

**NATIONAL TRANSPORTATION SAFETY BOARD  
WASHINGTON D.C.**

**September 12,2002**

**Structures Group Chairman's Factual Report of Investigation**

**DCA02MA054**

**A. ACCIDENT**

Location: Tallahassee, Florida  
Date: July 26, 2002  
Time: 0540 Eastern Daylight Time (EDT)  
Aircraft: FedEx Boeing 727-232, N497FE

**B. STRUCTURES GROUP**

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## C. SUMMARY:

On July 26, 2002, at approximately 0537 edt, a Boeing B-727-232, N497FE, operating as FedEx flight 1478, crashed into trees on short final approach to runway 9 at the Tallahassee Regional Airport (TLH), Tallahassee, Florida. The flight was operating under provisions of Title 14 Code of Federal Regulations Part 121, as a scheduled cargo flight from Memphis, Tennessee (MEM) to TLH. Night visual meteorological conditions prevailed at the time of the accident. The three flight crewmembers were injured, two seriously, and the aircraft was destroyed by impact and resulting fire.

The structures investigation included documentation of the wreckage distribution and damage to the airplane structure. Examination of the airplane was conducted at the accident site from July 26 to August 1, 2002.

Appendix A is survey of wreckage distribution, sketch/drawing-exhibit of the investigation

Appendix B is a photo-exhibit of the investigation

## D. DETAILS OF INVESTIGATION

### 1.0 Wreckage Distribution

The wreckage path is divided into two areas. The first area is the tree impact area extending from 3,650 feet to 2,520 feet as measured from the runway payment edge, for a distance of about 1,130 feet. (Note: All distances mentioned in this section are measured from the runway 09 payment edge, which is represented as "RP" on the wreckage distribution diagram). The second area is the open terrain area that extends from 2,520 feet to 1,556 feet, i.e. from the tree line to the main wreckage. The main wreckage was located 1,556 feet from RP and comprises of the fuselage, left wing, and the empennage.

The wreckage was spread across the tree covered ground and an open terrain over a distance of 2,100 feet. The first contact point of the airplane was with a tree (A) that was about 3,650 feet from RP, and broke at 48.3 feet above the ground. Ground elevation at this tree location was 100 feet mean sea level (MSL). Several trees were impacted along the flight path for a distance of about 1,130 feet, which is the tree-impact area of the wreckage path. The width of the tree swath at the beginning of the tree impact area measured 90 feet (between tree A and E), and gradually narrows down to 42 feet at the end (between tree QQ and TT). The height of the broken trees at the narrow end of the swath was 7.9 feet (tree QQ) on the right side and 31.7 feet (tree TT) on the left side of the swath. The ground elevation at the end of the tree swath measured 88 feet MSL. There was no evidence of any fire in the tree impact area of the wreckage path.

The first piece of the airplane found on the wreckage path was a 3” by 2” piece of leading edge flap. This was found 3,379 feet from RP. About 20” long piece of the right wing outboard trailing edge flap (item 3) was found 3,340 feet from RP. Most of the leading edge and the trailing edge control surface of the right wing were fragmented in small parts and were found in the tree impact area of the wreckage path. A small section of right wing tip (item 24a) was found about 2,900 feet from RP. Just forward of this location, the right wing tip strobe light (item 40) was located about 2,820 feet from the runway. Most of the right wing flap jack screws; leading edge and trailing edge flaps and slat tracks were located in this area.

The first ground scar from the airplane was located about 2,690 feet from RP. This ground scar was about 45 feet long, 3 feet wide and 1 foot deep fan shaped and was located in the middle of the tree swath. The elevation at this location measured 89.7 feet MSL. A large section of right horizontal stabilizer and elevator (item 45) were found 2,609 feet from RP. This was the first significant piece found from the empennage of the airplane. Two pairs of ground scar from the airplane were located at 2,531 feet (item 55) and 2,450 feet (item 127) from the RP respectively. A large fan shaped ground scar about 20 feet long and 1 foot deep was located 2,405 feet (item 63) from the RP. Sections of right wing stringers were embedded in this ground scar. A large right wing outboard section (item 62) was found 2,405 feet from the RP. There was no evidence of fire to these sections of the structure.

The airplane made a swath on the ground in the open terrain area. The swath was about 29 feet wide from the end of the tree impact area to about 120 feet wide near the main wreckage. This swath exhibited evidence of fire on the ground from 2,353 feet from the RP to the main wreckage. Most of the parts found on the ground swath exhibited evidence of fire. Large section of lower wing skin (item 105), upper wing skin, center fuel tank structure were located on the swath with fire damage. A fence post was knocked off the ground at 1,751 feet from the RP. A small section of radome (item 117a) was found near the fence post. The last piece on the wreckage was the nose landing gear wheel assembly with both the tires (item 129). This was found 1,249 feet from the RP.

