
# WINTER OPERATIONS CONFERENCE
# 5/6 OCTOBER 2011

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An Alenia Aeronautica and EADS joint venture

# ATR and WINTER OPERATIONS

1. **Introduction**
2. **Airlines « Heritage »**
3. **ATR Training Center response**
    1. Pilot training programs
    2. Instructors
    3. Training tools
    4. Documentation
4. **APM**

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# Who are typical ATR operators?

- **Short and mid-range airlines**

  - ✓ **Location**: worldwide, with a strong presence in emerging Markets

  - ✓ **Fleet**:
    - Few aircrafts 5/10 up to 40
    - 50 pilots up to 400

  - ✓ **Training program**: dependent on **international minima and exemptions** obtained from local authorities to accommodate for **specific** challenges (distance, budget...)

# What challenges are ATR operators facing today?

**1** **Booming demand for pilots over the past years**

- ✓ Scarcity of experienced pilots leading to a high turnover

è Lack of entry-level skills and pilot experience


**2** **Heavy costs of training**

- ✓ Unfavourable economics of classic (FFS) simulation
- ✓ Reliance on third-party training
- ✓ Remoteness of the training centres

**3** **Cost pressure**

- ✓ Fierce competition
- ✓ Security costs
- ✓ Environmental Constraints (Carbon tax)
- ✓ Rising Fuel Costs

**4** **Technical Challenges**

- ✓ Increasing complexity in operating aircraft systems
- ✓ Increasing congestion of air traffic

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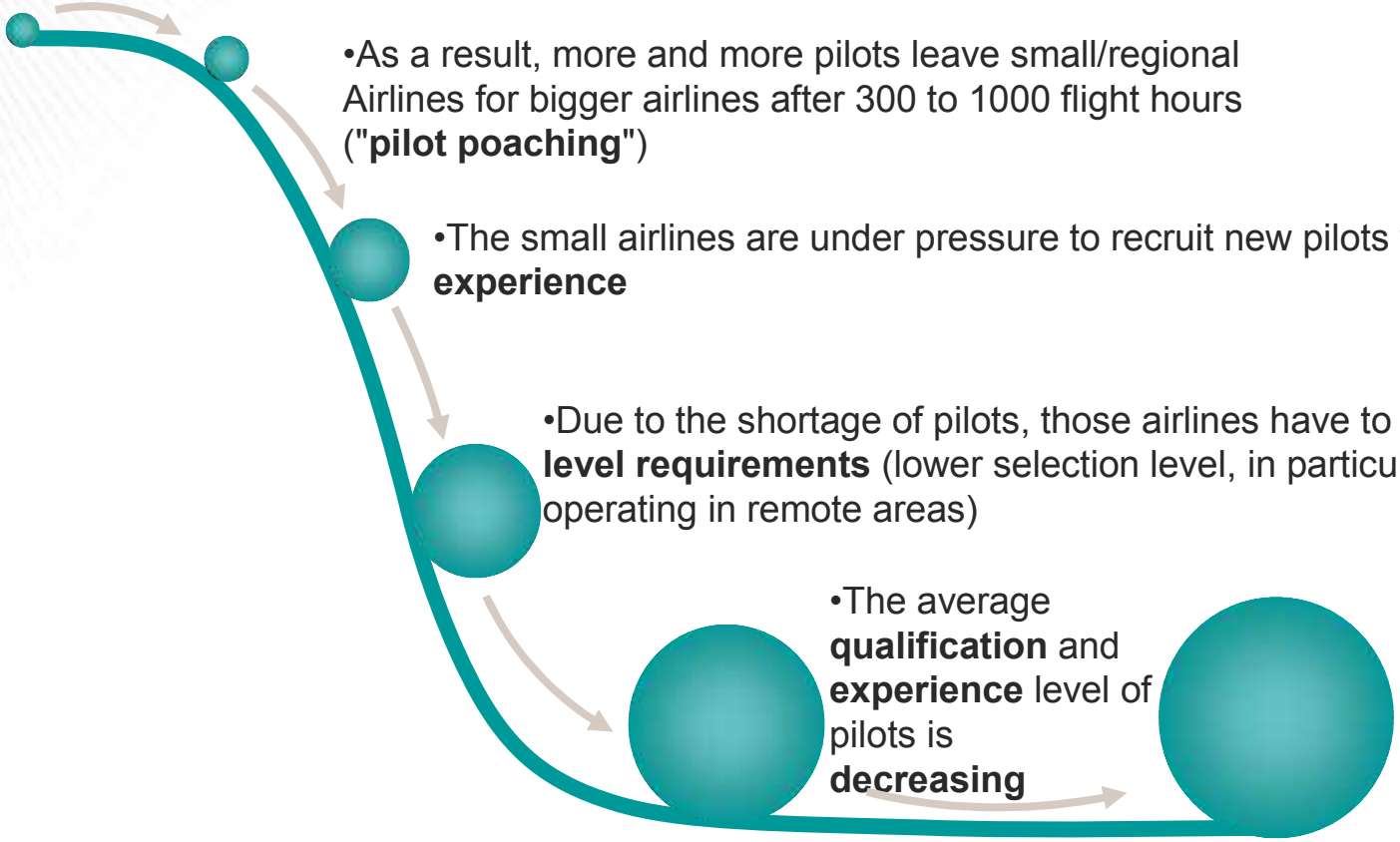
# Regional airlines see the average level of their crews decreasing.

