COMAIR
Delta Connection

Mr. Dave Ivey
National Transportation Safety Board
Office of Aviation Safety
490 L'Enfant Plaza, S.W.
Washington, D.C. 20594

Dear Mr. Ivey:

I am submitting this letter as supplemental information to the field notes we gathered in the previous weeks investigation. Please distribute it to the other Operations Group members.

COMAIR participated in last year's industry meeting regarding Supercooled Large Droplets (SLD), and their effect on aircraft icing for aircraft without powered aileron systems.

These meetings, in addition to specific flight testing, resulted in the issuance of Airworthiness Directive 96-09-24 for the EMB-120 aircraft. While participating in these meetings COMAIR learned of several other icing related roll and pitch upsets in the EMB-120 aircraft from John Dow of the FAA. Based on the information that was provided at this meeting, COMAIR published two bulletins to the *COMAIR EMB-120 Flight Standards Manual* (FSM). FSM Bulletin 96-02 primarily covers the issues contained in the AD. FSM Bulletin 96-04 includes items in addition to the AD that we feel are necessary to operate the EMB-120 safely in icing conditions.

FSM Bulletin 96-04 provides the following additional guidance to the flight crew about operations in icing conditions:

- Using the autopilot in IAS mode while climbing in icing conditions.
- Establishing a minimum airspeed during the climb of 170 KIAS to ensure a safe margin above the stalling speed of a contaminated wing.
- Establishing a minimum airspeed of 170 KIAS while holding in icing conditions (EMBRAER recommends 160 KIAS Flaps Zero).
- When landing with any residual airframe icing, use Flaps 25 and use $V_{REF\ 25}$ + 5 KIAS for reference speed.

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The following table provides a basic comparison showing how COMAIR has exceeded EMBRAER AFM procedures to provide an additional safety margin in operating the EMB-120.

COMAIR	EMBRAER
• IAS mode only for climb in icing conditions.	• No limitation.
• 170 KIAS minimum holding speed in icing conditions.	• 160 KIAS minimum holding speed in icing conditions. Holding performance charts based on 1.3 V_S holding speed.
• 180 KIAS climb speed to 10,000 MSL. 170 KIAS minimum speed during climb in icing conditions.	• Autopilot programmed for climb speed of 155 KIAS (to FL200) in CLIMB mode.
• 130 KIAS approach speed. $V_{REF\ 25}$ + 5 for short final (crossing runway threshold).	• Add 5-10 KIAS to approach speed, however, no approach speed specified (no published approach profiles). V_{REF} for short final.

The meetings last year concerning the operation of the EMB-120 in icing conditions were very informative. I would recommend the Safety Board interview John Dow of the FAA. John was very knowledgeable concerning the effects of icing on aircraft, specifically the EMB-120.

I enjoyed working with you during this investigation. Please call me if you have any questions.

Sincerely yours,

[redacted]

Wayne A. Wolke
EMB-120 Program Manager
COMAIR, Inc.

From: Cpt. Vernon Hobbs
Emp. # 4559

February 4, 1997

To: Cpt. John McGann
Chief Pilot, MCO

Cpt. McGann;

Here is the information you requested concerning icing conditions encountered January 9, 1997 while operating Flights 3076 CVG-LAN and 3077 LAN-CVG. All information is accurate to my best recollection, however some specifics such as altitudes and times I cannot fully remember.

The other members were: First Officer Bryan Parker, and Flight Attendant Michelle Stevens. We were conducting F.O. Parker's I.O.E.

On route from CVG to LAN we made an altitude change due to moderate turbulence opting for a lower altitude (I cannot recall the specific altitudes), but still remaining VMC above a solid undercast.

While decending for the approach in LAN we began to accumulate ice but not to a degree or rate that was of concern. As we flew the approach and decended the rate of ice accumulation increased dramatically. The ice we were experiencing had a very rough appearance producing a jagged texture along the leading edges visible from the cockpit. In the course of the approach we activated (Manually) the leading edge de-ice boots three times. The boots very effectively removed the visible ice all three times. The rate of accumulation required this high frequency of use. At one point during the approach the aircraft assumed a medium frequency vibration. I believed this to be due to un-equal ice acceration on a propeller, however the vibration stopped after the next subsequent actuation of the de-ice boots. This vibration was pronounced enough to prompt the Flight Attendant to call the cockpit and inquire about it.

