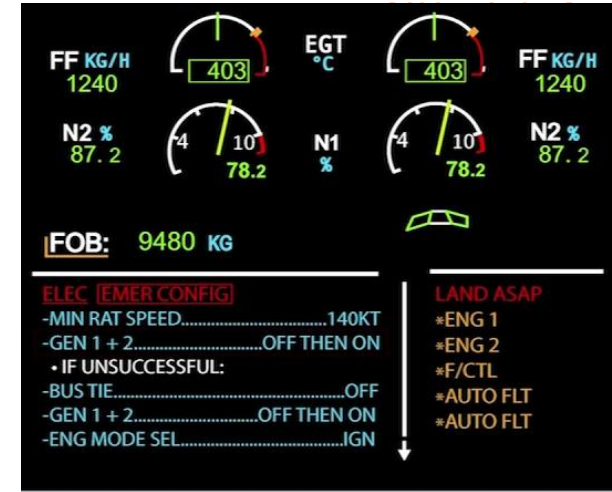


Contains some specific procedures which are not displayed on the ECAM

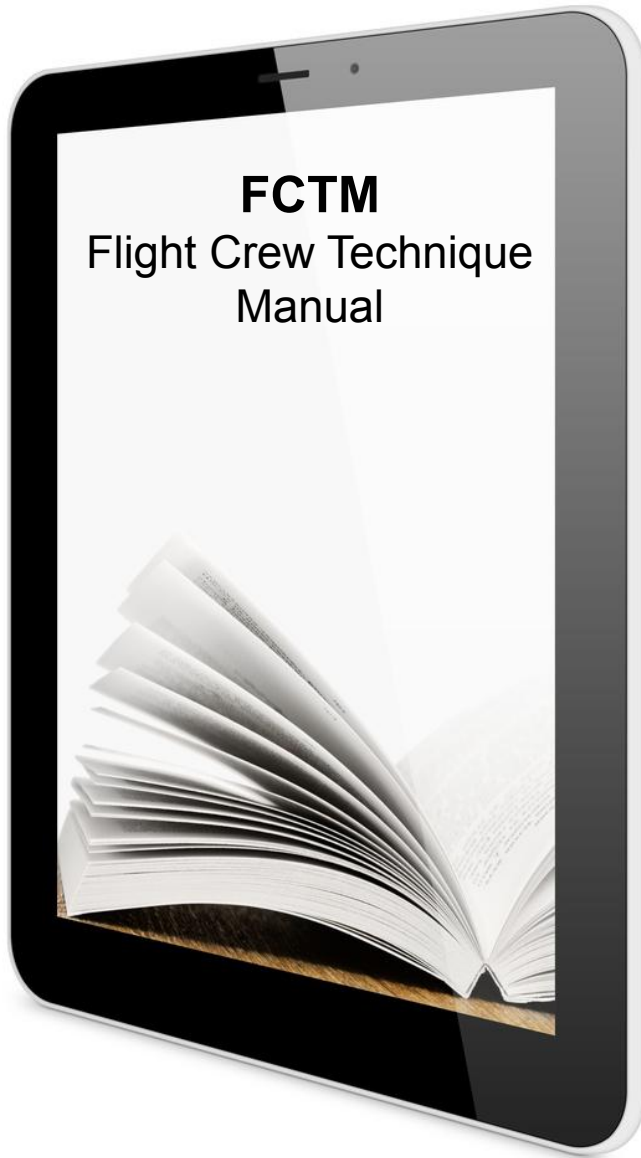
As a general rule, the procedures displayed on the ECAM are not provided in the QRH (but in FCOM PRO/ABN)

Used to be an extract of the FCOM, it currently contains:

- ABN/EMER non-ECAM procedures
- OEBs (Operational Engineering Bulletins)
- Checklists
- Tasksharing (on A320/330/340) *i.e. SOP presented by PF/PM roles*
- Additional information considered as "to be quickly available"



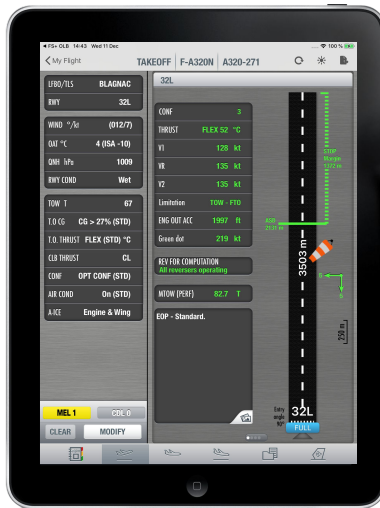
Operational documentation



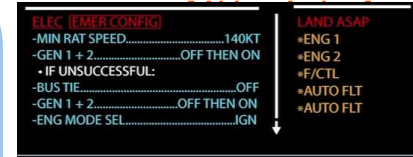
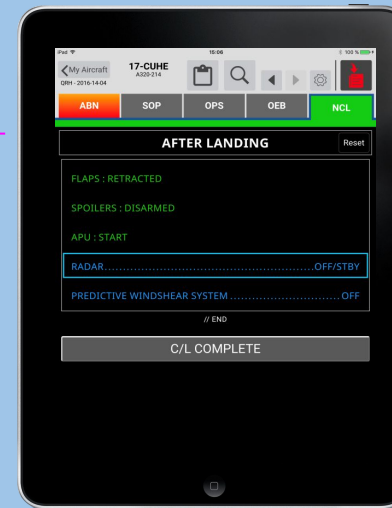
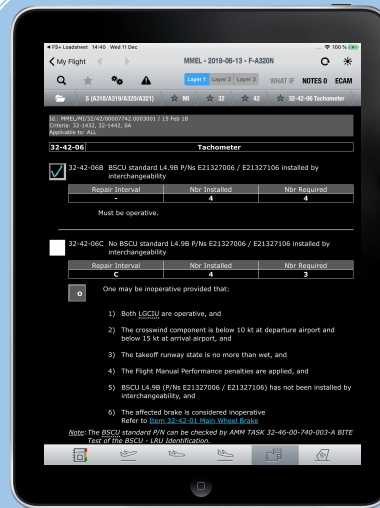
Provides complementary information to the FCOM:

