NATIONAL TRANSPORTATION SAFETY BOARD
Office of Aviation Safety
Washington, DC 20594

October 30, 1995

STRUCTURES GROUP CHAIRMAN'S FACTUAL REPORT

DCA-95-MA-054

A. ACCIDENT

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

B. STRUCTURES GROUP

Chairman:	Frank Hilldrup National Transportation Safety Board Washington, DC
Member:	Arlen Jones Embraer Aircraft Corporation Ft. Lauderdale, FL
Member:	David Jones Air Line Pilots Association College Park, GA
Member:	Dennis Cannon Atlantic Southeast Airlines Macon, GA
Member:	Glenn White Federal Aviation Administration College Park, GA

C. SUMMARY

On August 21, 1995, at about 1253 eastern daylight time, an Embraer EMB-120RT airplane, N256AS, operated by Atlantic Southeast Airlines (ASA) and operated as flight 529, crashed after departing the Atlanta Hartsfield International Airport (ATL), Atlanta, Georgia. The flight was a scheduled passenger flight carrying 26 passengers and 3 crewmembers operating under the provisions of Title 14 Code of Federal Regulations (CFR) Part 135. The flight was

operating in accordance with instrument flight rules (IFR). 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. The airplane crashed while en route, approximately 4 1/2 miles southwest of the airport. The airplane was destroyed by impact forces and postcrash fire. The captain and seven passengers received fatal injuries.

There was no damage to ground structures or injuries to persons on the ground. Portions of all primary airframe structure and flight control surfaces were located in the debris field. The investigation revealed no evidence of inflight fire.

D. DETAILS OF THE INVESTIGATION

1. Wreckage and Impact Information

The wreckage was located within trees and an open grass field in a residential area approximately 4 1/2 miles southwest of West Georgia Regional Airport. The location of the main wreckage was identified by a Global Positioning System unit as 33° 34' 50.5" N latitude and 85° 12' 51.2" W longitude. A topographical map indicated a field elevation of approximately 1100 feet mean sea level.

Numerous trees were impacted prior to ground impact, and several ground scars were observed in the field. The first tree impact was located approximately 850 feet from the main wreckage and the last tree impact was located approximately 490 feet from the wreckage. The bearing from the last tree impact to the main airplane wreckage was approximately 330° magnetic.

The height and location of several of the impacted trees were obtained using a laser transit. (Data on most of the early tree impacts were not obtained.) The first two impacted trees were determined to have broken at points 57 feet and 56 feet above ground elevation. The heights of these tree breaks relative to the ground elevation of the initial ground scar (i.e., "relative height") were 35 feet and 31 feet, respectively. The last two impacted trees were broken at relative heights of 10 feet and 27 feet. The first tree breaks were consistent with a slight left-wing-down attitude; the last tree breaks were consistent with a greater left-wing-down attitude.

Debris from the airplane was found along the wreckage path in the wooded area and the field. The first pieces found in the wooded area were pieces of center wing fairing (from beneath the wing), propeller skin and core, a static wick, and the rotating beacon from the belly of the airplane. Also found in the wooded portion of the debris field were the air inlet boot and several pieces of the left wing, including the outboard seven feet (to the tip) and the entire left aileron trim tab. Several pieces of composite propeller skin and foam were found throughout the early portion of the debris field in the wooded area.

Several ground scars were observed in the field. The first ground scar was located approximately 40 feet northwest of the tree line, and several pieces of the left wing were located nearby. Two longer scars were located approximately 80 feet northwest of the tree line; the lateral distance between these scars (relative to the centerline of the wreckage path) was 11 feet. Debris from the airplane was scattered along the wreckage path in the field, with the majority of the debris on the right (east) side of the path centerline. The left engine's propeller assembly had separated and was located approximately 160 feet from the tree line. Several ground scars were observed between the initial ground scars and the main wreckage and a separated portion of the left wing. The location of tree strikes and the distribution of major pieces and ground scars are included in figure 1, Wreckage Distribution Diagram.

The main wreckage was located about 850 feet from the first tree strikes and about 490 feet from the last tree strikes. This wreckage consisted of the cockpit, fuselage, right wing and engine, and the empennage. Portions of two of the right engine's propellers remained attached to the propeller hub and engine. Most of the cabin had been destroyed by fire and an area of the grass leading up to and surrounding the wreckage was burned.

2. Fuselage

The fuselage had split near the wing into two sections. The forward fuselage section (including the cockpit) was upright and oriented along a magnetic heading of approximately 60°. The aft fuselage section (including the empennage) was oriented along a magnetic heading of approximately 180°. This section was resting on the right side of the fuselage and the inboard stub of the right horizontal stabilizer.

