NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Aviation Engineering Division
Washington, D.C. 20594

October 23, 1995

SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

A. ACCIDENT : DCA-95-MA-054

Location	:	Carrollton, Georgia
Date	:	August 21, 1995
Time	:	1252 Eastern Daylight Time
Airplane	:	Atlantic Southeast Airlines flight 529, Embraer EMB-120, N256AS

B. SYSTEMS GROUP

Chairman : John DeLisi
Aerospace Engineer
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Member : Gerry Shutrump
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Member : Arlen Jones
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Member : Beotis Wright
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Member : Dan Ford
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C. Summary

On August 21, 1995, at about 1253 eastern daylight time, an Embraer EMB-120RT, N256AS, operated by Atlantic Southeast Airlines crashed after departing the Atlanta Hartsfield International Airport, Atlanta, Georgia. The flight was a scheduled passenger flight carrying 26 passengers and a crew of three operating under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135. The flight was operating in accordance with instrument flight rules. While climbing through 18,000 feet, the flightcrew declared an emergency and initially attempted to return to Atlanta. The pilots advised they were unable to maintain altitude and were vectored toward West Georgia Regional Airport, Carrollton, Georgia for an emergency landing. The airplane crashed approximately 4 miles from the West Georgia Regional Airport. The airplane was destroyed by impact forces and postcrash fire. The captain and seven passengers received fatal injuries.

The systems group met at the accident site on August 22 - 24, 1995. Follow-on testing included an examination of several Flight Data Recorder potentiometers and the light bulbs from the Multiple Alarm Panel, in the Safety Board's Materials Laboratory. The investigation did not reveal evidence of any systems malfunctions.

D. DETAILS OF THE INVESTIGATION

1. CVR/FDR

The Flight Data Recorder (FDR) and Cockpit Voice Recorder (CVR) were mounted in the aft portion of the cargo bay. Both units were intact and remained in their mounts. They appeared in good condition with only minor sooting on the cases.

The CVR was a Fairchild Model A100A, S/N 57597, and the FDR was a Fairchild Digital FDR, Model F-800, S/N 04856. Both units were transported to Washington, D.C. for further examination by the CVR and FDR groups.

2. Cockpit Documentation

The cockpit was found at the main wreckage site. There was extensive fire damage and sooting throughout the cockpit. The positions of all switches and gage readings were documented and are listed in Appendix A. Some of the observations were as follows:

The right power lever was full forward and the left power lever was approximately 1" aft of full forward. The left condition lever was 4" forward and the right was 2 1/4" forward. Of these four levers, only the left power lever remained attached to the cable below the throttle pedestal. The right Nh (high turbine) RPM gage read 58%. All other engine and fuel flow gages had 0 readings. Both fire T-

handles were in the stowed position and both electric feather switches were in the off position. The prop sync switch was off. The left fuel tank boost pump switches were off and the right tank switches were in auto.

The flap handle and landing gear handle were both found in the up position. The flap handle and detents engaged normally. The rudder trim knob was 10 units nose right, the aileron trim knob was 7 units right wing down, and the elevator trim was 1/2 unit nose up.

The heat switches for the pitot-static, slip, and AOA sensors were all in the off position. The green hydraulic system electric boost pump switch was on and the blue system was in auto.

At the request of the Survival Factors group, the position of the crewmember seats was measured. Both seats were in detents along the seat track. The captain's seat aft slide was 2 1/4" forward of the seat track stop. The first officer's seat aft slide was 3 1/8" forward of the seat track stop.

3. Flight Control System

The airplane was found upright with the empennage twisted to the right. The right elevator was resting on the ground. Continuity was verified for the rudder, rudder trim, elevator, and elevator trim cables from the surfaces to the cockpit. The right aileron and aileron trim cables were continuous from the surfaces to a point of heavy fire damage just aft of the cockpit.

The airplane has hydraulically actuated flaps which utilize conventional actuators. The left inboard flap actuator had separated and was found with the rod bent in a position that corresponded to the retracted position. Both left flap tracks were found with roller exit marks in the retracted position. The right inboard and outboard flap actuators remained attached and were both found in the retracted position.