•All Airlines face a **shortage** of experienced pilots



•As a result, more and more pilots leave small/regional Airlines for bigger airlines after 300 to 1000 flight hours ("**pilot poaching**")

•The small airlines are under pressure to recruit new pilots with **less experience**

•Due to the shortage of pilots, those airlines have to lower their **entry-level requirements** (lower selection level, in particular when operating in remote areas)

•The average **qualification** and **experience** level of pilots is **decreasing**

**Need to compensate the lower entry-level**

Source: Interviews, Roland Berger analysis

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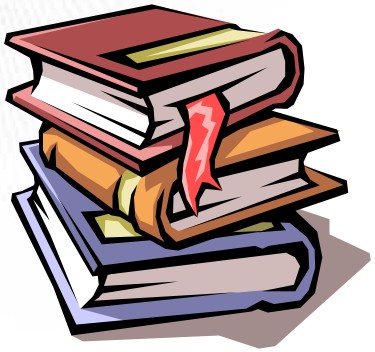
# Necessity to reinforce value of training



***Training Programs:***

- 4 weeks short course

- 5 weeks Standard course

- 6 weeks for first Type Rating including Multi Crew Course

- T/OFFs and Landings on the airplane, for each pilot regardless of the experience

# 6 weeks ATR type rating

- **Prerequisites**

**- Less than 500 flight hours**

**- CPL**

**- IR/ME**

- **Course Syllabus**

- **Ground Course**
  - 100h15
  - including 27h45 of Multi Crew Course (CRM and HF course theorical)

- **Flight Phase**
  - 8 X 4h FFT including 10h of Multi Crew Course
  - 4 X 4h FFS
  - 6 T/OFF & LDGs on the A/C

# ATR Pilot Training Paradigm

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# Instructors Qualifications

| | JAR-FCL1 Requirements | ATR Requirements = JAR FCL1 + … |
|---|---|---|
|  **GROUND SCHOOL INSTRUCTORS** | **None** | - Commercial Pilots<br>- Instructor qualification<br>- Full ATR Type Rating |

# Instructors Recurrent Training

|  | JAR-FCL1 Requirements | ATR Requirements = JAR FCL1 + … |
|---|---|---|
| GROUND SCHOOL INSTRUCTORS | None | - Theoretical check<br>- Standardisation Course<br>- Safety Course |

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# A Complete suite of training tools adapted to each training phase