The forward fuselage from the radome to frame 13 (just forward of the passenger/crew entry door) was crushed in, aft, and up. The forward portion of this section was crushed inward to the left side of the nose landing gear wheel well. Inward deformation was less severe near the aft portion of the crushed area. The external fuselage skin forward of frame 13 was undamaged by fire except for an area of sooting aft and above the captain's side window.

Fire had destroyed the left side of the fuselage aft of the passenger/crew entry door to just forward of the cargo door. Fire had destroyed the entire right side of the fuselage from approximately frame 23 (near leading edge of wing) to frame 35 (about 2 seat rows forward of aft cargo section). The upper portion of the right fuselage forward of frame 23 to the cockpit had been destroyed by fire.

3. Wings

a. Left Wing

A section of the left wing with the nacelle and engine attached was found approximately 125 feet from the cockpit. The left wing from the fuselage to the left engine was intact except for two minor punctures in the upper leading edge aft of the de-icing boot and one

in the lower leading edge aft of the boot. The leading edge outboard of the engine was recovered from the debris field but was broken into several pieces. There were no cuts or gouges in the leading edge. Attached outboard of the engine were approximately 3 feet of front spar, 7 feet of upper wing skin, and 3 feet of rear spar. No lower skin was attached. The upper skin outboard of the engine was curled upward. No scraping or impact damage was observed on the top of wing skin outboard of the engine. The inboard and nacelle flaps and the inboard flap track for the outboard flap were attached. Damage to the flap tracks was consistent with the flaps in the retracted position at the time of separation.

b. Right Wing

The right wing remained attached to the fuselage. The wing inboard of the engine had been essentially destroyed by fire. There was no fire damage to the wing outboard of the engine. There was a small tree trunk embedded in the underside of the outboard leading edge. There was no damage to the de-icing boot outboard of the engine. The aileron was (visually) observed in a down position and the tab was faired. All flap segments appeared to be in the retracted position.

4. Empennage

The vertical stabilizer was intact and essentially undamaged except for two small punctures in the right side of the skin. There was no impact damage to the leading edge boot or the dorsal fairing. Only minor fire damage to the left forward area of the dorsal was observed. The rudder segments were intact. The only damage consisted of several small dents and buckles, most to the right lower side of the aft rudder. Both fore and aft rudder segments were observed deflected to the right, with greater deflection by the aft rudder.

The left horizontal stabilizer was intact except for the outboard 4 feet of leading edge that had separated. This piece was found in the trees approximately 500 feet from the cockpit with a portion of the leading edge crushed aft from a tree impact. The area of the stabilizer aft of this was crushed aft. The trailing edge of the left horizontal was intact and undamaged.

The right horizontal stabilizer had separated from just outboard of the elevator trim tab. The attached portion of the right horizontal stabilizer was undamaged.

The left and right elevators were observed near the faired position. The left elevator trim tab was observed in a slightly trailing-edge-down position. The right elevator trim tab was partially separated from the elevator.

5. #1 Engine Nacelle

The outboard member of frame 1 of the nacelle was deformed aft approximately 90° and twisted outboard slightly. There was also a semi-circular flattened area in the middle of the outboard member of frame 1. The "axis" of the flattened area was oriented upward

approximately 20° from the horizontal. The forward, inboard engine mount bolt had sheared in an upward and slightly outboard direction. The corresponding area of the attach fitting was smeared in the same direction. The engine inlet and the lower nacelle were bent inboard. The inboard nacelle skin exhibited buckling creases consistent with inboard movement of the nacelle.

The engine air inlet fairing and the forward portion of the forward cowling remained with the propeller/gearbox assembly but were deformed outboard. Both steel tubes connected to the forward and aft engine mounts were found separated from the terminal ends. The inboard tube was bent slightly; the outboard tube was not bent.

Five of the six hinges that secure the inboard and outboard forward cowling doors were attached but were bent in a direction consistent with up and aft movement of the cowling doors. The area underneath several of the hinges was damaged consistent with overtravel of the hinges. The forward, inboard hinge had separated, and the area of the inboard door where the hinge was attached was torn. The forward edge of both forward cowling doors was bent upward.