- General Airbus operational philosophy (design and utilization principles, golden rules for pilots...)
- Additional information to the procedures (the "why" and "how" to do)
- Best practices, operating techniques on maneuvers or handling
- Information on situational awareness

Is not used for a flight completion, but is not considered as a Training manual, the flight crew could want to consult it in long cruise (e.g. weather radar use)

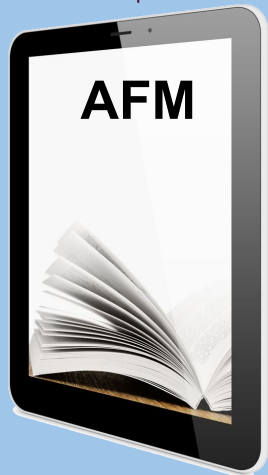


Perf impact
List of items



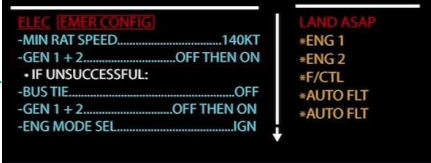
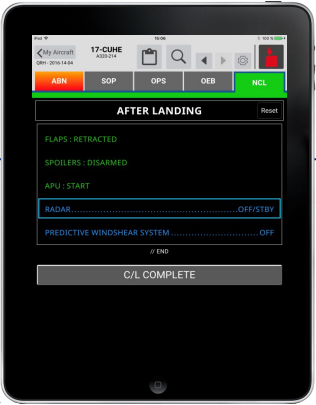
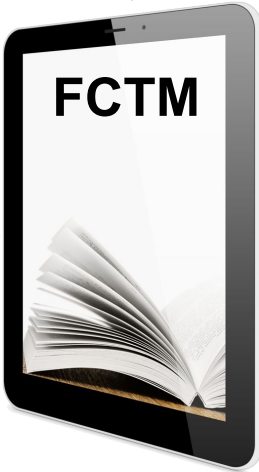
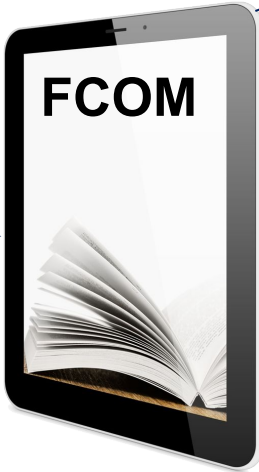
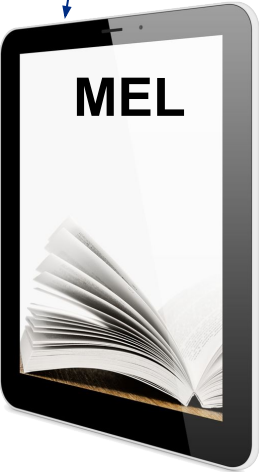
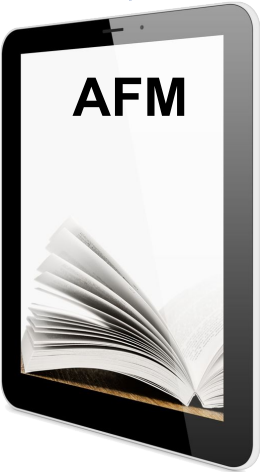
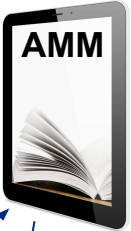
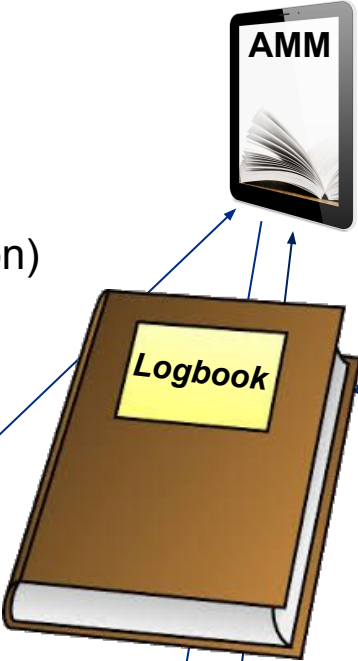
CDL
items

MEL
items



Airbus reference documents

Airbus ISI (In Service Information)