FFS

FFT

VPT

CBT

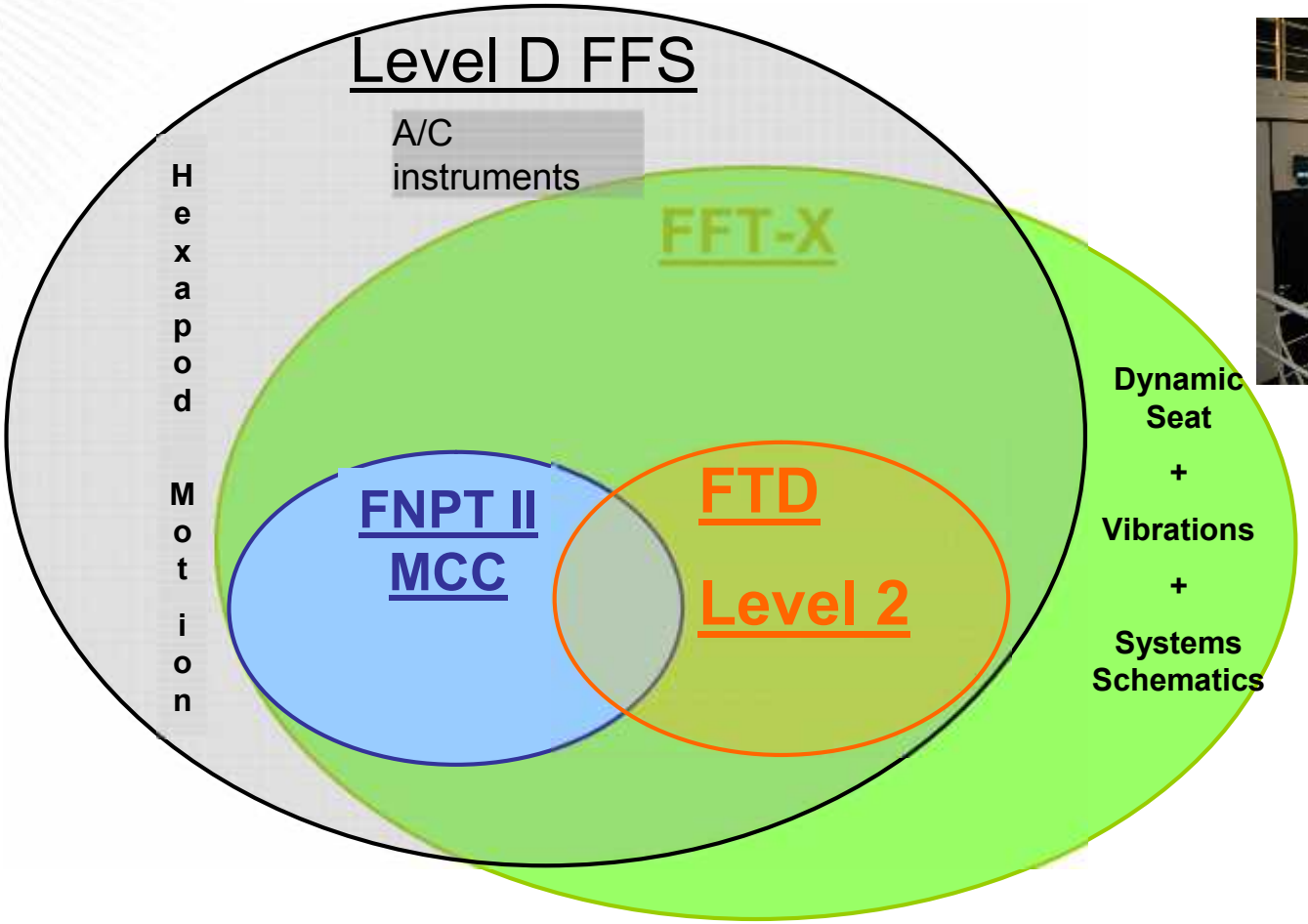
GROUND PHASE

FLIGHT PHASE

DEBRIEFING

WALK-AROUND

# The FFT-X® : A new concept of Flight Synthetic Training Device




# Why an ATR FFT-X® ?

~160 M$



A/C

~16 M$

~ 4 M$

FFT-X

FFS
Level D

A/C

FFS
Level D

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# Systems

ATR Training & Flight Operations Services

Scan your aircraft

42-500 72-212A

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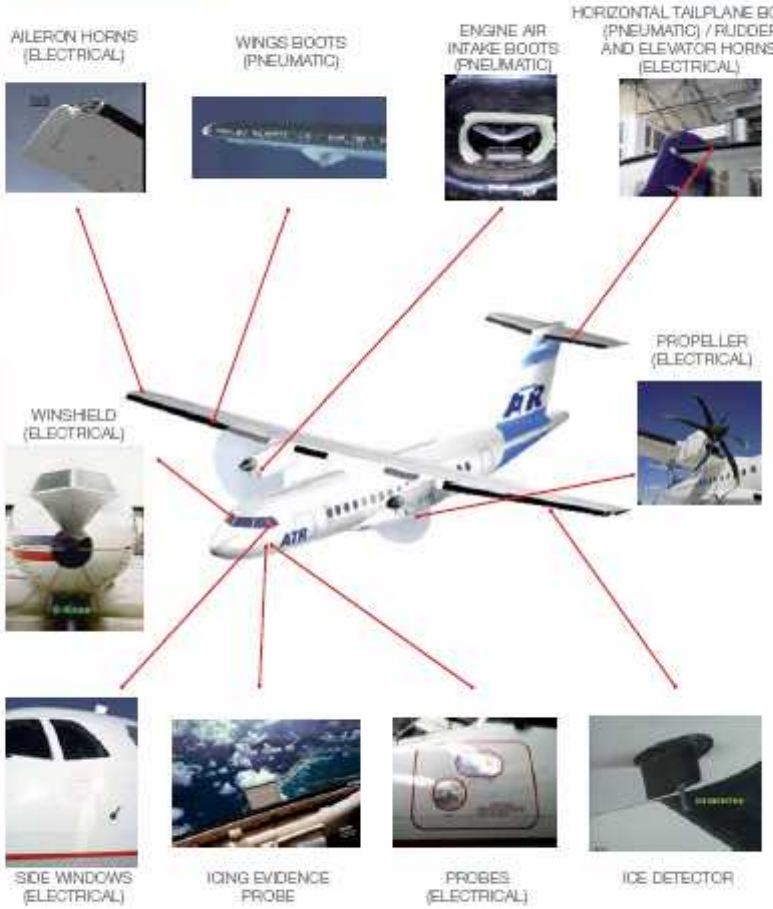
# N. Ice and rain protection

Aircraft ice protection is provided by a pneumatic and an electrical system adapted for the critical areas. Ice detector monitors ice accretion. It is connected to the CCAS.

## 1. Schematic

ATA 30



## 2. Probes and windshield HTG

ATA 30

ALPHA
ACW supply. AMBER LT illuminates in case of FAIL or power loss. CAP.

PITOT STBY
not heated.
ACW BUS 1 or 115 AC STBY BUS as back up.

WINDSHIELD HTG
ACW supply. Outer surface +2°C. Inner +21°C

SAT
no heated. CAP. (ACW supply) heating inhibited on ground.

WINDSHIELD HTG FAULT
Power loss or failure. CAP.

PITOT tube
not heated. CAP. (ACW bus 1 for CPT and ACW bus 2 for F/O).

STAT
Static port not heated (On ground only, not monitored in flight). CAP. (DC BUS)

CAPT, STBY and F/O
Normal operation - ON (depressed) and OFF (released).

## 3. Rain protection

ATA 30

CAPT WIPER rotary selector
**OFF**: wiper stops at the end of travel (park) position.
**SLOW**: wiper operates at 60 cycles/min
**FAST**: wiper operates at 130 cycles/min

F/O WIPER rotary selector
**OFF**: wiper stops at the end of travel (park) position.
**SLOW**: wiper operates at 60 cycles/min
**FAST**: wiper operates at 130 cycles/min

## 4. Ice detector panel and icing AOA

ATA 30

FAULT
detector failure or supply loss (ACW BUS 2). CAP.

ICE DET indicator Lt: ACW bus 2.

PTT pb
press for ST:
– icing will flash if system works correctly.
– FAULT LT illuminates steady if ice detector failure is detected.

ICING
Illuminates amber when ice accretion is detected provided both horns anti-icing and airframe de-icing are selected ON.

