WORLDWIDE FLIGHT SAFETY CONFERENCE

BANGKOK 2018

27TH – 28TH JUNE

ATR

PROPELLING THE NEXT CONNECTION

WORLDWIDE FLIGHT SAFETY CONFERENCE
BANGKOK 2018
27TH – 28TH JUNE

Prevent
Loss Of Control In Flight

Paul JOUAS
Flight Safety Director,
Accident Investigator

Cyril CIZABUIROZ
Experimental Flight
Test Pilot

Stéphane VIALA
Chief Engineer

ATR
PROPELLING THE NEXT CONNECTION

WORLDWIDE FLIGHT SAFETY CONFERENCE BANGKOK 2018 27TH – 28TH JUNE

AGENDA

- Why are we here?
- How to prevent LOC-I?
- Safety enhancements

ATR PROPELLING THE NEXT CONNECTION

WORLDWIDE FLIGHT SAFETY CONFERENCE BANGKOK 2018 27TH – 28TH JUNE

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- Why are we here?
- How to prevent LOC-I?
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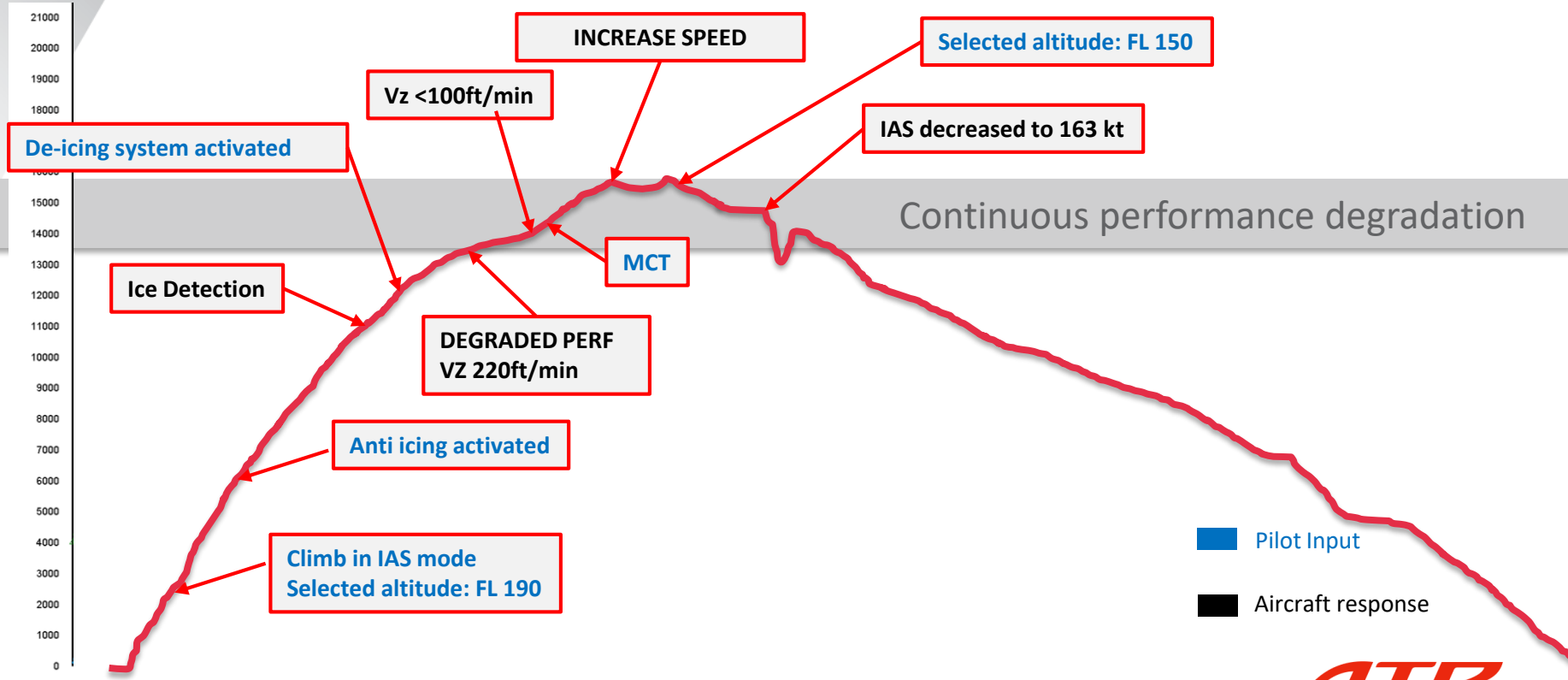
ATR PROPELLING THE NEXT CONNECTION

Why are we here?