Some important data points:

Aircraft resting Heading:	260 degrees
Runway elevation at RP:	59.9 feet MSL
Average height of unbroken trees:	48 ft
Elevation at first ground scar:	89.7 feet MSL
Elevation at first impact tree:	100 feet MSL
Elevation at last impact tree:	88 feet MSL
Elevation at the main wreckage:	64.4 feet MSL

## 2.0 Structures

### 2.1 Fuselage

The fuselage was damaged by impact and destroyed by an intense post crash fire. It was found about 1,556 feet from the approach end of the runway 09 payment (RP) resting on its belly with severe fire damage. The heading was about 260 degrees.

The fuselage section from the nose to Sta 227 and below the cockpit window remained intact with fire damage just below the right side cockpit windows and sooting on the left side. Structure above the cockpit windows exhibited fire damage. The radome remained attached to the fuselage forward bulkhead with 3 feet by 4 feet dent on the left side; the right side of the radome was fractured. The right fuselage section from Sta 219 to Sta 312 above the nose landing gear suffered severe impact damage. The skin and major structure were pushed inward. There was evidence of scrape marks at 45 degrees in this area. The interior cockpit area suffered severe fire damage with melting aluminum. All 5 windows on the left side remained intact with fire damage. Number L2 sliding window was found in the open position. Right side windows number L1 remained intact with fire damage. Windows R (2,3,4,5) were missing. The primary crew entry door was found in the open position with no fire damage. The internal handle was in the closed position. The external handle was found out of its recess position. The crew entry slide was missing and found about 100 feet fwd of the airplane.

The entire fuselage crown from Sta 312 to Sta 1109 (aft bulkhead) was consumed with fire. The left fuselage from Sta 930 to Sta 1090 was burned through from crown to below the window belt. The main cargo door remained closed and exhibited severe soot damage. There was evidence of severe scrape marks on the lower fuselage skin from the nose to the main landing gear (MLG) area. Lower fuselage aft of the MLG suffered slight scrape marks. The remaining portion of the fuselage skin that was not burned through in the section between Sta 870 to Sta 1464 exhibited severe soot damage. Engine #1 remained attached with severe soot damage on the cowling. The left main landing gear remained attached in the down and locked position with the main landing gear door attached to the fuselage. The left main landing gear strut door was missing and was found on the wreckage path.

The right fuselage suffered severe fire damage. Large portions of the fuselage section were consumed by fire. The right main landing gear separated from the fuselage and was found laying near the right main landing gear wheel well. The #3 engine separated from the aircraft and was found near the forward right fuselage. The nose wheel with inner cylinder had separated from the aircraft and was found about 320 feet away from the aircraft (item 129).

## 2.2 Wing:

The left wing remained attached to the fuselage with localized fire and impact damage. The inboard landing light was missing and the structure around the landing light suffered impact damage. The inboard wing fairing (near the root) was damaged. All 3 leading edge flaps exhibited impact and fire damage with portions of structure missing (about 12 inch from #3 flap, 3 feet from #2 flap, and 2 feet from #1 flap). The outboard landing light on #1 leading edge flap was broken. All 4 slats were extended and remained attached to the wing with the exception of # 1 slat, which was found partially detached. The outboard 3 feet of the # 2 slat was dented and buckled. The left wing tip exhibited no impact or fire damage and all lights and glass remained intact. The static dischargers remained attached with no damage noted. The outboard aileron and trim tab remained attached with no damage. The outboard trailing edge aft flap remained attached and exhibited impact damage with a 6 foot section missing. A farm tractor was found under the inboard flap and aileron. The # 2 flap jackscrew fairing was torn and bent outward. Inboard aileron and trim tab remained attached to the wing with no damage. Left inboard trailing edge aft flap was broken about 4 feet from the outboard end and exhibited fire and soot damage at the inboard end. The fixed leading edge from root to WS 224 was dented on the upper skin. About 5 feet by 4 feet section of the fiberglass honeycomb panel aft of the rear spar over the left main landing gear wheel well was burned. The upper and lower wing skin remained attached to the front and rear spar. The inboard portion of the upper skin from the root to the outboard aileron exhibited soot damage. The lower skin has soot damage at the inboard end. Forward fuel boost pump panel near the wing root was missing. The #3 flap track movable fairing was damaged and dislodged. The #4 flap jack screw movable fairing exhibited fire damage.