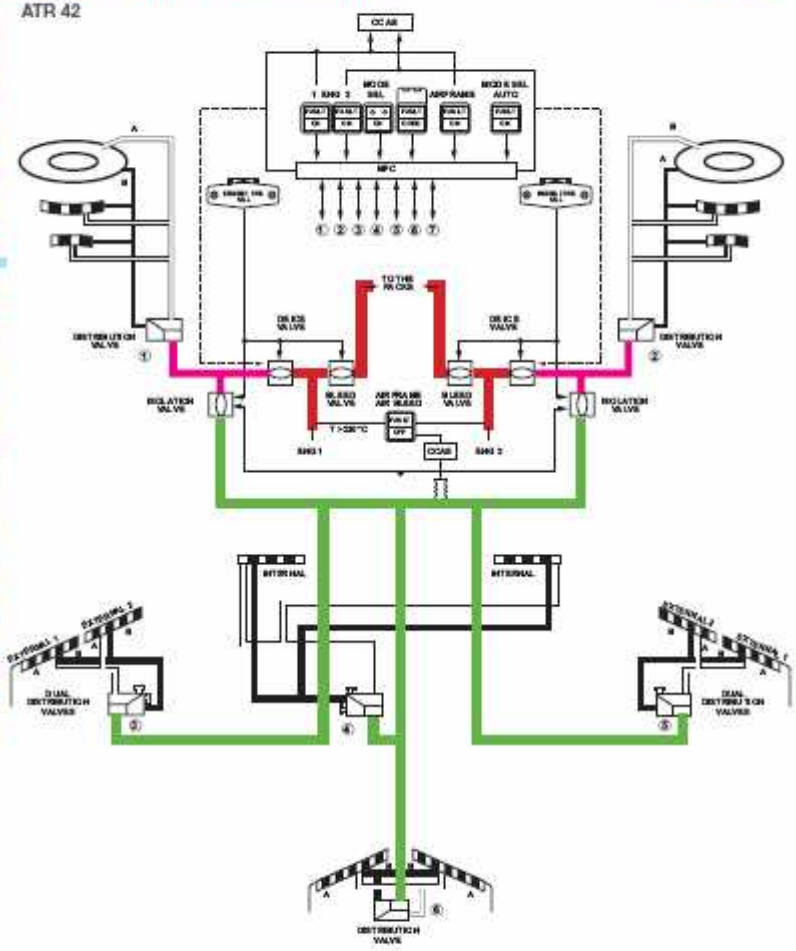
ICING AOA Lt
(DC emer BUS).
Illuminates green as soon as 1 horn anti-icing on. Stall alarm + stick shaker threshold lowered. When light ON, the angle of attack for the stall warning is reduced.
It can be extinguished manually only by releasing ICING AOA P/B provided both horns anti-icing are selected OFF

ICING
flashes amber when ice accretion is detected and horns anti-icing and/or airframe de-icing are not selected ON.

## 5. De-icing schematic

ATA 30

ATR 42



# Normal Procedures

ATR Training & Flight Operations Services

## Flight Crew Training Manual

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# Emergency & Abnormal Procedures

ATR Training & Flight Operations Services

Flight Crew Training Manual

Edition 2009

An Alenia Aeronautica and EADS joint venture

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## 11. Engine flame out after $V_1$ (2/4)

72 PEC

42 PEC

| Flight events | PNF | PF |
|---|---|---|
| ACTIONS TRIGGERED BY PNF WITHOUT PF REQUEST, JUST AFTER GEAR RETRACTION SEQUENCE | ▶DO, CHECK AND ANNOUNCE<br>UPTRIM GREEN LIGHT ENG 2 (or 1) CHECK<br>RTC TORQUE ENG 2 (or1)..... CHECK<br>ALTITUDE ENG 2 (or 1) CHECK<br>2 BLEEDS FAULT LIGHT.....CHECK UT<br>*ENG 2 (or 1) UPTRIMMED,<br>ENG 1 (or 2) AUTOFEATHERED,<br>(TWO) BLEED FAULT UT* | |
| | If no UPTRIM, PF orders corrective actions before acceleration altitude | |
| WHEN ALL LIGHTS EXTINGUISHED ON THE LDG GEAR PANEL | ▶ANNOUNCE<br>*GEAR UP* | |
| REACHING ACCELERATION ALTITUDE<br>Note: MNI 400ft or Higher if requested | ▶ANNOUNCE<br>*ACCELERATION ALTITUDE*<br>▶DO AND ANNOUNCE<br>ALT PB ON AFCS..... DEPRESS<br>*ALT GREEN*<br>▶DO AND ANNOUNCE<br>SPEED BUG TO WHITE BUG.....SET<br>*SET* | ▶ORDER<br>*SET ALT*<br>▶ORDER AND DO<br>*SET SPEED BUG WHITE BUG* |
| REACHING WHITE BUG | ▶ANNOUNCE<br>*WHITE BUG*<br>▶DO AND ANNOUNCE<br>IAS PB ON ADU.....DEPRESS<br>*IAS XXX SET*<br>▶DO AND ANNOUNCE<br>PWR MGT.....MCT<br>TORQUE.....ADJUST / CHECK<br>*MCT SET*<br>▶DO<br>FLAPS LEVER.....SET AS REQD | ▶ORDER<br>*SET IAS*<br>▶ORDER<br>*SET MCT*<br>▶ORDER<br>*NORMAL CONDITIONS, FLAPS 0*<br>OR<br>*ICING CONDITIONS, REMAIN FLAPS 15* |
| WHEN FLAPS AT 0/15 ON FLAPS INDICATOR | ▶ANNOUNCE<br>IN NORMAL CONDITIONS<br>*FLAPS 0*<br>OR<br>IN ICING CONDITIONS<br>*REMAIN FLAPS 15* | |



# ATC

# INSTRUCTOR GUIDE



### 2. 4. 1 - Session guide:

- 6 - It is essential to provide the simulator with all information in a logical sequence. The software produces different icing effects according to altitude and temperature conditions; however it does not look at visibility. It is not capable of causing or removing ice accretion. The instructor must program every aspect correctly and logically to ensure correct functioning of the systems (APM, IEP, ice detector).