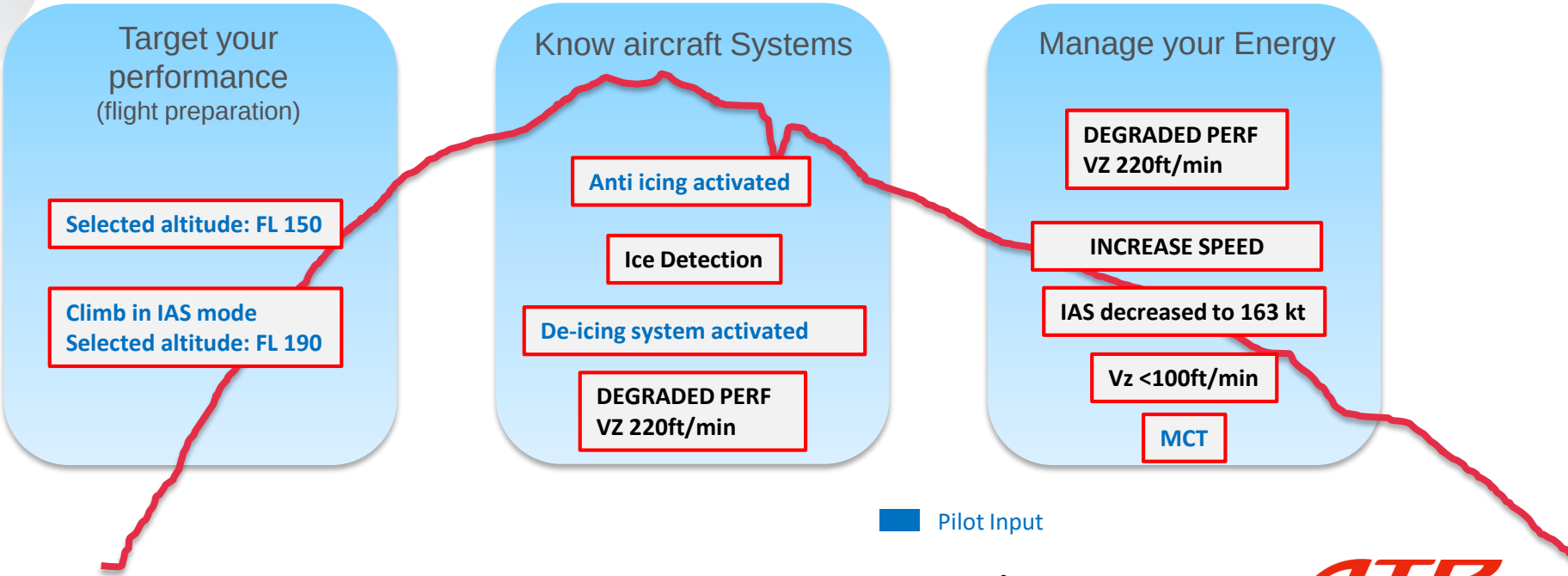
Loss of performance

2 accidents

In-service event



How to prevent loss of control in flight?



WORLDWIDE FLIGHT SAFETY CONFERENCE BANGKOK 2018 27TH – 28TH JUNE

AGENDA

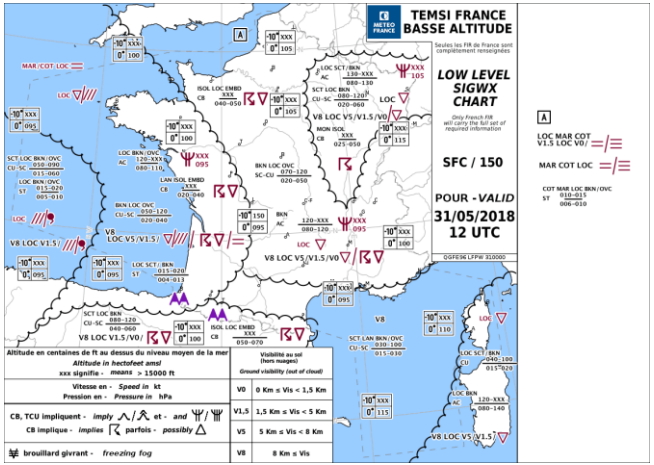
- Why are we here?
- How to prevent LOC-I?
- Safety enhancements

ATR PROPELLING THE NEXT CONNECTION

Flight preparation

1. Analyze your weather conditions
2. Know your aircraft systems
3. Target your aircraft performance

Flight preparation
1. Analyze your weather conditions



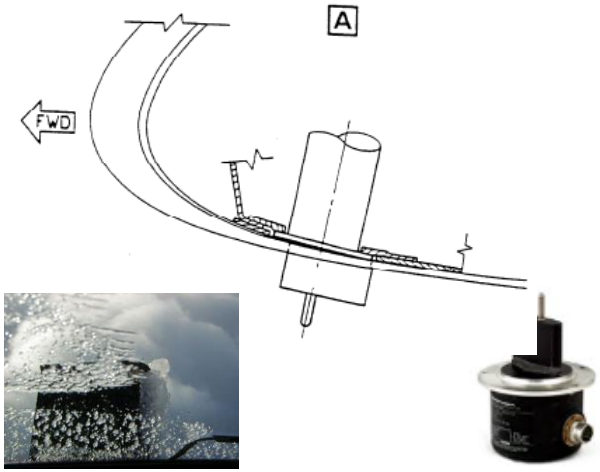
Significant weather	Anticipated FL	Actual FL
5°c		
0°c		
Icing conditions		
Ice accretion		