While the first officers rudder pedals were movable, crush damage prevented the group from moving the captain's pedals. Both control columns remained intact and were movable and interconnected.

4. Landing Gear

The nose landing gear was found in the retracted position. Both tires were inflated. Both main gear were found in the retracted position beneath their respective nacelles. The landing gear manual extension override electrical switches were in the normal guarded position. The manual release selectors were in the normal position.

5. Bleed Air/ Pressurization

An air cycle machine (S/N 83-6641R) turbine and several sections of bleed air duct were inspected. There was no evidence of oil contamination.

6. Auxiliary Power Unit

The APU generator switch and the start contactor switch were both on. A visual inspection of the APU was performed. The unit appeared in good condition, with no evidence of fire damage or other malfunction.

7. Engine Systems

The power control and condition lever cables were found attached normally at each engine nacelle. The flight idle lockout solenoids and stops were visually inspected and appeared normal. The flight idle solenoid circuit breaker panel was severely damaged by impact and fire. Due to the crush damage, many of the circuit breakers were in contact with fuselage structure. Nine of the 12 breakers on this panel, including both flight idle breakers, were found popped. Both engine fire extinguishing bottles were fire damaged and empty.

Both left wing fuel pump switches were in the OFF position while both right wing pump switches were in the AUTO position. The crossfeed valve switch was in the OPEN position. The fuel quantity gages both had 0 gallon readings.

8. Electrical System

The left and auxiliary generator switches were off, the right was on. The overhead circuit breaker panel had extensive fire damage. Many of the circuit breakers were melted away, leaving only the coiled springs remaining.

9. Multiple Alarm Panel

The Multiple Alarm Panel (MAP) and pitot-static, AOA, and slip probe heat indicator lights were analyzed in the Safety Board's Materials Laboratory. No evidence of light bulb filament stretching was seen.

10. Baggage

Baggage from the cargo compartment was removed and inventoried. There were 28 total pieces, including 1 foot locker, 2 duffle bags, and 1 shipping box.

11. Flight Data Recorder Potentiometers

According to the FDR Group Chairman, the rudder pedal position parameter, as recorded by the FDR, did not show the expected movement. At the request of the FDR group, the rudder pedal position potentiometer was removed for further examination.

During removal, the coupler which attaches the shaft of the potentiometer to the rudder pedal mechanism slipped off the shaft of the potentiometer. It fell into the wreckage below the cockpit floor and could not be recovered. The coupler is normally attached to the potentiometer shaft via a set screw.

The couplers on the other similar potentiometers (control wheel and control column) were examined and found to be securely attached.

According to ASA maintenance records, the rudder pedal potentiometer (P/N RP1814, S/N 79990641) was installed on the accident airplane in November 1990. The most recent calibration check was performed in June 1994. At that time, no discrepancies were noted during a three-point calibration check (neutral, full left, and full right).

ASA maintenance personnel did not recall any previous discrepancies involving these potentiometer couplers on their EMB-120 fleet. Two other EMB-120 operators were surveyed (Skywest and Comair). Neither reported any discrepancies with the potentiometer couplers on their EMB-120s.

[redacted]
John DeLisi
Systems Group Chairman
10/23/95

APPENDIX A

The following is a list of cockpit switch positions and gage readings as found:

Aft Panel

Cabin Pressure Switch	- AUTO
Emergency/Parking Brake	- OFF
Cabin Pressure Manual Controller	- DOWN
Cabin Altimeter	- 800 feet
Cabin Pressure Electric Controller	- Arrow: 4000 feet Baro Knob: 29.92"Hg Aileron Trim -
Rudder Trim	- 10 units nose right
Aileron Trim	- 7 units right wing down
Flap Handle	- 0° (Handle was bent left but moveable)
Stall Warning Panel	- SYS 1 - OFF (Guard open) SYS 2 - ON (Guard down)