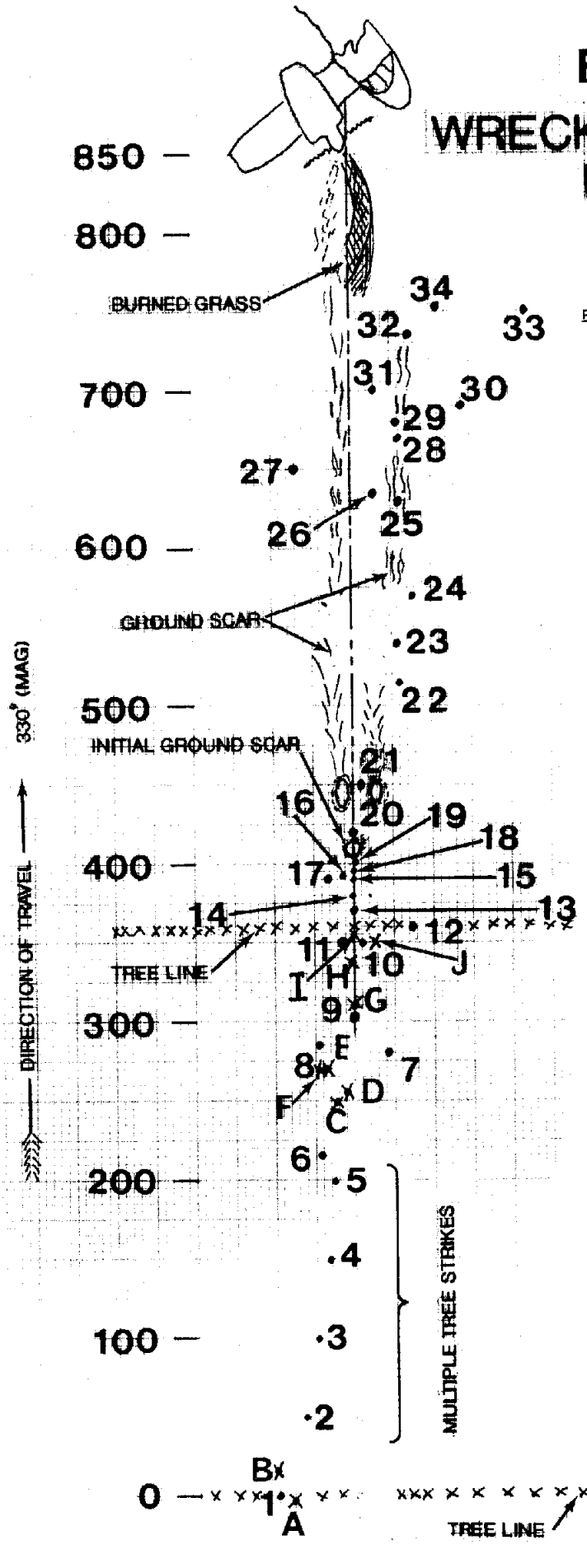
Portions of the following left engine/gearbox mounts were removed and submitted to the NTSB Materials Laboratory for examination of the fracture surfaces: upper and lower rod ends of the inboard and outboard torque mount assemblies; forward, inboard engine/gearbox mount bolt; and forward, outboard engine/gearbox mount. Examination of the fracture surfaces revealed no indications of fatigue or other pre-existing defects. The inboard engine/gearbox mount and the outboard engine mount bolt were intact and remained attached to the engine and the nacelle structure, respectively. No deformation was noted on the inboard engine mount. The forward, outboard engine/gearbox mount was deformed aft near the fracture location. No definitive failure directions were obtained from the upper rod ends, which had fractured near the first screw thread. Examination of the fracture surfaces of the lower rod ends revealed characteristics consistent with the fracture propagating inboard-to-outboard.

Frank Hilldrup
Structures Group Chairman

10/31/95

FIGURE 1

WRECKAGE DISTRIBUTION DIAGRAM



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PART NO.	DESCRIPTION
1.	PROP SKIN/CORE & FAIRING PCS.
2.	STATIC WICK
3.	ROTATING BEACON & PROP SKIN
4.	PROP SKIN & LH STAB. TIP
5.	HORIZONTAL TIP
6.	LH AILERON TRIM TAB
7.	L.E. SECTION
8.	SPAR SECTION
9.	LH WING, 7' OUTBD SECTION
10.	LOWER LH WING SKIN, 6' SECTION
11.	ENGINE GEARBOX COMPONENT
12.	LH AILERON, 3' OUTBD SECTION
13.	LH L.E. WING, 2.5' OUTBD SECTION
14.	LH AILERON, 3' INBD SECTION
15.	LH WING FRONT SPAR
16.	ENGINE GEARBOX COMPONENT
17.	HORIZONTAL L.E., 4' OUTBD SECTION
18.	LH WING REAR SPAR SECTION; LH OUTBD FLAP, OUTBD SECTION; HORIZ TIP L.E.;
19.	LH WING STALL FENCE
20.	RADOME UPPER SECTION
21.	LH OUTBD FLAP SECTION
22.	LH PROPELLER AND GEARBOX ASSY.
23.	HORIZ L.E. OUTBD & FRONT SPAR SECTION
24.	LOWER FUSELAGE SKIN
25.	OUTBD FLAP ACTUATOR & REAR SPAR SECTION
26.	OUTBD FLAP RIB AND TRACK
27.	LH PCU
28.	LH WING, OUTBD L.E.
29.	LH WING BOTTOM SKIN
30.	RH ELEVATOR AND HORIZ., 6' SECTION
31.	LH ENGINE FWD. NACELLE (FRAME 1)
32.	LH WING INBD SECTION & ENGINE
33.	LH EMERGENCY EXIT
34.	RH ELEVATOR, 4' SECTION