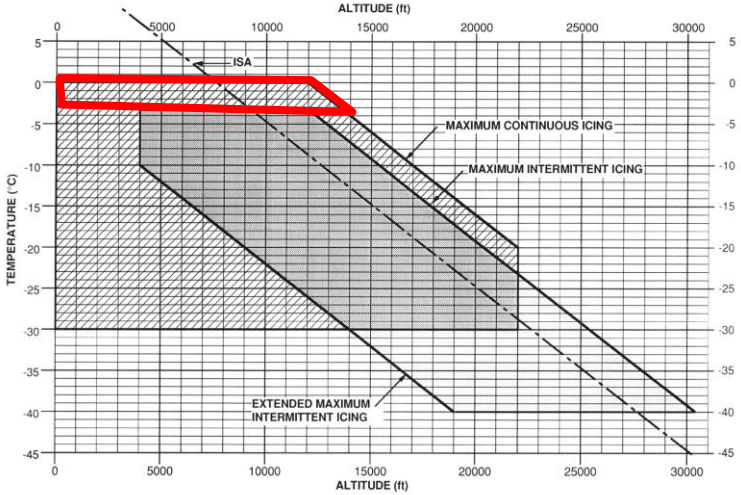
Anticipate weather

Flight preparation
2. Know your aircraft systems

Ice detector

ICING
ICING AOA



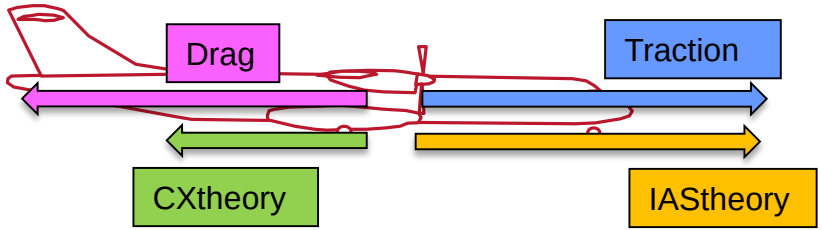


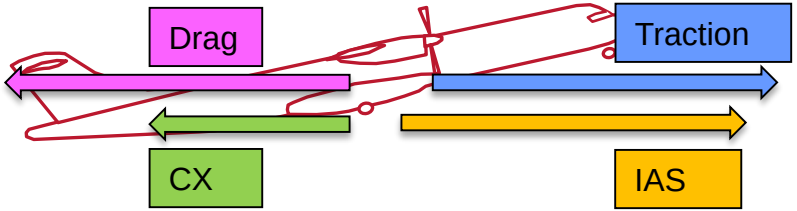
Use airframe de-icing at the first cue

Flight preparation
2. Know your aircraft systems

APM

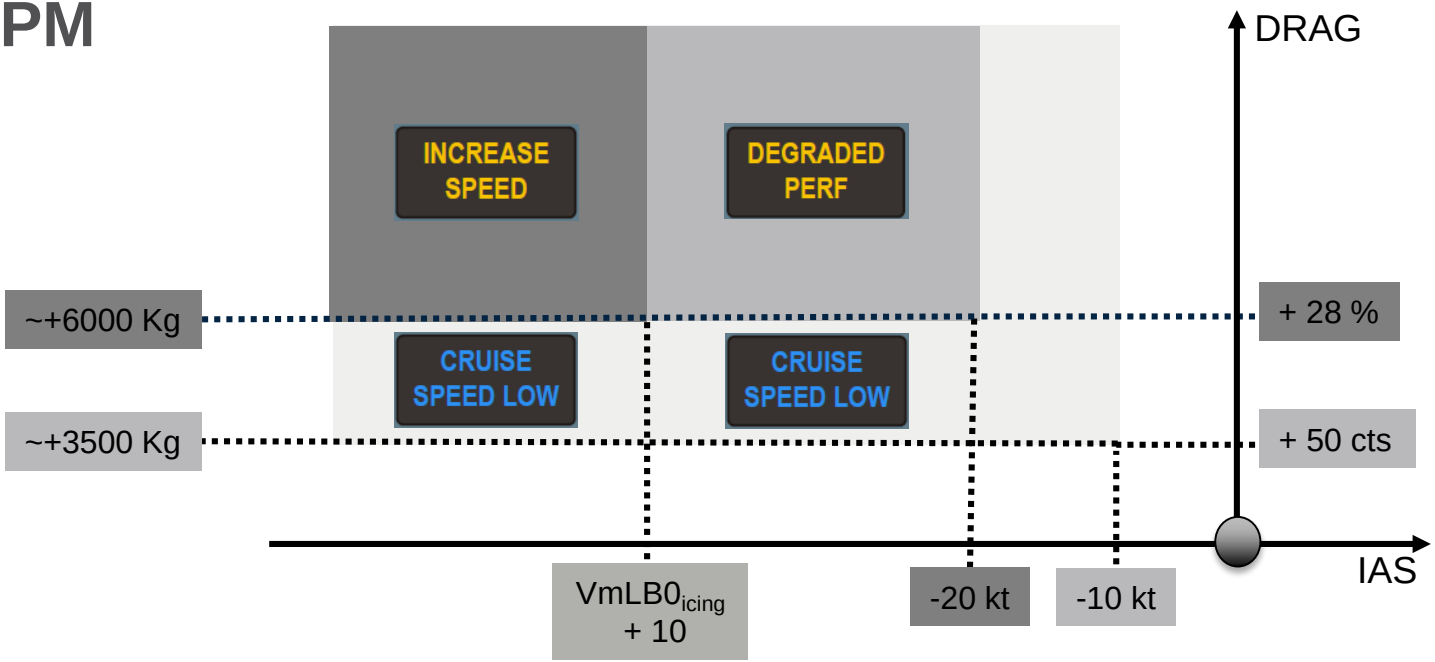
Aircraft Performance Monitoring





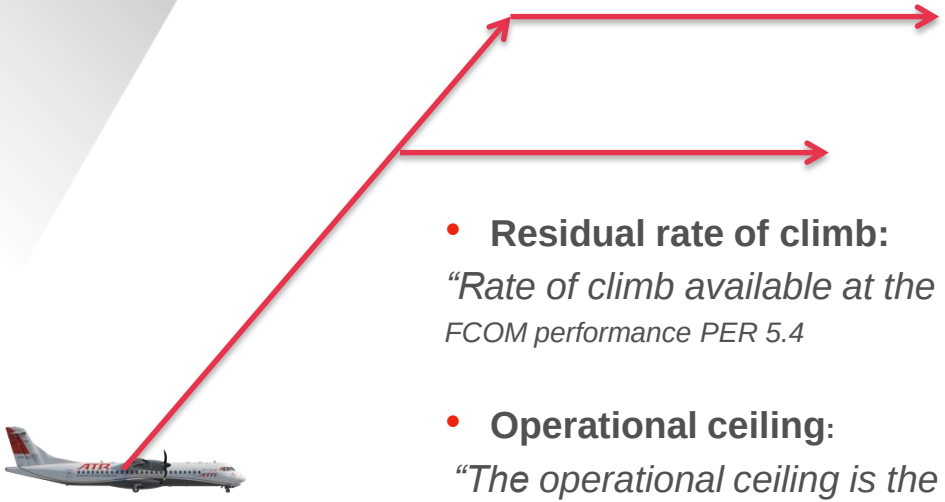
Flight preparation
2. Know your aircraft systems

APM



Trust DEGRADED PERF

Flight preparation
3. Target your aircraft performance



- **Residual rate of climb:**

“Rate of climb available at the Top Of Climb ”

FCOM performance PER 5.4

- **Operational ceiling:**

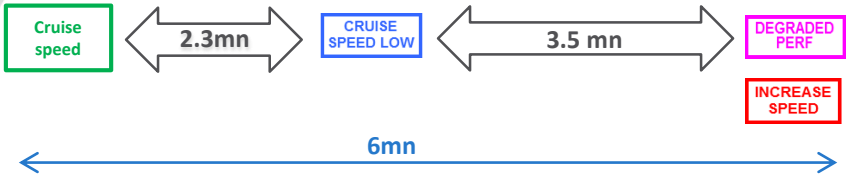
*“The operational ceiling is the maximum altitude which can be reached with a minimum rate of climb of **300 ft/min**.”*