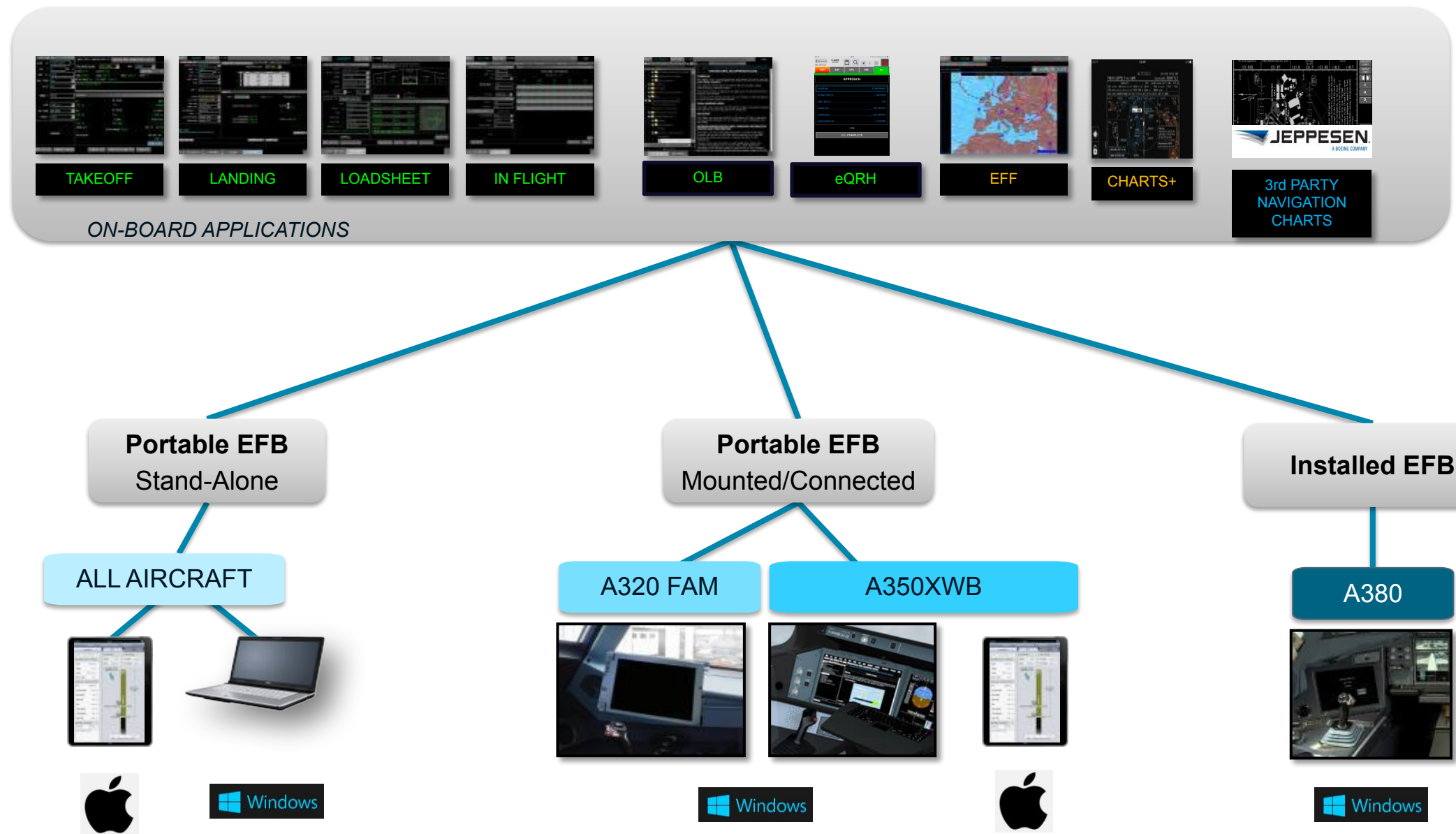


Agenda

- Introduction of EFB Hardware
- **Presentation of Flysmart+**
- Presentation of Mission+

Presentation of Flysmart+ applications

[Airbus Amber]





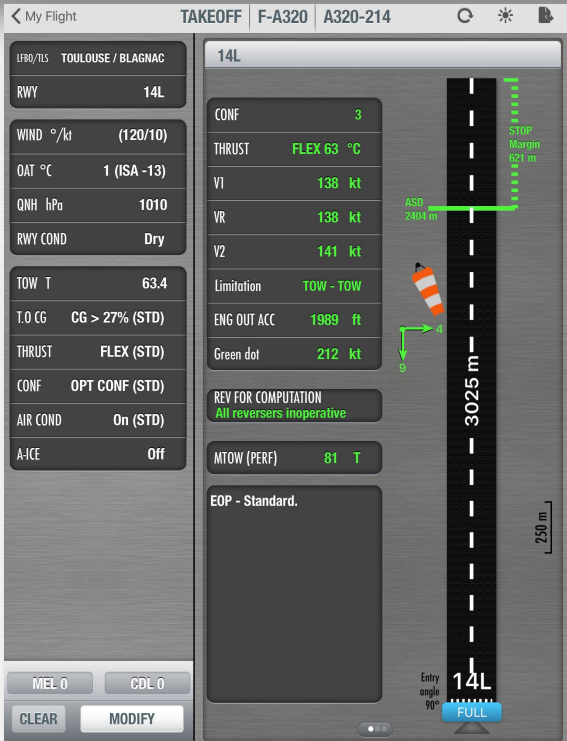
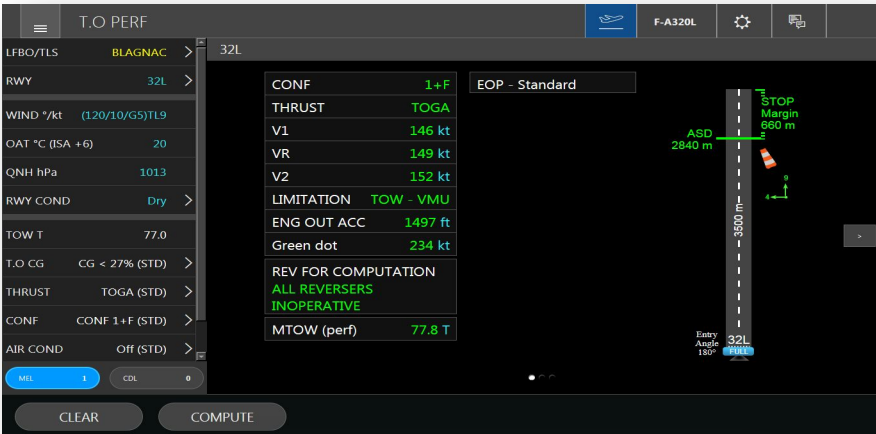
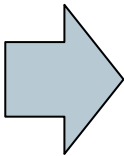
- *LMC: Last Minute Change

Flysmart – Takeoff Performance Application

[Airbus Amber]