Control Stand

Elevator Trim Indicators	- 1/2 unit nose up (both)
Power Levers	- Left: 1" back from full forward Right: full forward
Condition Levers	- Left: 4" forward Right: 2 1/4" forward
Friction Locks	- Moveable (both)

Forward Panel

Fuel Flow	- 0 (Left & Right)
Fuel Quantity	- 0 (Left & Right)
Fuel Totalizer	- Not readable
Elevator Disconnect Handle	- In
Aileron Disconnect Handle	- In

Pilot's Panel

EFIS Control Panel	- Composite Mode: OFF Display Source: NORM AHRS Attitude: NORM AHRS Heading: NORM

	VOR Course Dev: ANG
Audio Panel	- Not readable
Airspeed Indicator	- Less than minimum reading (40 knots)
Radio Magnetic Indicator	- Big Needle: 48°
	- Small Needle: 40°
Altimeter	- 1000 feet
	29.92" Hg
Vertical Speed Indicator	- 50 feet/minute climb
Engine Temperature Gage (T_6)	- Left: 0°
	Right: 0°
Torque Indicators	- Left: 0%
	Right: 0%
Propellor Speed Indicators	- Left: 0%
	- Right: 0%
High Press/Low Press Indicators	- Left: Both 0%
	Right: 58% H
	0% L
Oil Temp/Press Indicators	- Left: 0 psi (Both)
	Right: 0 psi (Both)

Copilot's Panel

EFIS Control Panel	- Composite Mode: OFF
	Display Source: NORM
	AHRS Attitude: NORM
	AHRS Heading: NORM
	VOR Course Dev: LIN
Audio Panel	- Not readable
Airspeed Indicator	- 168 knots
	Barber Pole at 300 knots
Radio Magnetic Indicator	- Big Needle: 100°
	- Small Needle: 22°
Altimeter	- 1000 feet
	29.91" Hg
Vertical Speed Indicator	- 300 feet/minute climb

Center Panel

Standby Horizon	- 90° right wing down
	10° nose down
Radio Master Switches	- ON (both)
Back-up Battery	- ARM
Weather Radar	- NORM

	Gain: MAX Tilt: UP Range: 100 nm
VHF/COMM #1	- ON
VHF/COMM #2	- ON
Transponder	- ALT

Center Glareshield Panel

Engine Fire Handles	- IN (both)

Overhead Panel

APU Start Contactor	- ON
APU Bleed	- OPEN
APU Generator	- ON
APU Fire Extinguisher	- DOWN (guarded)
Fuel Pumps - Left	- OFF (both)
Fuel Pumps - Right	- AUTO (both)
Fuel Crossfeed	- OPEN
Electric Feather Switches	- DOWN (guarded)
Auto Feather	- OFF
Prop Sync	- OFF
Engine Electric Controls	- TO (both)
Engine Start Switches	- Middle (spring-loaded)
Rudder Control Switches	- ON (both)
Anti-Skid	- ON (both)
Electric Hydraulic Pumps	- Left: ON - Right: AUTO
Leading Edge Deice Switch	- OFF
Engine Inlet Deice Switch	- OFF
Pitot, Slip, AOA Sensor Heat	- OFF
Windshield Wipers	- OFF
Windshield Heat	- OFF
Cockpit Temp Control	- MANUAL
W/S Defog	- OFF
Cockpit Recirculation	- OFF
Cabin Temp Control	- CABIN ATTENDANT
Cabin Recirculation	- OFF
Gasper	- MIX
Ram Air Inlet	- CLOSE
Bleed Switches	- Left: CLOSE Right: LOW
Crossbleed	- OPEN

Electrical Inverters	- ON (both)
Bus Transfer	- Normal
Aux Generator	- Left: OFF
	- Right: ON
Bus Cut Off Switches	- ON (both)
Generators	- Left: OFF
	- Right: ON
No Smoking Sign	- ON
Fasten Seat Belt Sign	- OFF
Emergency Lighting	- ARM
Landing Lights	- OFF (both)
Taxi Light	- OFF
Nav Lights	- ON
Beacon & Strobe Lights	- ON (both)
Inspection & Logo Lights	- OFF