- 6 - Examples: it is possible to have ice accretion whilst stationary on the ground; it is possible to have ice accretion when outside of cloud. It is therefore essential to manually follow the logical sequence of ICING ON when ice accretion is desired, and ICING OFF when no more ice accretion is desired or when leaving icing conditions (temperature/visibility)

- 6 - When leaving icing conditions, set cloud tops to current aircraft altitude if in climb, or just below of level flight. Note the simulator is not programmed to automatically set ICING None when leaving cloud, it must be done manually

- 6 - The instructor may manually remove the ice on the airframe or the system will remove the ice later

- 7 - set position freeze, carry out air work to NW of Toulouse

- 7 - approximate pitch attitude 0° for 60° bank level flight

- 8 - Total of five stall exercises:

    - Clear skies, to STICK SHAKE only. Emphasise that the aircraft is still flying at stick shake, and a full stall recovery is not necessary. The correct action is to increase power and lower the nose to recover to safe speed.

        - AP ENG for first stall
        - After recovery, remain F15, AP OFF for second stall
        - After recovery, select gear DOWN and F30, AP OFF for third stall

    - Enter cloud, set ANTI ICING ON, maintain stall warning until activation of STICK PUSHER
        - AP ENG F15
        - AP OFF Gear DOWN F30



2.4.2 - Session Overview

- Introduction to Abnormal procedures:
  - DC GEN fault
- Introduction to ICING procedures
- General handling
  - Stalls, steep turns, ICAS

Preliminary cockpit preparation
Unusual attitudes
Steep turns
Full Scale NORMAL conditions

ICING procedures

2.4.3 - MCC Objectives

- Introduction to abnormal procedures:
  - Task sharing
  - Specific callouts
  - Mutual supervision
- IEM : Icing conditions, aircraft malfunctions, interruptions in flight, ground/ramp problems



**2. 4. 8 - Trainee recurring mistake list continued:**

| What is observed | What may happen | What can be inferred | What can be done |
|---|---|---|---|
| DC GEN fault - carrying out actions or abnormal checklist before after take off checklist | Mis-setting of altimeters or not retracting F15 | Loses the action project | Trainee to think in terms of stabilised aircraft states. Replay the exercise until all actions are correctly sequenced |
| ICING procedures - de icing not selected on, checklists not carried out, de icing switched off when MEMO panel flashes, leaving de-icing ON when leaving clouds, not resetting ICING AoA light | Aircraft not protected from ice build up and stall protections reduced | Overconfidence in the machine | Complex subject for pilots new to ATR/turboprops. Need to pre-brief, guidance and de-brief this item in detail with practical aide-memoires. Question trainees about the purpose of the procedures, talk about relevant incidents. |



**2. 4. 9 - Threats: (TEM)**

| Environmental Threats | | Airline Threats | |
|---|---|---|---|
| **Adverse weather** | ~~Airport conditions~~ | **Airline operational procedures** | **Ground/Ramp** |
| **ATC** | **Heavy traffic** | **Cabin** | ~~Dispatch/Paperwork~~ |
| ~~Terrain~~ | ~~Other~~ | **Aircraft malfunctions/MEL** | ~~Manuals/Charts~~ |
| | | ~~Maintenance~~ | ~~Other~~ |

**Environmental**
Adverse Weather:

- Low pressure requires particular vigilance with altimeter setting
- Icing conditions require extra care with procedures on ground and in air

ATC:

- Deliberately interrupt checklists and procedures on ground and in air. Procedures should be fairly robust by this stage
- Radar vectoring below MSA should be avoided

Heavy traffic:

- TCAS exercise should be realistic situation, for example give 10 degree adjustment of heading "due conflicting traffic" before TCAS traffic alert.

ATR CUSTOMER SERVICES

# COLD WEATHER OPERATIONS

## BE PREPARED FOR ICING

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PROPELLING TOMORROW'S WORLD

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# A. Weather revision on icing

## 1. What is icing?

Icing is defined by any deposit or coating of ice on an object caused by the impact of liquid hydrometeors usually supercooled. This phenomenon generally occurs first on parts exposed to relative wind (i.e. probes, antennas, leading edge...)

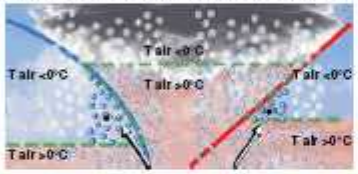
Supercooled water is a physical state where liquid water exists below its normal freezing point without freezing.

## 2. Build up process

Ice can form by three processes described below. At least one of them is involved whatever the weather situation.

### 2.1. Supercooled water droplets

Large quantities of supercooled water are present in the atmosphere, basically in clouds and freezing precipitation.




Freezing rain

Ice deposits on airframe are directly related to supercooled water concentration in atmosphere, size of droplets and precipitation intensity.

This phenomenon appears when it is raining in very cold air.

### 2.2. Freezing of liquid water

This case occurs when liquid water, at positive temperature remains on exterior parts of the airplane, typically scratch on skin, landing gear case, probes and control surfaces gap.

This water is very likely to freeze as soon as the aircraft enters a very low temperature atmosphere after uncompleted snow removal on ground for instance.

### 2.3. Condensation from vapor to ice

This is a transition from the vapor phase directly to the solid phase.

This phenomenon is likely to occur outside the clouds in a high moisture atmosphere on an aircraft with particularly cold skin. This case typically happens while aircraft is descending from its cruise flight level.

### 2.4. Types of accretion

This classification refers to the aspect of the accretion. It depends on several factors among them:

- Quantity of supercooled water droplets (Liquid Water Content)
- Size of droplets (diameter and distribution)
- Environment
- Outside Air Temperature (OAT)

# Cold weather operations

Weather analysis is one of the most important aspects of flight preparation. It may become critical for particularly demanding conditions where potential icing conditions could be encountered. Typical weather forecast provided to pilots at flight preparation includes several documents which will be discussed in the following chapter.