Temp: 25° Wind: -3 kt

20214 - JAA		CFM56-5B4 engines		KZCHING KCH - WBGG		07	23.1.1 04-APR-06
QNH 1013.25 HPA		Elevation 89 FT TORA 2454 M		Isa temp 15 C TODA 2545 M		1 obstacle	AE214B02 *V20
Air cond. On		Dry check		No reversers on dry runway		DRY CONF 3	
Anti-icing Off		All reversers operating		Dry check			
QAT	TAILWIND	TAILWIND	WIND	HEADWIND	HEADWIND		
0	-10 KT	-5 KT	0 KT	10 KT	20 KT		
13	74.5 3/4 137/3742	76.0 3/4 142/3746	77.5 3/4 147/4750	78.4 3/4 150/5053	79.3 3/4 153/5356		
28	73.5 3/4 135/3559	75.0 3/4 139/3943	76.5 3/4 143/4347	77.5 3/4 147/4750	78.4 3/4 150/5053		
43	72.6 3/4 132/3257	74.1 3/4 136/3641	75.6 3/4 141/4145	76.6 3/4 144/4447	77.5 3/4 147/4750		
45	71.8 3/4 132/3257	73.3 3/4 136/3641	74.7 3/4 140/4044	75.7 3/4 143/4347	76.6 3/4 146/4650		



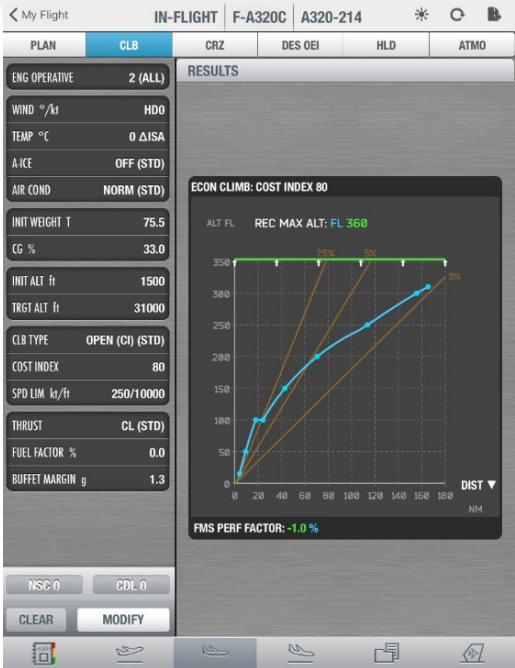
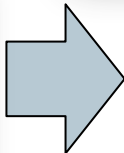
- Optimized TakeOff parameters computation
- Multi-runways scenarios
- Data exchanged with other applications (OLB, Loadsheet, etc)
- FMS crosscheck: automatic control of FMS parameters



Flysmart – In-Flight Performance Application

[Airbus Amber]

GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED									
ONE ENGINE OUT									
GROSS FLIGHT PATH DESCENT AT GREEN DOT SPEED - 1 ENGINE OUT									
MAX. CONTINUOUS THRUST PACK FLOW HI ANTH-CING OFF		ISA CG=33.0%		DISTANCE (NM) INITIAL SPEED (KT)		TIME (MIN) FUEL (1000KG) LEVEL OFF (FT)			
INIT.GW (1000KG)	INITIAL FLIGHT LEVEL	250	290	310	330	350	370	390	
50		83 16 196 .4 30700	205 38 196 1.0 31000	253 47 200 1.2 31200	284 52 202 1.3 31200	308 56 204 1.4 31300			
52		170 32 200 .9 29900	237 44 202 1.2 30000	273 51 204 1.3 30100	301 55 206 1.5 30200	322 58 208 1.5 30200			
54		102 20 202 .6 28700	207 39 204 1.1 29000	255 48 206 1.3 29100	287 53 208 1.5 29200	311 57 210 1.5 29200	331 60 212 1.6 29200		
56		174 33 206 1.0 27800	238 45 208 1.3 28000	276 51 210 1.5 28100	304 56 212 1.6 28200	324 59 214 1.6 28200	345 62 216 1.7 28200		



- Performance parameters at different phases of flight (climb, cruise, descent, etc)
- Computation of fuel burn and flight time for the whole flight or a part of the flight
- Aircraft configuration considerations



AIRBUS

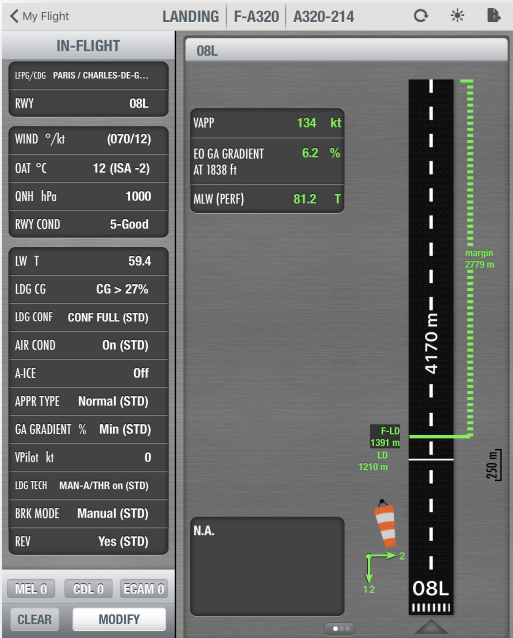
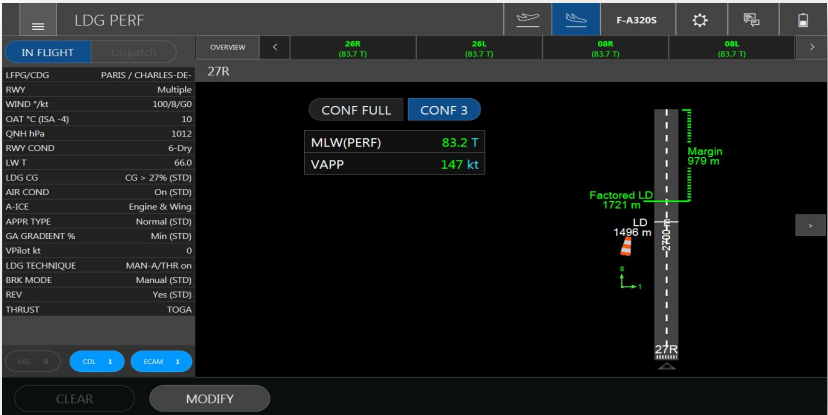
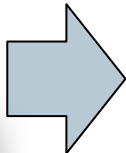
Flysmart – Landing Performance Application