TREE	HEIGHT*
A	35'
B	31'
C	18'
D	19'
E	11'
F	13'
G	17'
H	15'
I	10'
J	27'

* (RELATIVE TO INITIAL GROUND SCAR ELEVATION)

• AIRCRAFT PART

X TREE

50 0 50 100

SCALE IN FEET

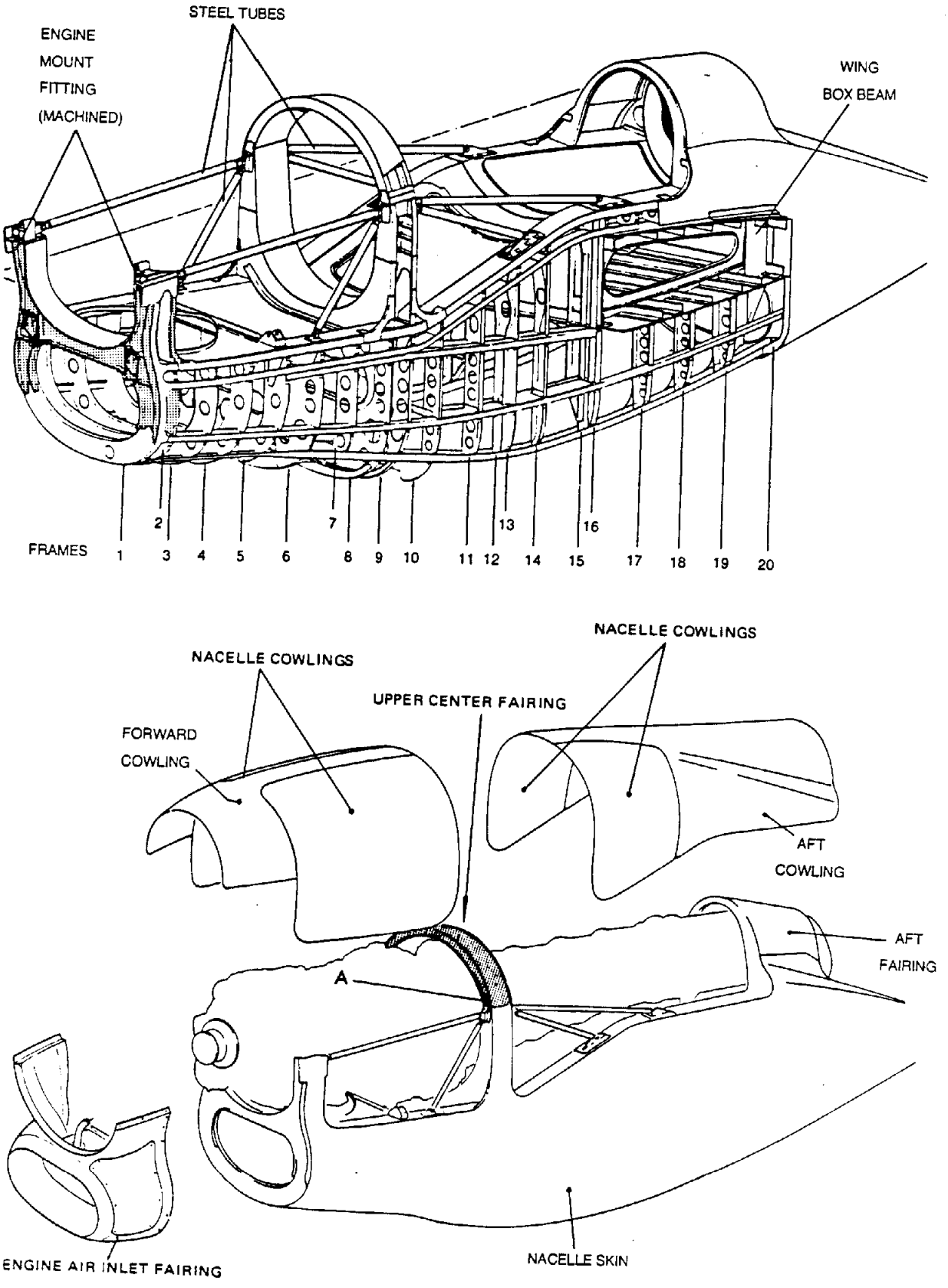

FIGURE 2. NACELLE STRUCTURE AND SKIN