FCOM performance PER 5.4

Residual rate of climb
(cruise speed – climb speed) X 10

Flight preparation
3. Target your aircraft performance

ATR 72-212A,21T ISA+5



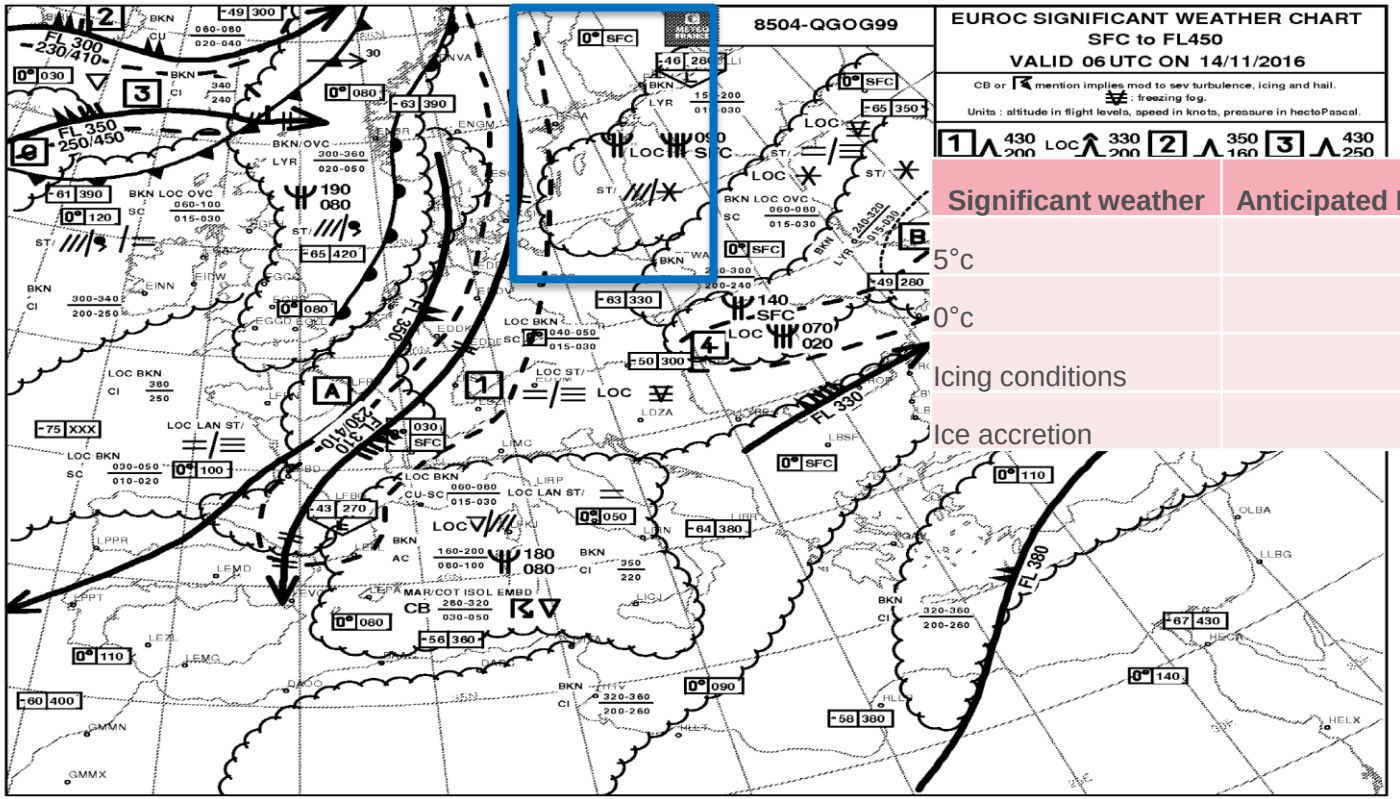
FL220

Timely alerts

FL180

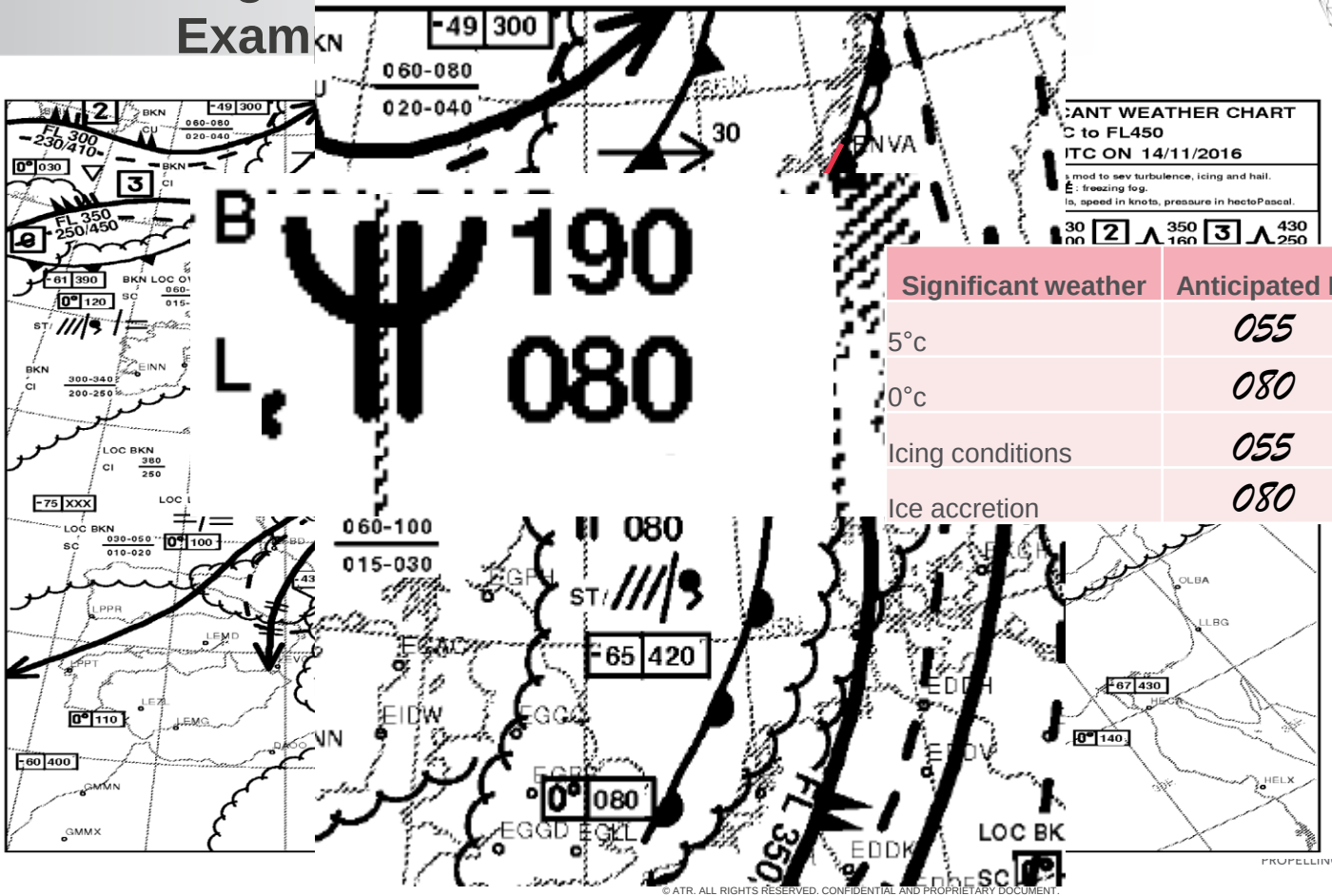
Maintain 40kt margin to Icing bug
Adapt your FL