[Airbus Amber]



LANDING DISTANCE WITHOUT FAILURE										
The Reference Distance (REF DIST) considers : Sea Level (SL), ISA, no wind, no slope, no engine reverse thrust, manual landing ⁽¹⁾ , VAPP=VLS without APPR COR.										
6 - DRY										
Corrections on Landing Distance (m)	LDG CONF	REF DIST (m) for 66T	WGT ⁽²⁾ Per 1T above 66T	SPD Per 5kt	ALT Per 1000ft above SL	WIND Per 5kt TW	TEMP Per 10°C above ISA	SLOPE Per 1% Down Slope	REV Per Thrust Reverser Operative	OVW If OVW PROC applied
Maximum MANUAL	FULL	1 090	+ 50	+ 70	+ 40	+ 120	+ 30	+ 20	- 10	+ 780
	3	1 170	+ 50	+ 80	+ 40	+ 130	+ 40	+ 20	- 10	+ 940
AUTOBRAKE MED	FULL	1 370	+ 30	+ 90	+ 50	+ 130	+ 50	+ 10	0	+ 230
	3	1 450	+ 40	+ 100	+ 50	+ 140	+ 50	+ 10	0	+ 250
AUTOBRAKE LOW	FULL	1 950	+ 40	+ 140	+ 70	+ 200	+ 70	+ 30	- 10	+ 260
	3	2 090	+ 50	+ 140	+ 80	+ 210	+ 70	+ 20	- 10	+ 290

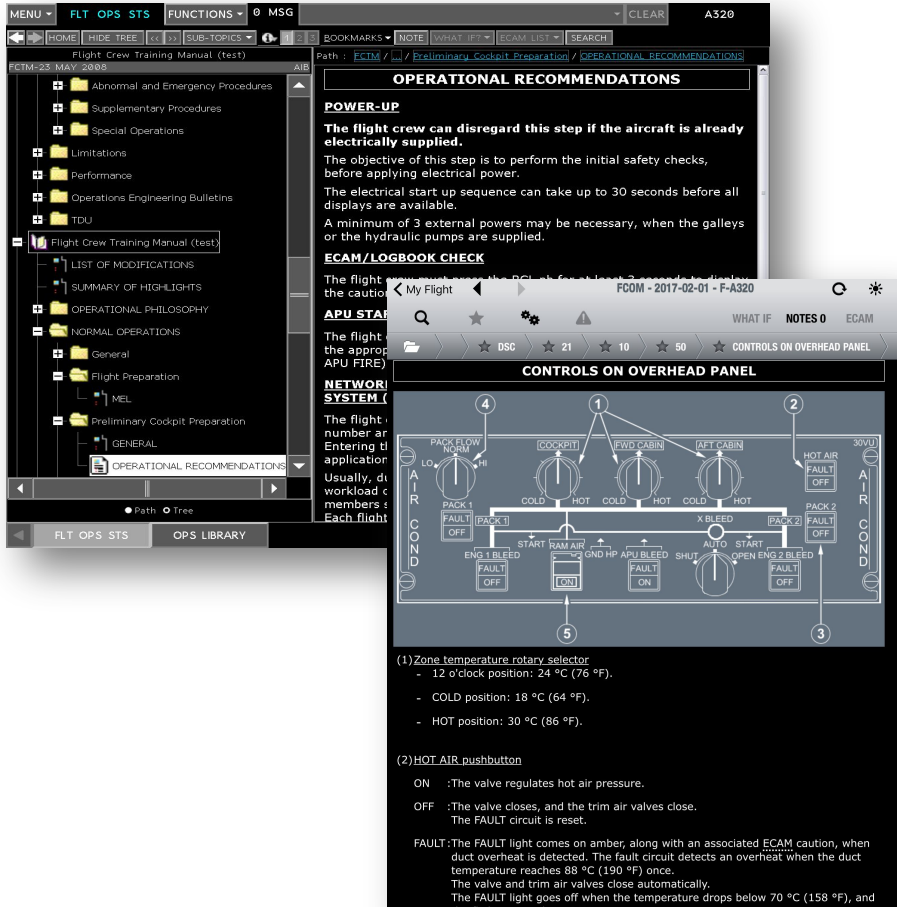
(1) Automatic Landing correction: If CONF FULL, add 280m. If CONF 3, add 300m.
(2) Weight correction: subtract 10m per 1T below 66T.



- Optimized Landing parameters computation
- Required and InFlight landing distance
- Engine Out Go around gradient
- Data exchanged with other applications (OLB, Loadsheets, etc)



Flysmart – Operational Library Browser (OLB)