The entire right wing, from the wing root to the tip, was fractured into numerous pieces. These pieces were found on the wreckage path. The wing tip shattered into small pieces and was found near the tree impact area of the wreckage path. Majority of the primary and secondary flight control surfaces fractured into small sections after contacting with trees, and were found in the tree impact area. There was no evidence of fire to these fragmented flight control pieces. Wing stringers pieces (item #69A) were found buried in the trench about 2,356 feet from RP. The outboard section of the wing from WS 629 to WS 760, was the first significant section of the wing (item # 62) found on the wreckage path. This piece was found outside the tree impact area with upper and lower skin attached to the front and rear spar section. There was no evidence of fire damage to this section. A large section of lower wing skin, about 34 feet long, with 15 fuel tank access panels and right main landing gear support beam was found closer to the main wreckage (item # 105). About 21 feet of upper wing skin was lying on top of this section (item # 105A). Both these pieces exhibited severe fire damage. A large section of wing rear spar (about 11 feet long section (item #97) of center wing tank (CWT) with inboard wing stringers) was also found with fire damage near this area.

### 2.3 Empennage:

The vertical stabilizer remained attached to the aft fuselage with severe soot damage. The rudder and rudder trim tab remained attached to the vertical stabilizer with soot damage. There was no evidence of any impact damage to the vertical stabilizer and the rudder.

The left horizontal stabilizer remained attached to the vertical stabilizer with sooting on the upper and lower skin at the inboard end. The leading edge exhibited impact damage from leading edge Sta 25 to Sta 32. The left elevator and trim tab remained attached to the left horizontal stabilizer. The elevator counter balance weight had separated from the elevator and was found on the ground at the main wreckage. The elevator trailing edge exhibited a "U"- shaped damage at the outboard end. This "U" shaped damage was from the trailing edge to leading edge and was about 30 inch in diameter from Sta 173 to Sta 209. The inboard section of the elevator exhibited fire damage.

Right horizontal stabilizer and elevator were severely damaged. About 4 foot by 6 foot section of outboard horizontal stabilizer (from Sta 136 to the tip) (item 45) had separated and was found on the wreckage path. This section was found in the tree impact area of the wreckage path with no fire damage. Section of the right horizontal stabilizer from Sta 65 to Sta 136 and from leading edge to the aft spar, had fractured but remained attached with its upper skin. This section was found hanging down. A 6-foot section of outboard elevator with counter balance weight was found on the wreckage path with the outboard horizontal stabilizer section. The elevator trim tab remained attached to the elevator section. A 6-inch section of the upper skin on the elevator trim tab was missing. Remaining part of the elevator and trim tab had fire damage. Inboard leading edge of horizontal stabilizer from root to Sta 20 exhibited "U" shape damage about 8 inches in diameter. About 3 foot large section of the right horizontal leading edge from Sta 25 to Sta 60 was dented and torn.

### 2.4 Landing gear:

The left main landing gear remained attached to the main landing gear trunnion support beam and forward trunnion mount. Side drag brace remained attached to the fuselage. The left main landing gear was found in the down and locked position with main landing gear door attached to the fuselage. The outboard tire was inflated and the inboard tire was found deflated. Both tires did not exhibit any visible damage. One brake de-boosters was missing and was found on the wreckage path. Second de-boosters remained partially attached. The left main landing gear exhibited soot damage and the main landing gear door remained attached with fire damage to the leading edge. The main landing gear strut door was missing and was found in the wreckage path.

The right main landing gear separated from its forward and aft trunnion points and found next to the fuselage with fire damage. Both the tires exhibited fire damage. The outboard tire has signs of a blow out and the inboard tire was deflated. Main landing

gear strut forward brace and trunnion remain connected and side drag brace was broken at the fuselage attach point.

A portion of nose landing gear remained attached to nose landing gear trunnions. There was evidence of severe structural damage to right nose landing gear trunnion and associated structure. The left side of the trunnion remained attached to the wheel well structure with no damage. There was no evidence of fire damage to nose landing gear. Nose landing gear down lock drag brace was found in a folded position. Nose wheel steering cylinder remained attached to the outer cylinder with minor damage. A 14-inch long portion of nose landing gear outer cylinder was missing and found in the wreckage path (item # 99). Both nose wheels with tire and the nose landing gear inner cylinder was missing and was found about 320 feet from the main wreckage. Both the nose landing gear tires were inflated with no visible damage. Left nose landing gear door remained attached and right nose landing gear door was missing and found in wreckage path.

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