Flight preparation
Example



Significant weather	Anticipated FL	Actual FL
5°c		
0°c		
Icing conditions		
Ice accretion		

Flight preparation
Exam



Significant weather	Anticipated FL	Actual FL
5°c	055	
0°c	080	
Icing conditions	055	
Ice accretion	080	

Flight p
Ex

21T, ISA+5

Recommended cruise speed: 162+40=202kt

Recommended FL: FL180

MAX CRUISE 2 ENGINES

FL	Δ ISA													
	–10		–5		0		+5		+10		+15		+20	
80	94.5	249	94.5	248	94.5	247	89.4	241	84.4	234	79.8	228	75.3	222
	459	272	461	273	464	275	446	270	429	265	412	260	396	255
100	94.5	247	94.5	246	90.3	240	85.7	234	80.9	228	76.4	221	72.2	215
	453	277	456	279	440	275	425	271	408	266	392	261	377	256
120	93.7	243	90.1	239	86.2	233	82.3	228	78.1	222	73.8	215	69.8	209
	446	282	433	279	418	276	405	271	390	267	376	262	361	257
140	89.5	237	86.2	232	82.9	227	79.2	222	75.5	216	71.6	210	67.6	204
	428	282	413	280	401	277	387	272	374	268	361	263	347	258
160	84.8	229	82.2	225	79.1	220	76	215	72.5	210	69.2	204	65.4	198
	407	282	395	279	381	276	370	273	357	269	345	264	332	258
180	79.6	220	76.9	216	74.4	212	71.5	207	68.5	202	65.3	196	62.1	190
	382	279	371	277	360	274	348	271	337	267	325	262	314	256
200	73.8	210	71.5	206	69.1	202	66.8	197	64.1	192	61.4	186	58.4	180
	356	276	346	273	336	270	325	267	315	263	305	257	294	251
220	68.1	200	66.1	196	64	191	61.8	187	59.6	181	57.2	175	54.6	167
	330	271	320	268	312	265	302	261	293	256	284	250	275	242
240	62.6	189	60.7	184	58.8	179	56.8	173	54.8	167	52.6	159	50.1	148
	304	265	296	261	288	257	279	251	270	245	263	236	254	222
250	60	182	58	177	56.1	172	54.2	165	52.1	157	49.8	145		
	292	260	283	256	275	250	267	244	258	234	251	219		
	TQ % NP = 82 % KG/H/ENG			IAS TAS						NOT THERMO LIMITED				

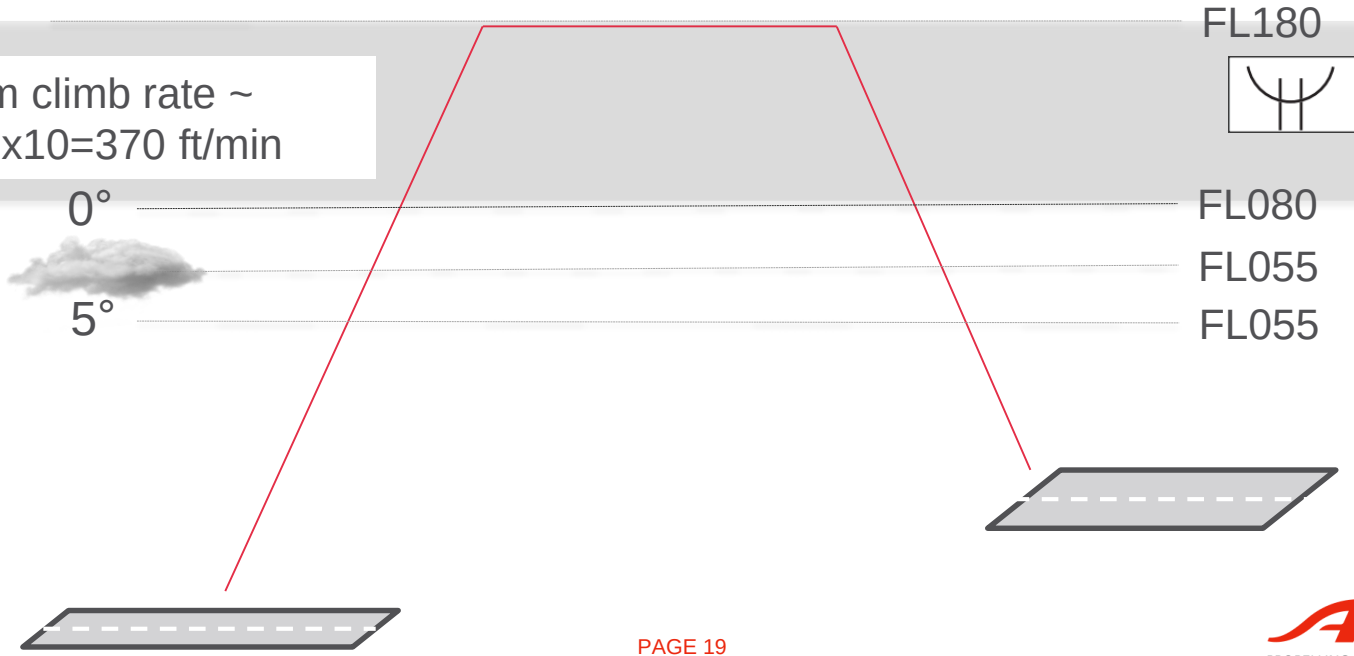
TQ % NP = 82 % KG/H/ENG IAS TAS NOT THERMO LIMITED