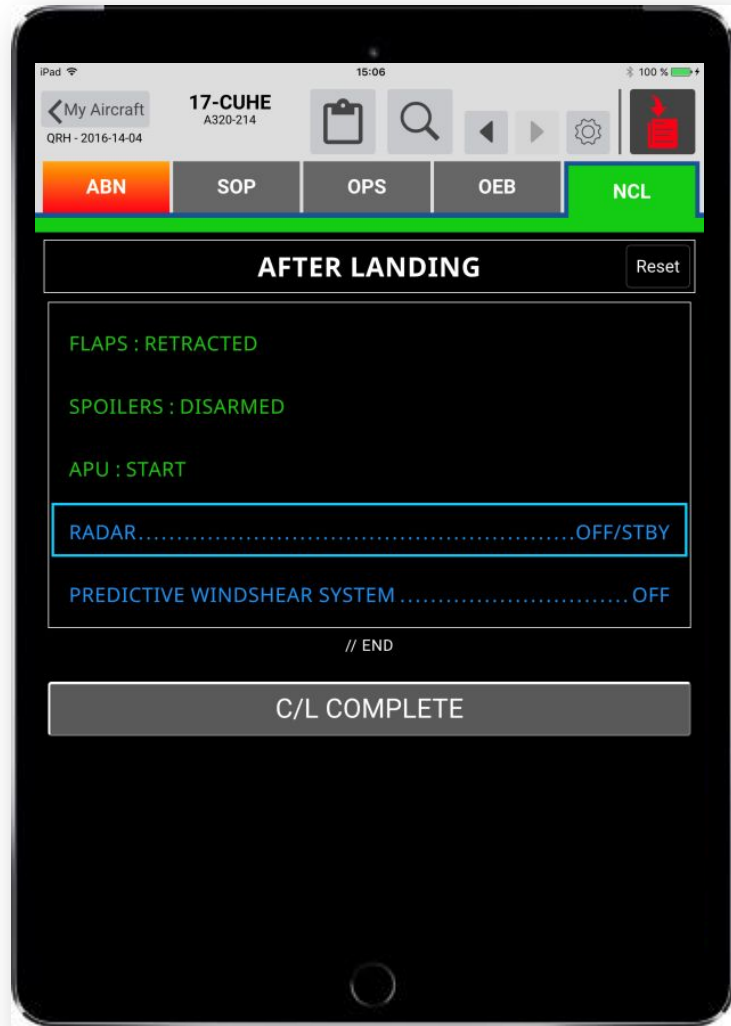
Enhanced consultation of the operational manuals:

- Contextualisation according to the aircraft selected
- Web-like consultation
- 3 information layers
- ECAM and word search

Links between the OLB and Performance applications

Flysmart – Electronic QRH (eQRH)

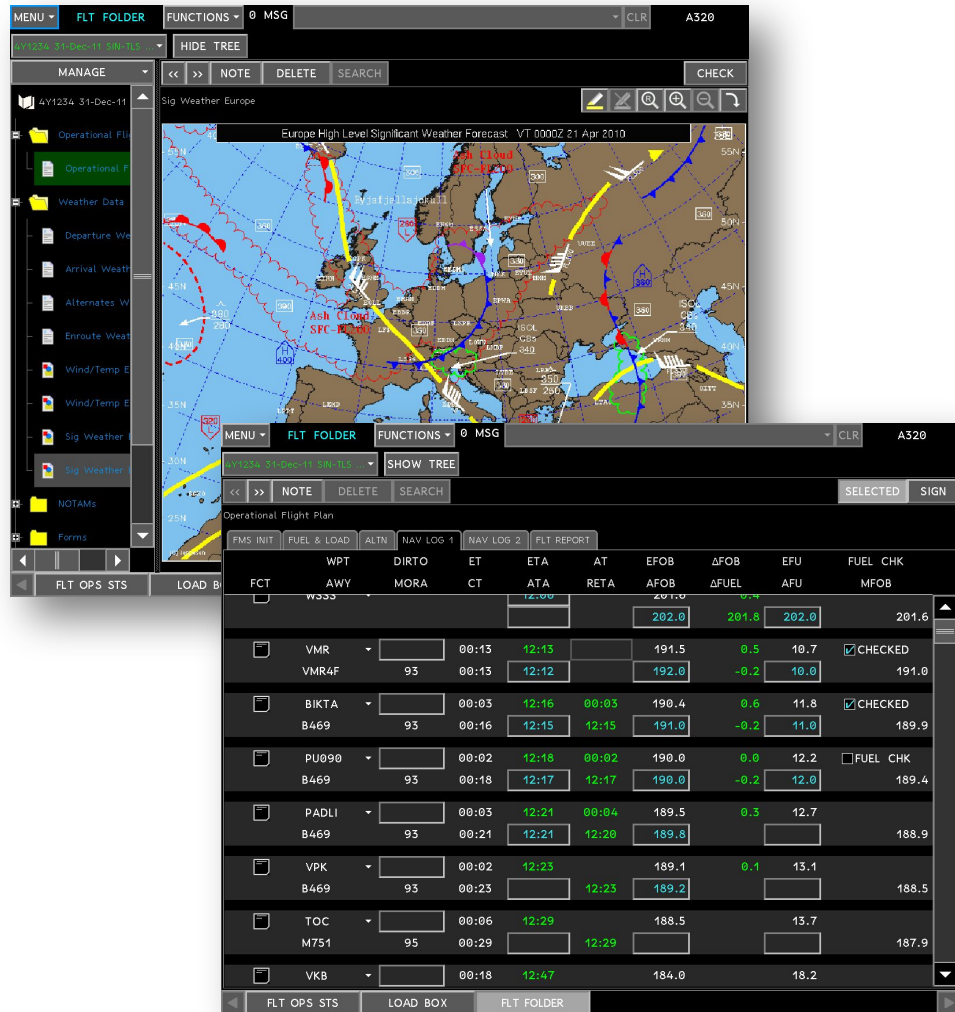
[Airbus Amber]



- ❑ Enhanced display of the checklists and abnormal procedures:
 - ❑ Interactivity
 - ❑ Color Coding
 - ❑ Autoscroll
 - ❑ Exclusive conditions
- ❑ Direct access to the Emergency procedures
- ❑ Reliability of the information displayed

Flysmart – Electronic Flight Folder (EFF)

