Docket No. SA-533

Exhibit No. 2-AA

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C.

Excerpts from ATR 42 Airplane Flight Manual (AFM)

(12 Pages)

ATTACHMENT
26

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2 . 06 . 01 - ICING CONDITIONS

- Atmospheric icing conditions exist when :
  - OAT on the ground and for take-off is at or below 5° C or when TAT in flight is at or below 7°C,
  - and visible moisture in any form is present (such as clouds, fog with visibility of less than one mile, rain, snow, sleet and ice crystals).
- Ground Icing conditions exist when :
  - OAT on the ground is at or below 5°C,
  - and surface snow, standing water or slush is present on the ramps, taxiways and runways.

Take-off is prohibited when frost, snow or ice is adhering to the wings, control surfaces or propellers.

- Operation in atmospheric icing conditions :

  Emergency flaps setting (45°) is prohibited.

  Np setting below 86 % is prohibited.

  Refer to 3.02.01 for associated procedures and 6.06.02 for performance data.

- All icing detection lights must be operative prior to flight at night.

  NOTE : This supersedes any relief provided by the Master Minimum Equipment List (MMEL).

- The ice detector must be operative.
- Operation in ground icing conditions :

  Refer to 3.02.01 for associated procedures and to FCOM part 3 for advisory information on contaminated runways penalties.

... / ...

2 . 06 . 01 – ICING CONDITIONS (cont'd)

- **Severe icing :**

R **WARNING :**

Severe icing may result from environmental conditions outside of those for which the airplane is certificated. Flight in freezing rain, freezing drizzle, or mixed icing conditions (supercooled liquid water and ice crystals) may result in ice build–up on protected surfaces exceeding the capability of the ice protection system, or may result in ice forming aft of the protected surfaces. This ice may not be shed using the ice protection systems, and may seriously degrade the performance and controllability of the airplane.

- During flight, severe icing conditions that exceed those for which the airplane is certificated shall be determined by the following :

Visual cue identifying severe icing is characterized by ice covering all or a substantial part of the unheated portion of either side window,

and / or

Unexpected decrease in speed or rate of climb,

and / or

The following secondary indications :

. Water splashing and streaming on the windshield
. Unusually extensive ice accreted on the airframe in areas not normally observed to collect ice.
. Accumulation of ice on the lower surface of the wing aft of the protected area.
. Accumulation of ice on the propeller spinner farther aft than normally observed.

The following weather conditions may be conducive to severe in–flight icing :

. Visible rain at temperatures close to 0°C ambient air temperature (SAT)
. Droplets that splash or splatter on impact at temperatures close to 0°C ambient air temperature (SAT)

If one of these phenomena is observed, immediately request priority handling from Air Traffic Control to facilitate a route or an altitude change to exit the icing conditions. Apply procedure specified in the Emergency Procedures chapter.

- Since the autopilot may mask tactile cues that indicate adverse changes in handling characteristics, use of the autopilot is prohibited when the severe icing defined above exists, or when unusual lateral trim requirements or autopilot trim warnings are encountered while the airplane is in icing conditions.

3 . 02 . 01 – ICING CONDITIONS

• DEFINITION
Refer to 2.06 page 1.

Procedure for operation in atmospheric icing conditions :

• As soon as and as long as atmospheric icing conditions exist, the following procedures must be applied :

ANTI–ICING (propellers, horns, side–windows, engines) ..... ON
PROP MODE SEL ..... According to SAT
NP ..... set ≥ 86 %
Minimum maneuver / operating
icing speed ..... BUGGED AND OBSERVED
R ICE ACCRETION ..... MONITOR

NOTE : horns anti icing selection triggers the illumination of the "ICING AOA" green light and lowers the AOA stall warning threshold.

R • At first visual indication of ice accretion and as long as atmospheric icing conditions exist, the following procedure must be applied :

- ENG START rotary selector ..... CONT RELIGHT
- ANTI ICING (propellers, horns, side windows, engines) .. CONFIRM ON
- DE ICING (airframe) ..... ON
- Eng and airframe MODE SEL ..... According to SAT
- Minimum maneuver / operating
  icing speed ..... CONFIRM BUGGED AND OBSERVED

NOTE : Be alert to severe icing detection.
In case of severe icing refer to Emergency Procedures 4.05.05.

R • When leaving icing conditions, CONT RELIGHT, DE ICING and ANTI ICING may be switched OFF.

• When the aircraft is visually verified clear of ice, ICING AOA caption may be cancelled and normal speeds may be used.

NOTE : Experience has shown that the last part to clear is the propeller spinner. As long as this condition is not reached the icing speeds must be observed and the ICING AOA caption must not be cancelled.

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- When the aircraft is visually verified clear of ice, ICING AOA caption may be cancelled and normal speeds may be used.

  NOTE : Experience has shown that the last part to clear is the ice evidence probe. As long as this condition is not reached the icing speeds must be observed and the ICING AOA caption must not be cancelled.