Flight preparation
Example

Flight today: 21T, ISA+5

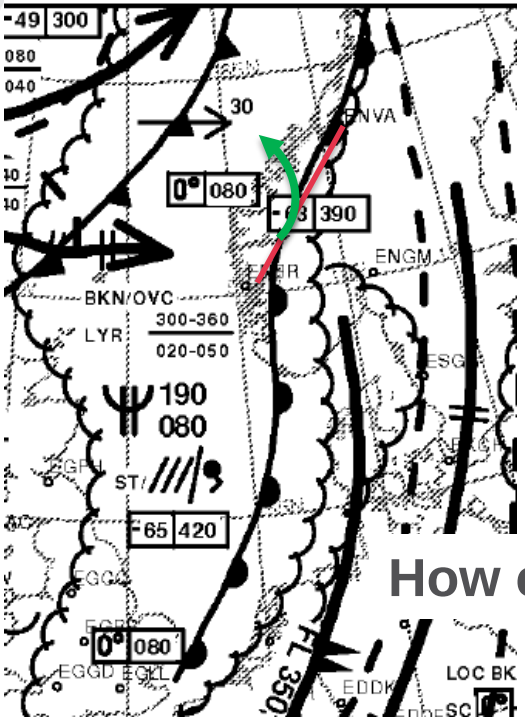
Cruise speed: 207kt

Minimum climb rate ~
(207-170)x10=370 ft/min



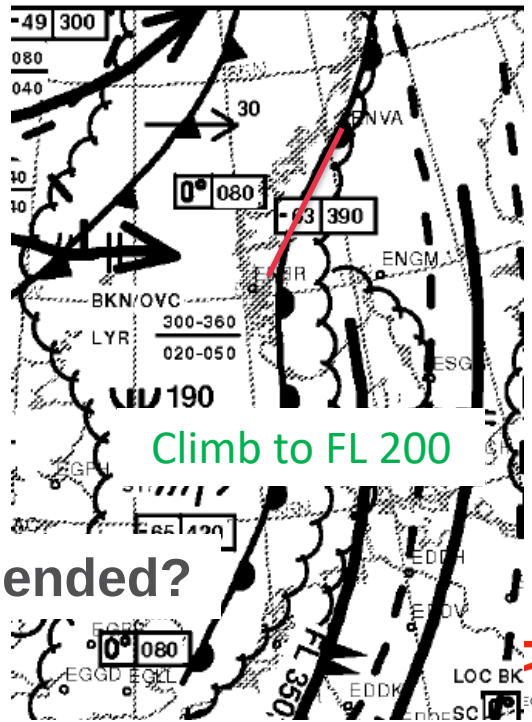
Quiz

A



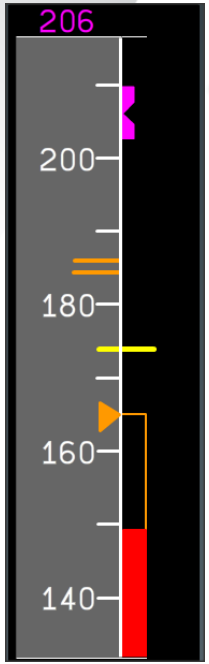
B

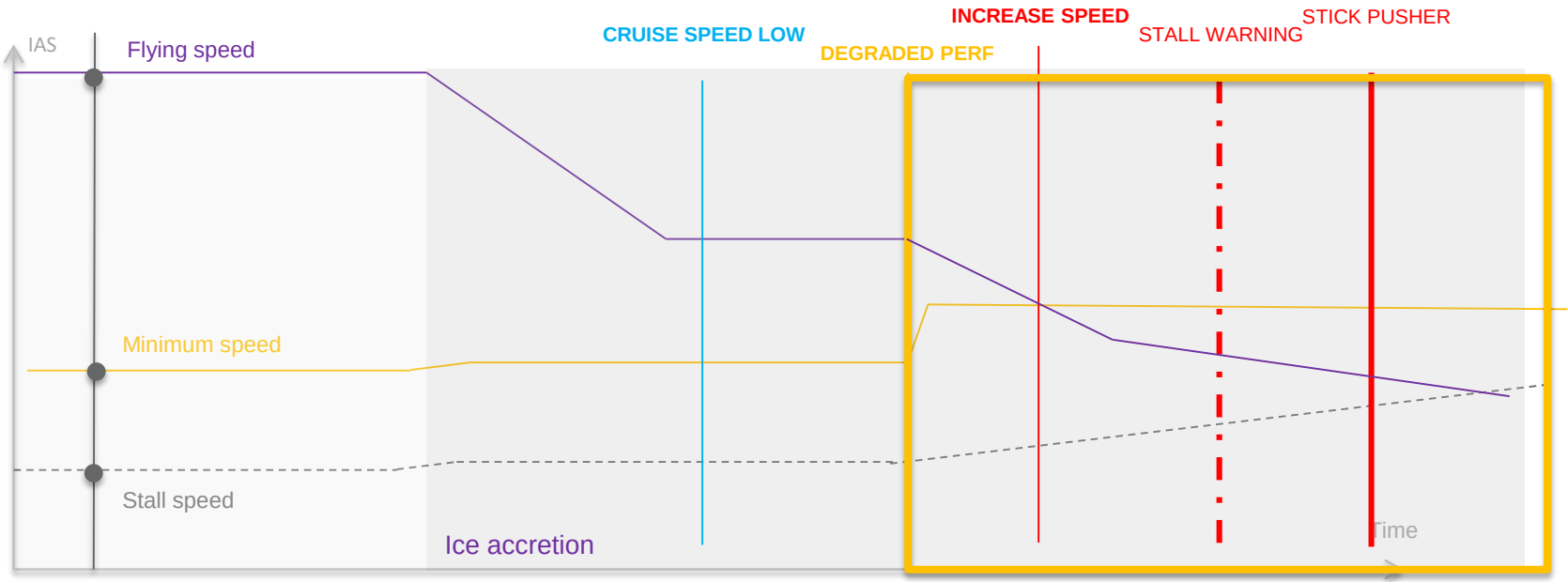
C



How can the flight path be amended?

Flight management





Severe icing: *The rate of accumulation is such that ice protection systems fail to remove the accumulation of ice"*

FCOM PRO.NOP 8.1.2

Flight management: Climb phase

Vertical speed decay:
Vs 300ft/min
LEVEL OFF or DESCEND!

Vertical speed decay:
Vs<Residual rate of climb
Performance check
Amend routing

Vertical speed decay:
Vs 100 ft/min
MAYDAY DESCEND!