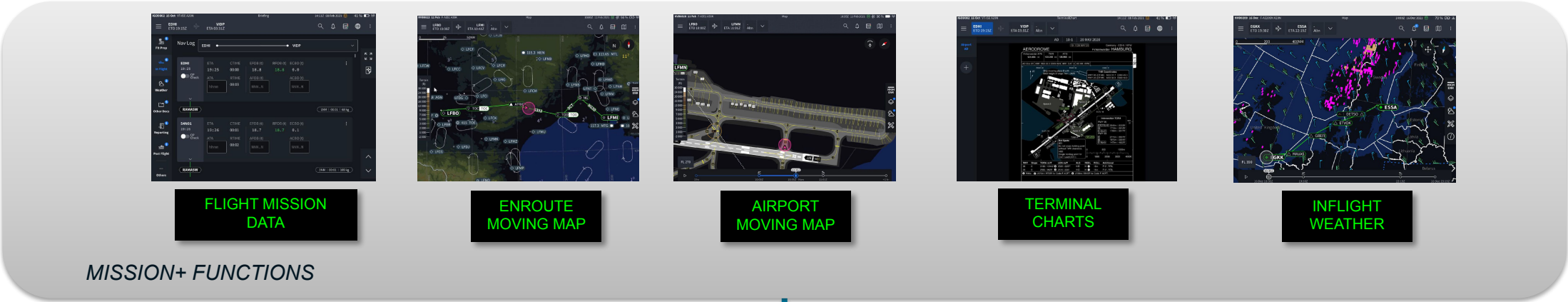
[Airbus Amber]



- Enhanced consultation of the Flight Folder
 - Flight data (FROM/TO, route, ATC Flight Plan)
 - NavLog
 - NOTAMS, NOTOC
 - Weather (TAF, METAR, SIGMET)
 - Flight reports (Performance computations, Fuel/Time, etc)
- Easy Flight Follow up

Agenda

- Introduction of EFB Hardware
- Presentation of Flysmart+
- **Presentation of Mission+**



Portable EFB
Stand-Alone

ALL AIRCRAFT



Mission+ Flight Mission Data

[Airbus Amber]

The screenshot displays the Mission+ Flight Mission Data interface for flight NVB0209 on 03 Aug. The top bar shows the flight number, aircraft type (F-A320SN A20N), and status (Briefing). The main menu includes Dashboard, Flt Prep, In Flight, Weather, Other Docs, Reporting, Post Flight, and Others. The Weather section is active, showing Departure METAR & TAF for EGKK/LGW. The METAR data includes Wind (140° / 06kt), Visibility (More Than 10km), Cloud (Few At 032, Scattered At 049), Temperature (19°C DEW PT 11°C), and QNH (1012hPa). The TAF forecast shows conditions from 03 Aug 12:00 to 04 Aug 18:00, including Wind (Calm), Visibility (3000m), Cloud (Scattered At 030, Broken At 300ft), and Weather (Mist (moderate)). The interface also displays a list of flight reports, including a report from 03:00 on 19 Days and a report from 23:59 on 26 Days. The bottom bar shows the Reporting and Post Flight sections.

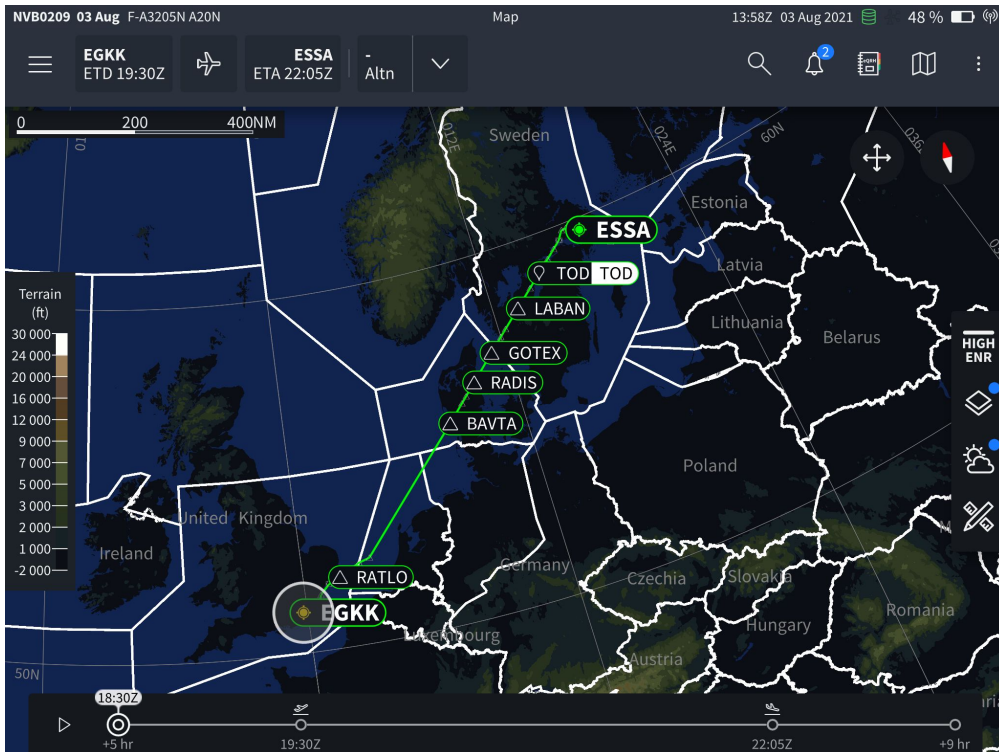
Enhanced consultation of the Flight mission data

- Flight data (FROM/TO, route, ATC Flight Plan)
- NavLog
- NOTAMS
- Weather (TAF, METAR, SIGMET)
- Flight reports (Performance computations, Fuel/Time, etc)

Data exchanged between Flight Mission data and Flysmart+ applications

Easy Flight Follow up

Mission+ Enroute Moving Map



- ❑ Display the Enroute map with the flight plan route
- ❑ Display the Enroute layers (Airport, Navaid, Waypoint, Airway, Airspace, Com Area, Holding, Terrain)
- ❑ Display the Own-ship position and track retrieved from the Mission+ device or from external GPS (avionics system or other)
- ❑ Increase the situational awareness but not used as a primary means for Navigation

[Airbus Amber]



- ## Manage Clips of charts

- Integrated tools (drawing, rotation, day/night mode)