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Procedure for operation in atmospheric icing conditions :

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  - ANTI ICING (propellers, horns, side windows, engines) .. CONFIRM ON
  - DE ICING (airframe) ..... ON
  - Eng and airframe MODE SEL ..... According to SAT
  - Minimum maneuver / operating icing speed ..... CONFIRM BUGGED AND OBSERVED

NOTE : Be alert to severe icing detection.
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- MINIMUM MANEUVER / OPERATING ICING SPEEDS :
  Whenever "ICING AOA" green light is ON, the following minimum icing speeds must be observed :

FLAPS	MINIMUM MANEUVER / OPERATING ICING SPEED		MAXIMUM BANK ANGLE
0°	1 . 45 Vs		15°
15°	1 . 32 Vs	T / O 2nd segment	15°
	1 . 45 Vs	En route	15°
	1 . 50 Vs	APPROACH	30°
	1 . 39 Vs	GO AROUND	15°
30°	1 . 50 Vs		30°
45°	PROHIBITED		–

CAUTION : For obstacle clearance, the en route configuration with engine failure is flaps 15 at a minimum speed of 1.45 Vs if ice accretion is observed.

Refer to 6 . 06 . 02 for performance data.

■ Procedure for take off with ground icing conditions but no atmospheric icing conditions :

- For take off the following procedure MUST BE APPLIED :
  ENG START rotary selector ..... CONT RELIGHT
  PROP ANTI ICING ONLY ..... ON

  NOTE : it is recommended when possible to cycle landing gear after take off.

- Minimum maneuver / operating speeds :
  The normal minimum maneuver / operating speeds are applicable.
  Refer to FCOM part 3 for advisory information on contaminated runways penalties.

R NOTE : horns anti icing must not be selected ON to avoid lowering AOA of the stall warning threshold.

3 . 02 . 02 – SEVERE TURBULENCE

- ENG START rotary selector ..... CONT RELIGHT
- SIGNS ..... ON

Maintain the speed at or below VRA : 180 kt

3 . 02 . 03 – HEAVY RAIN

- ENG START rotary selector ..... CONT RELIGHT

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4 . 05 . 05 – SEVERE ICING

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MINIMUM ICING SPEED	INCREASE RED BUG by 10 kt
PWR MGT	MCT
CL / PL	100% / MCT
AP (if engaged)	FIRMLY HOLD CONTROL WHEEL and DISENGAGE
SEVERE ICING CONDITIONS	ESCAPE
ATC	NOTIFY

- **If an unusual roll response or uncommanded roll control movement is observed :**
  Push firmly on the control wheel
  FLAPS 15

- **If the flaps are extended, do not retract them until the airframe is clear of ice**

- **If the aircraft is not clear of ice :**
  GPWS ..... FLAP OVRD
  STEEP SLOPE APPROACH (≥4.5°) ..... PROHIBITED
  APP/LDG CONF ..... MAINTAIN FLAPS 15
  ..... with "REDUCED FLAPS APP/LDG icing speeds" + 5 kt
  Multiply landing distance FLAPS 30 by 1.22

.../...

4 . 05 . 05 – SEVERE ICING (Cont'd)

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DETECTION

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and / or

Unexpected decrease in speed or rate of climb

and / or

The following secondary indications :

. Water splashing and streaming on the windshield
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The following weather conditions may be conducive to severe in–flight icing :

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5 . 04 . 04 - FLIGHT CONTROLS

▶ REDUCED FLAPS LANDING
GPWS ..... FLAP OVRD
STEEP SLOPE APPROACH (≥4.5°) ..... PROHIBITED

FLAPS	LDG DIST FLAPS 30 MULTIPLY BY	APP SPD	LDG SPD
0	1 . 3	1.3 VS (0) + wind effect	1.25 VS (0) + wind effect
15	1 . 15	1.3 VS (15) + wind effect	1.25 VS (15) + wind effect

▶ FLAPS UNLOCKED

■ DURING TO

- Before V1
  TAKE OFF ABORT ..... INITIATE
- After V1
  VR,V2 ..... INCREASE BY 10 KT

■ DURING APPROACH
GA POWER ..... APPLY
VGA ..... INCREASE BY 10 KT

▶ ELEVATOR JAMMING
CONTROL COLUMNS ..... UNCOUPLE
FLAPS 30 LANDING ..... PERFORM

■ IF LEFT ELEVATOR IS JAMMED :
MINIMUM MANEUVER OPERATING SPEED ..... INC BY 10 KT

LDG DIST ..... MULTIPLY BY 1.13

▶ PITCH DISCONNECT
AVOID ICING CONDITIONS
CHECK BOTH CONTROL COLUMNS FREE
MAX SPEED ..... 180 KT
MAX LOAD FACTOR 2g

NOTE : Bank angle must be restricted to 30° until flaps extension

- FOR APPROACH
  STEEP SLOPE APPROACH (≥4.5°) ..... PROHIBITED
  FLAPS 30 LANDING ..... PERFORM
  LAND AT AIRPORT WITH MINIMUM CROSSWIND
  REDUCE SMOOTHLY TO FLARE