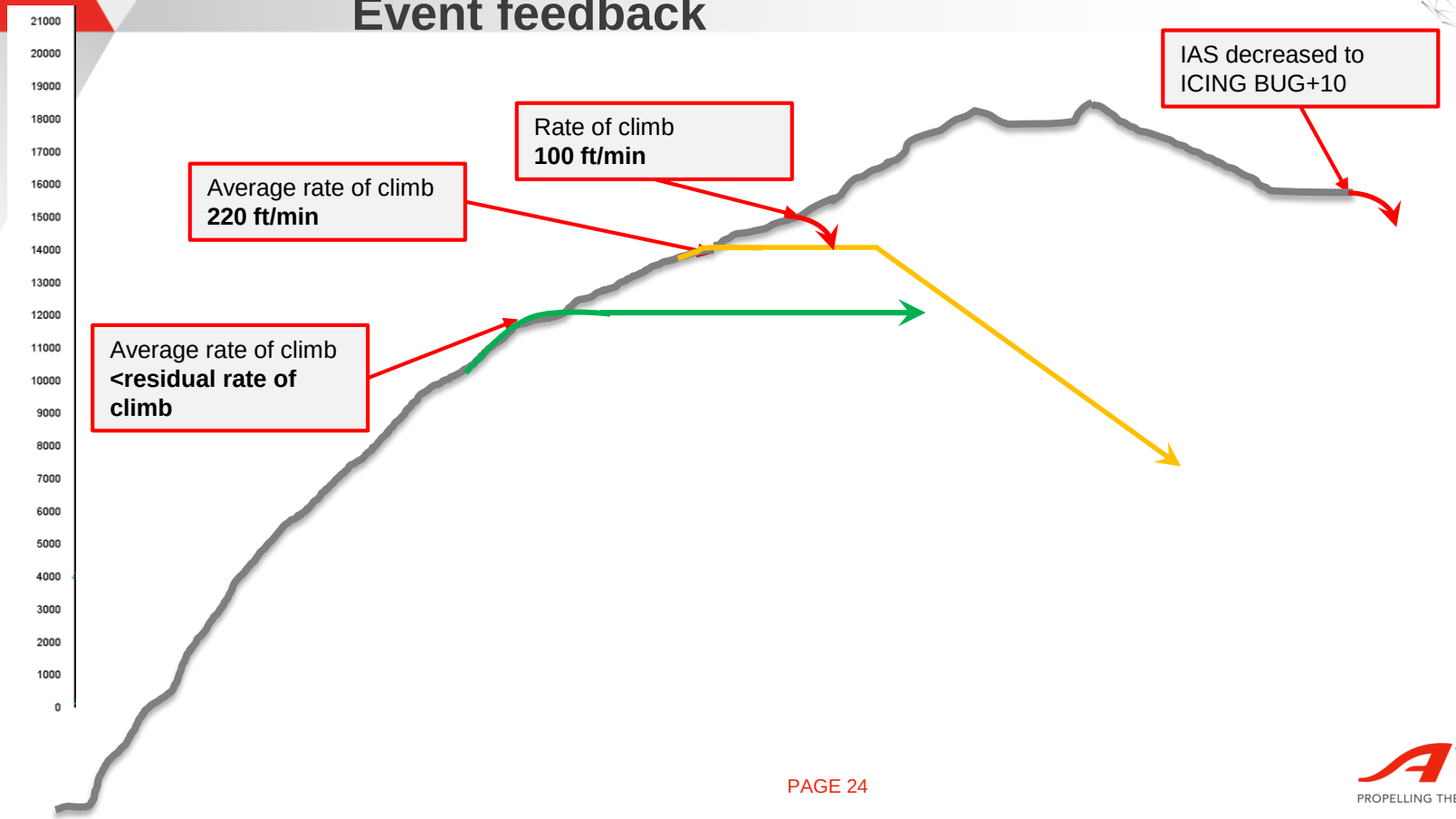
Flight management: Cruise phase

IAS decay:
IAS Cruise speed-10 kt
Amend routing

IAS decay:
IAS Cruise speed-20 kt
DESCEND

IAS decay:
IAS ICING BUG+10
MAYDAY DESCEND

Event feedback



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- Why are we here?
- How to prevent LOC-I?
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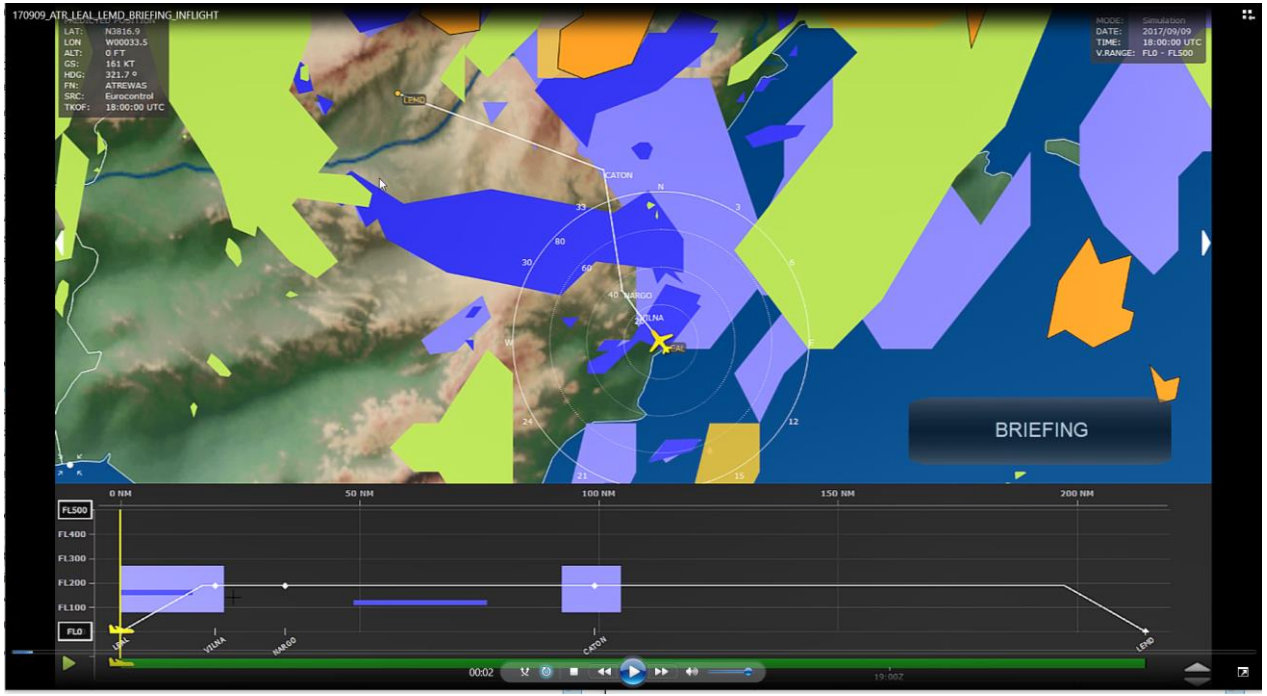
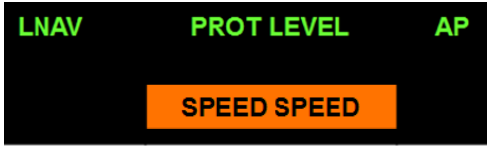
ATR PROPELLING THE NEXT CONNECTION