Mission+ Airport Moving Map (AMM)



- Display the Airport map (Hotspots, etc)
- Display the Own-ship position and track on the map retrieved from the Mission+ device or from external GPS (avionics system or other)
- Increase the situational awareness but not used as a primary means during taxi phase

Mission+ Weather

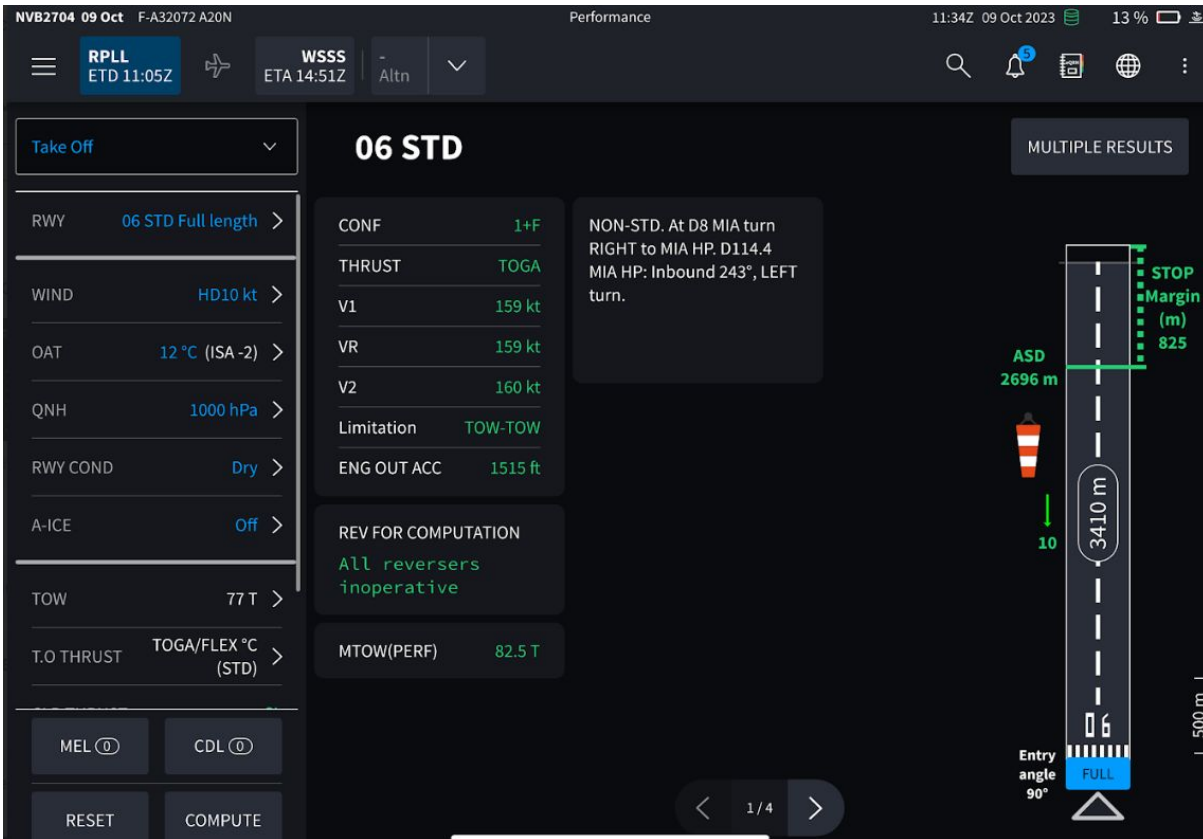
[Airbus Amber]



- ❑ Display weather data (METAR/TAF, wind, SIGMET, turbulence, icing, convection, convection top) according to a given time and a FL (when applicable)
- ❑ Update weather data in a defined area:
 - ❑ Custom (area manually defined by the user)
 - ❑ Around the flight plan route
 - ❑ Globe (worldwide area)
- ❑ Increase the situational awareness but not used for tactical decisions (Weather Radar is the primary means)

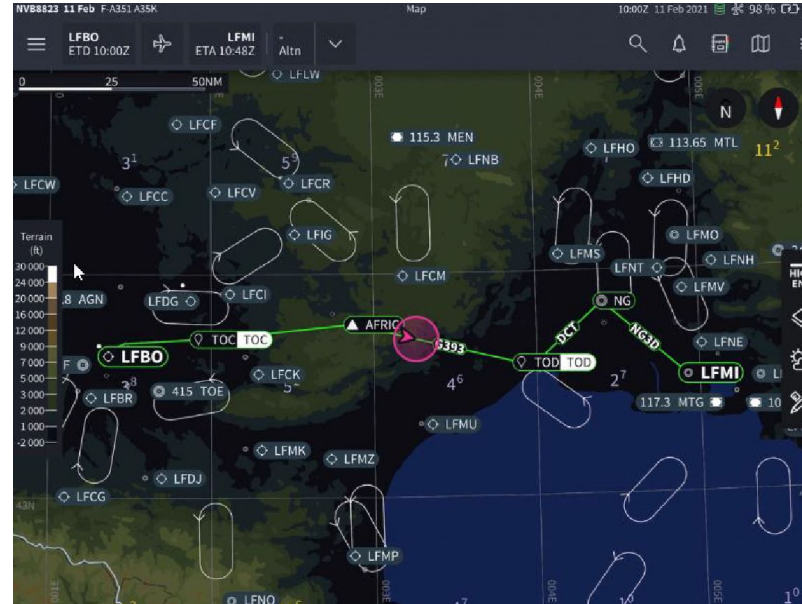
Mission+ Performance (TakeOff and Landing)

[Airbus Amber]



- Almost same functional scope than Flysmart+ TakeOff and Landing apps
- New functions compared to Flysmart+
 - Access to several computations en parallel
 - Generic landing computation (Inflight and Go-around computed on a fictional runway)

[Airbus Amber]



Thank you

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