## 1. Available means

### TAF, METAR, SPECI and TREND collection

The crew should collect such information for all airports of interest including the ones along the planned route. These information might be essential in deciding whether the flight has to be re-planned via another route.

### Sigmets and Airmets collection

This will alert the crew of areas of forecast or reported moderate and severe icing.

### Significant weather charts collection

This is an invaluable mean for assisting the crew in forecasting possible areas of icing conditions or precipitation.

### Snotams

These information will complete the picture and assist the crew in developing any alternate or contingency plan.

## 2. TAF/METAR/SPECI/TREND interpretation

**TAFs** are meteorological forecasting at airports.

**METARs** are routine meteorological observations at airports. Usually they are issued each 30 or 60 minutes.

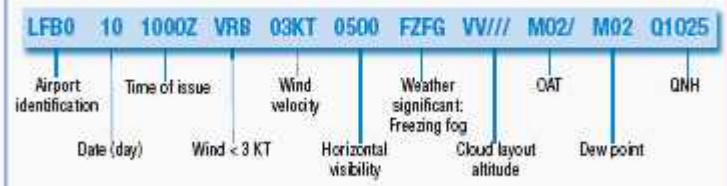
**SPECIs** are special meteorological observation reports. They are issued at a given airport if:

- Meteorological conditions are worse than the last METAR
- Meteorological conditions have improved and improvement has lasted for at least 10 minutes

**TREND** is a section included in a METAR or a SPECI providing information on the evolution of meteorological conditions. It is issued if a variation of wind, visibility, weather or cloud phenomenon is expected. The validity of a trend is 2 hours starting from the associated METAR or SPECI time.

### Example of METAR message

This METAR is the typical example of ground icing conditions in winter: low visibility with moisture, freezing fog and OAT below 5°C.



# C. Aircraft de-/anti-icing

### Anti-icing

Anti-icing is a precautionary procedure which provides protection against formation of frost or ice and accumulation of snow on treated surfaces of the aircraft, for a limited period of time (holdover time).


### De-icing/anti-icing process

De-icing and anti-icing may be performed as a one-step or two-step process, depending on predetermined practices, prevailing weather conditions, concentration of FPD (freezing point depressant) used, and available de-icing equipment and facilities. Note that when a large holdover time is expected or needed, a two-step procedure is recommended, using undiluted fluid for the second step.

- **The one-step process**

It is accomplished using a heated or in certain case an unheated FPD mixture. In this process, the residual FPD fluid film provides a very limited anti-icing protection. This protection can be enhanced by the use of cold fluids or by the use of techniques to cool heated fluid during the de-icing process.

- **The two-step process**

This process involves both de-icing and anti-icing procedure. First step (de-icing) is accomplished with hot water or a hot mixture of FPD fluid and water. The ambient weather conditions and the type of accumulation to be removed from the aircraft must be considered when determining which de-icing fluid to use. The second step (anti-icing) involves application of type II or type IV fluid and water to the critical surfaces of the aircraft.

## 2.2. Equipment and material

De-icing or anti-icing procedures use the following products:

- Hot air
- Heated water
- Type I de-icing fluids (in accordance with ISO, SAE or AEA standards).
- Type II or type IV anti-icing fluid (in accordance with ISO, SAE or AEA standards).

**NOTE:** The staff performing this operation must observe the safety precautions in force (gloves, and safety goggles). If de-icing or anti-icing fluid is accidentally sprayed on skin, rinse thoroughly with water to avoid irritation.

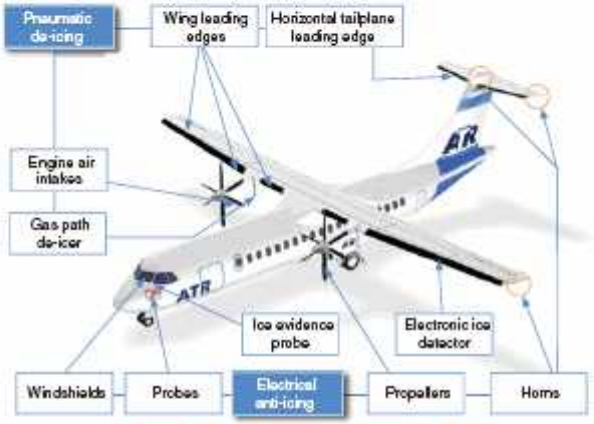
## 2.3. Fluid selection

The selection of de-icing process depends on numerous parameters. Therefore, only the experience of the operator will direct the choice of the appropriate method according to the prevailing weather. The following table provides basic information to determine the appropriate procedure to be used:

# 1. Systems description

On a turboprop aircraft the ancillary power available (bleed air and electrical power) is less than on a jet. Consequently a permanent thermal protection is impracticable, in particular for the airframe. A solution consists in installing a pneumatic de-icing system on the exposed critical parts (i.e airframe) complemented by an electrical anti-icing protection for the parts on which a pneumatic de-icing device is not applicable, i.e rotating components (such as propellers), windshields, probes. This philosophy is applied on all new generation turboprop airplanes. On ATR aircraft, ice protection is generally provided by the system, as illustrated on the figure below.

**NOTE:** To review the specific system installed on your aircraft, refer to your FCOM.




Example of ATR 72-500 basic ice protection system

## 1.1. Electrical System

The electrical heating power is supplied by AC wild frequency power.

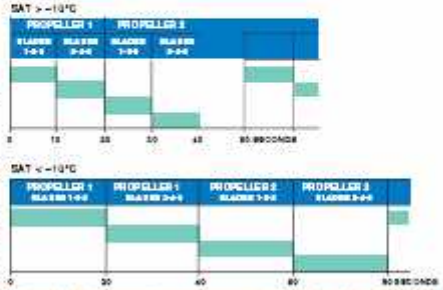
**Permanent level**

- Probes and windshield (always selected ON).