Flight preparation

Developing technology to enhance flight preparation



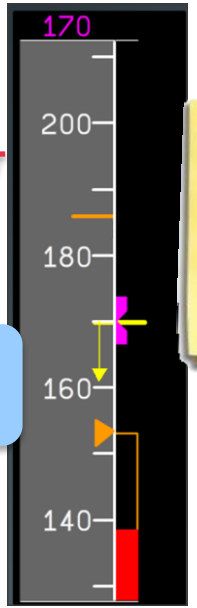
Safety enhancements
Low Speed Protection



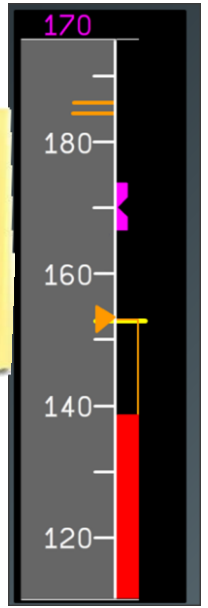
AP ON
IAS decay:
IAS Vminops

AP ON
IAS decay:
IAS<Vminops+10

AP ON
VS → 0 ft/min

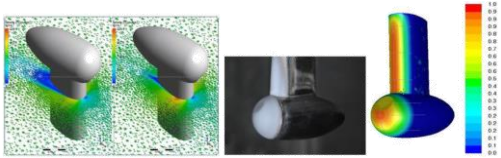


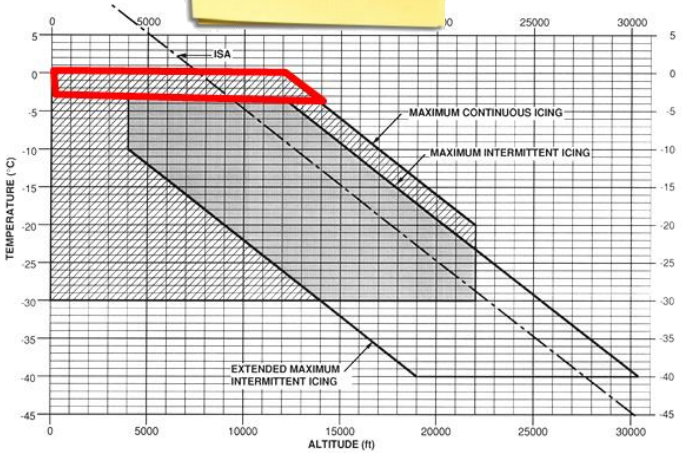
AP ON:
Certified end 2017
Retrofitable on NAS ST2
via upgrade to ST3
AP OFF:
Available in ST4



Safety enhancements
Ice Detector

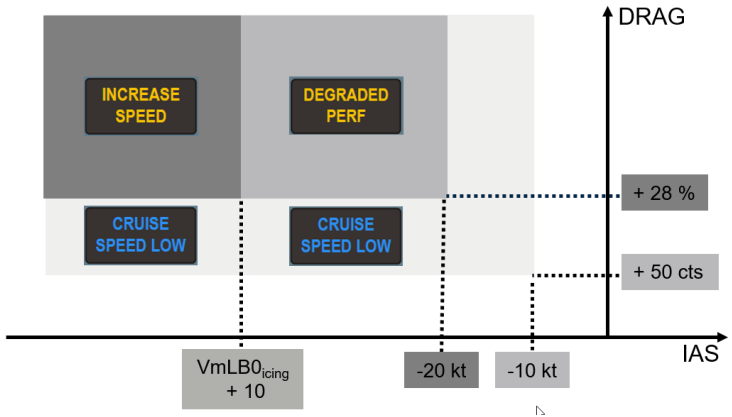
Test expected early 2019

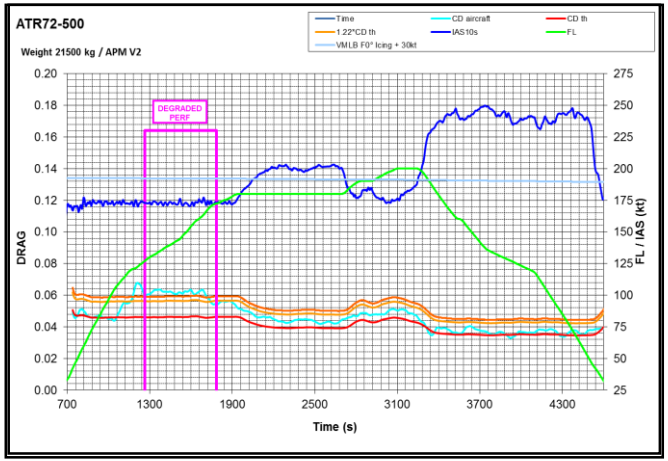




Enhance ice detection close to 0°C

Safety enhancements
APM



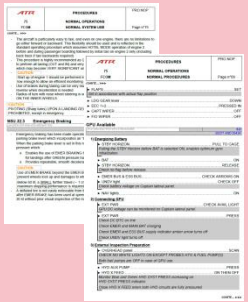


Available all the time
Alerts match with procedures

Documentation

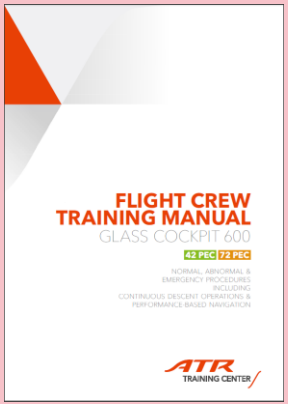
FCOM

DSC.30.8 APM
ANOR.8 Adverse Weather
PER.5 Performance

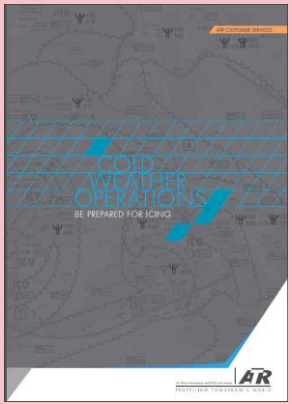


FCTM

63-UPRT



Cold weather operations



AUPRTA

issue 3

PROPELLING THE NEXT CONNECTION

Never forget your best friends