After landing we reported the ice to LAN tower or ground. To my best recollection we used the term "Moderate or greater" to describe the ice. Upon post flight inspection I found pieces of ice on unprotected surfaces, notably the fillet area where the wing root meets the fuselage. This ice was the approximate thickness of my hand.

We had a 1 hour and 56 minute scheduled layover in LAN during which time the local weather improved.

On the climbout portion of our return flight we experienced only light ice accumulation. However, when we decended in the vicinity of Richmond VOR (specifically north of the VOR) we again began icing at a very fast rate. We told ATC (Dayton Approach) we were in moderate or greater ice and asked to climb back out of it. ATC immediately approved a climb that put us in VMC conditions. We remained above the clouds until well into CVG approach airspace. During our decent we picked up more ice, but not at the rate or amount earlier experienced.

We changed airplanes in CVG, and the on-coming pilots remarked that the airplane had a lot of ice on the unprotected surfaces.

Steve Tedrow
1003 Hampton Av.
Orlando, Fl. 32803

John McGann
Chief Pilot
Comair Inc.
Orlando, Fl.

Captain McGann:

This is a requested report of an incident that occurred sometime approximately two years ago. Some of the exact details I may not be able to recall exactly.

I believe that on June 6, 1995, First Officer David Ryan and I were operating Flight 3574 from Orlando, Fl. to Miami, Fl. We were under the control of Miami TRACON at approximately 6:00pm in the evening.

We were on a southerly heading in good weather at about 4000 feet. We were on a modified base leg for Runway 30 at MIA. We were instructed to reduce airspeed a moderate amount. I believe back to 210 kts. We were given traffic instructions to watch for an American Airlines Airbus A310 that would be approaching from our right rear and slightly between us and the airport. It would be stopping 1000 feet above this. We were almost immediately given another speed restriction for the descending traffic.

We then saw the Airbus about one quarter of a mile off our right side descending from a high altitude. The airplane was in a clean configuration and descending at a very rapid rate. At the time of the second speed reduction, we were abruptly upset almost to a 90 degree bank angle. I immediately disconnected the Autopilot and we were upset almost to a 90 degree bank angle in the opposite direction. This happened twice more in both directions. We regained control of the aircraft and the flight continued without incident.

Upon reflection of the incident, I realized that when disconnecting the Autopilot my main concern was to level the wings and to maintain the aircraft upright. I now believe that this was only partially correct. By trying to maintain the wings level, the aircraft kept a relative constant heading. This kept us in the path of the wake turbulence. I believe that I could have taken a right angle heading and might have not been in the wake turbulence as long. I also referred the unusual attitude training that I had received during my annual checkride. I was very hopeful that I did not have to complete a roll over Biscayne Bay.

Sincerely,

[redacted]

Captain Steven Tedrow

Memorandum

TO: NTSB, Operations Group **DATE:** January 13, 1997

FROM: Brian J. Schimp, CRJ Program Manager

SUBJECT: Captain Dann Carlsen

On Thursday, January 9, 1997, at approximately 1400, I spoke with Captain Dann Carlsen.

When Captain Carlsen first arrived in my office, while I was busy at my desk, I stood up to shake his hand and talk with him briefly. We joked briefly about the fact that the handshake was merely a handshake and did not in anyway constitute a payment for his services. This comment was made because of the note which Dann had given me earlier in the day, which stated that the payment for some work which he had performed, could be repaid with what I felt it was worth, a "handshake" or 1,000 hours of paytime.

During the approximately 10 to 15 minutes that I was talking with Captain Carlsen, he did not display any unusual behavior, but displayed his typical and usual happy-go-lucky personality. During our conversation, we discussed the note that he had dropped off on my desk. The note was in reference to some technical performance engineering work which he had completed for the Regional Jet training department. During our conversation, we discussed the work that he had performed and he expressed that he was happy to have been able to complete it. He expressed that he enjoyed doing that type of work in his idle time.

Knowing that I needed to finish a few items prior to my own departure for Montreal Canada, I expressed this to him. We then briefly discussed his upcoming training in the Regional Jet and he once again expressed his interest in joining the Regional Jet training department. We finished our conversation with his request that I once again know his preference of conducting his own Regional Jet training in Berlin (Captain Carlsen was scheduled to begin training for the CRJ on February 2, 1997). This was his request due to the fact that Barbara (his wife) wanted to go back to Berlin.

In summary, I can say that Captain Carlsen appeared normal, alert and not distracted by any outside issues. He was himself, just like I had observed many times before.