**Anti-icing**

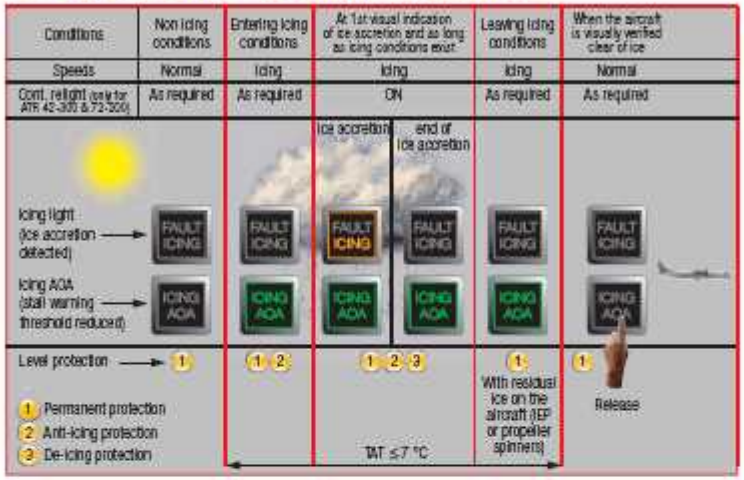
- Side windows (heating for defogging only, not for ice protection),
- Right control horns (ailerons, elevators, rudder),
- Inner leading edge of propeller blades (outer part is de-iced by centrifugal force only).

Propeller ice protection system combines electrical heating of blades leading edge and centrifugal force. Heating cycle duration have been optimized according to OAT to decrease the adhesion strength of the accreted ice. Ice is then shed by the centrifugal effect.




Electrical ice protection sequence – Example of sequencing applicable to ATR 72-500.

## 6. Flight profile in icing conditions




This diagram is a sum-up of the different procedures for flight in atmospheric icing conditions that can be found in FCOM 2.02.08:

- Entering icing conditions
- At first visual indication of ice accretion and as long as icing conditions exist
- Leaving icing conditions
- When the aircraft is visually verified clear of ice

### 6.1. Entering icing conditions

Operations in atmospheric icing conditions require special care since ice accretion on airframe and propellers significantly modify their aerodynamic characteristics. To avoid such problems, the crew must select "anti-icing" level ON (level 2) as soon as aircraft reaches icing conditions.

Icing conditions definition:

- Visible moisture
- Temperature SAT ≤ 5 °C on ground or at take-off
  TAT ≤ 7 °C in flight
- Visibility less than 1 Nm

By depressing one of both horns push buttons to the ON position, "ICING AOA" green light appears automatically, alerting the crew that the stall threshold alarm has been decreased

- In normal operations the stick shaker threshold is set at ~12° of angle of attack to prevent stall with flaps 0.
- When ICING AOA light is ON, stick shaker threshold is reduced at ~7°.

# G. Severe icing


**Certification Standards**

- Droplets diameter from 5 to 135 microns
- MVD from 15 to 50 microns

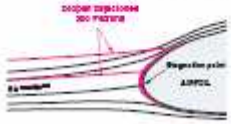
**Supercooled Large Droplets**

- Droplets diameter from 5 to 2000 microns
- MVD from 15 to 2000 microns

Droplet trajectory relative to the aircraft is governed by aerodynamic forces acting on the droplet and its inertia. The opposite chart evidences how small droplets, essentially following the streamlines will escape the airfoil except close to the stagnation point, when the much heavier larger droplets will tend to go straight, with a significantly extended accretion coverage.

200 microns versus 40 microns:

- Droplet aerodynamic drag x 25
- Droplet inertia x 125



Large droplets will also tend to stream back before freezing, further extending the coverage of the resulting ice accretion.

The extent of the ATR wing de-icing boots is such as it is unlikely to accrete ice beyond the protection on the upper surface. Nevertheless under these SLD conditions ice may accrete aft of the protected area on the lower surface and the whole boots extent may be covered with residual ice.

Case of severe icing conditions: the whole chordwise extent of the boot is covered with ice.

## 2. Detection of SLD

### 2.1. Conditions conducive to SLD

The following weather conditions may be a sign of SLD encounters:

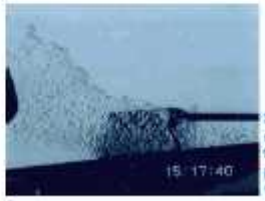
- Visible water precipitation at temperatures close to 0 °C ambient air temperature (SAT)
- Droplets that splash or splatter on impact on cockpit windows at temperatures close to 0 °C ambient air temperature

### 2.2. Visual Cues

SLD encounters have been experienced several times on ATR during either flight test campaigns or commercial flights and the following visual cues were established:

- Ice spots covering all or a substantial part of the unheated portion of either forward side windows, possibly associated with water splashing and streaming on the windshields
- Unexpected decrease in speed or rate of climb

SLD- Total coverage of the unheated part of the side window. The yellow color is due to the water used during tanker tests.




SLD - Partial coverage of the unheated part of the side window"

# ATR Pilot Training Paradigm

1. Introduction
2. Airlines « Heritage »
3. ATR Training Center response
    1. Pilot training programs
    2. Instructors
    3. Training tools
4. **APM**

# MULTI-PURPOSE COMPUTER

An Almaz-Antonov and EADS joint venture

AR

# Presentation

- **Today, all ATR a/c are equipped with FDAU: required by airworthiness authorities for recording 57 parameters.**

ED 55 → FDAU

- **a/c operating under FAA are equipped with AFDAU: recording of additional parameters (88).**

- **The MPC is an upgrade of the existing** AFDAU **with some other new functions**

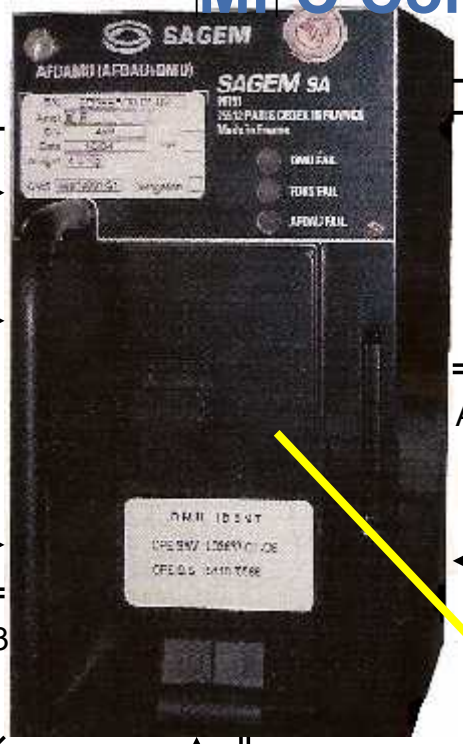
FAR 121.344 → FDAU + AFDAU

MPC = Upgraded **AFDAU**

# MPC Concept

DC EMER BUS

DC ESS BUS




APIU

CRUISE SPEED LOW

DEGRADED PERF.

INCREASE SPEED

ASCB, GNSS, MFC, EEC, PEC TCAS, Analog, Discrete, ARINC ect …

ATC Mode S Enhanced Surveillance

ARINC 429

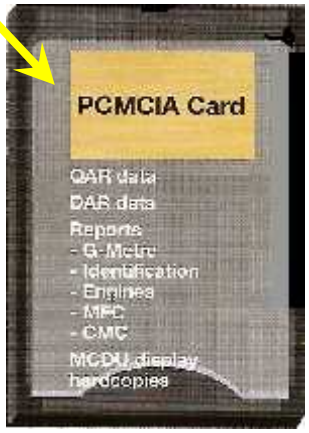
Accelerometer

Signals From Aircraft Systems

FDAU

ARINC 573

ARINC 429





SSFDR

ARINC 573

# APM

- APM Aircraft Performance Monitoring
  - To enhance a/c safety and protection acting on the crew awareness aspect
  - Real time acquisition of a/c parameters according to the a/c configuration and computation of weight, speed, performance.

APM objectives:

- Monitoring of an abnormal increasing of the drag
- Give evidence to the crew of “severe ice” effect on the a/c performance
- Alert the crew about the compliance with minimum required IAS to keep

# Cockpit APM

CRUISE SPEED LOW

INCREASE SPEED

DEGRADED PERF.

# APM

- **The drag analysis starts as soon as the aircraft entered in icing conditions, that is to say:**

  - ✓ If the anti-icing is selected ON
  - ✓ And/or if the airframe de-icing is selected ON
  - ✓ And/or if ice accretion has been detected at least once during the flight

# CRUISE SPEED LOW

- On Cruise, Inform the crew, that an abnormal drag induces a speed decrease of more than 10 kts compared with the expected speed

# Cruise speed low

## CRUISE SPEED LOW

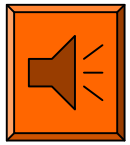
Appears in cruise only, to inform the crew that an abnormal drag increase induces a speed decrease of more than 10 KT compared with the expected speed

ICING CONDITIONS and SPEED .....MONITOR

# Degraded performance

DEGRADED

PERF.

CAUTION + 

Single Chime

– In Climb or in Cruise to alert the crew that:
  - An abnormal drag increase induces a speed decrease or a loss of the rate of climb
  - In cruise, appears after the « CRUISE SPEED LOW » alarm.

# DEGRADED PERF

Mainly appears in level flight after CRUISE SPEED LOW or in climb, to inform the crew that an abnormal drag increase induces a speed decrease or a loss of rate of climb

The most probable reason is an abnormal ice accretion

AIRFRAME DE-ICING ON.....CHECK
IAS > RED BUG + 10 KT.....MONITOR
AP (if engaged).....HOLD FIRMLY CONTROL WHEEL and DISENGAGE

- **If SEVERE ICING conditions confirmed**

**– or –**

- **If impossibility to maintain IAS > RED BUG + 10 KT in level flight**

**– or –**

- **If abnormal aircraft handling feeling**

SEVERE ICING procedure (1.09).....APPLY

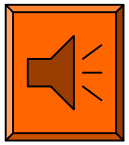
- **If not**

SCHEDULED FLIGHT.....CONTINUE
ICING CONDITIONS and SPEED.....MONITOR

# Increase speed

INCREASE SPEED

flashing

CAUTION + 

Single Chime

- Active in Climb, Cruise and Descent
- Appears after the alert « DEGRADED PERFORMANCE »
- Alert the crew when the drag is abnormally high and IAS is lower than MSIS (MIS + 10 kts).

# Increase speed

## INCREASE SPEED

Appears after DEGRADED PERF to inform the crew that the drag is abnormally high and IAS is lower than RED BUG + 10 KT

- **If abnormal conditions confirmed**

  IMMEDIATELY PUSH THE STICK TO INCREASE SPEED
  TO RECOVER MINIMUM IAS = RED BUG + 10 KT

  SEVERE ICING procedure (1.09) ..... APPLY

# THANK YOU
# FOR
# YOUR ATTENTION



**From ATR Customer Services**