NATIONAL TRANSPORTATION SAFETY BOARD
OFFICE OF AVIATION SAFETY
WASHINGTON, D.C. 20594

July 19, 2001

SYSTEMS GROUP CHAIRMAN'S FACTUAL REPORT OF INVESTIGATION

DCA01MA034

A. ACCIDENT

Operator:	Avjet Corporation
Aircraft:	Gulfstream III (N303GA)
Location:	Aspen, Colorado
Date:	March 29, 2001
Time:	19:02 Mountain Standard Time

B. SYSTEMS GROUP

Chairman	Steven Magladry National Transportation Safety Board Washington, DC
Member	Jeff Fritz Avjet Corporation Burbank, CA
Member	Tim Centivany Gulfstream Cincinnati, OH
Member	Mark Moss Gulfstream Seattle, WA

C. SUMMARY

On March 29, 2001, at 19:02 Mountain Standard Time (MST) a Grumman Gulfstream III, registration number N303GA, operated by Avjet Corp., was destroyed when it collided with terrain about 0.4 miles northwest of the Aspen-Pitkin County Airport, Aspen, Colorado. The 2 crew, 1 flight attendant and 15 passengers were all fatally injured. The accident site was about 100 feet above the airport elevation of 7815 feet. The flight arrived under Instrument Flight Rules (IFR) and had reported the airport in sight. The flight was operating on an IFR flight plan under 14 CFR Part 135 operations. The weather at 18:53 was: wind 250 degrees at 3 knots; visibility 10 miles; and light snow, few clouds at 1500 feet, ceiling 2500 feet broken, 5000 feet broken.

Approximately 10 minutes after the accident the visibility decreased to 1-¾ miles in light snow.

The Systems Group was formed on March 30th and convened at the accident site. The group recovered and examined most of the flight instruments in the area of the cockpit wreckage. The group identified and documented the condition of the flight control system components, landing gear, pneumatics and auxiliary power unit.

The main landing gear were found still attached to the wing structure, in a retracted position. The landing gear handle was not found, but the handle knob was located. The knob contains lights which illuminate when the landing gear is in transit. Examination of the landing gear handle lights was performed by the Group Chairman between 4 - 8 June 2001. The examination did not provide conclusive evidence that the lights were illuminated at impact.

A review of the Cockpit Voice Recorder revealed some warnings from the Ground Proximity Warning Computer (GPWC) and Flight Profile Advisory (FPA) unit. The GPWC was found in the wreckage and retained for possible future testing.

This factual report summarizes the findings for all on-site activities and follow-up investigation. Supporting documentation, which includes a description of the condition of the cockpit instruments (Appendix A) is attached.

D. DETAILS OF THE INVESTIGATION

1.0 Cockpit

Most of the flight instruments and panels were recovered in the vicinity of cockpit wreckage. Figure 1 shows the cockpit wreckage, which included parts from the electrical equipment center to the nose of the airplane. All of the instruments were separated from the panels, so we were not able to determine which instruments were the captain's versus which were the first officer's. Though the instruments experienced varying degrees of damaged, the indications of the instrument were recorded and are provided in Appendix A.

Figure 1. Cockpit wreckage.

2.0 Flight Controls

2.1 Flaps

The Gulfstream III has one single slotted trailing flap on each wing. Each flap can be moved to one of four positions 0° (Up), 10° (Takeoff), 20° (Approach), and 39° (Full Down). Each flap travels on four flap tracks and is actuated by two jackscrews. The flap is connected to the each jackscrew by a traveling nut, which moves along the jackscrew as it is rotated.

Both flaps were found separated from the wing, near the wing structure. Figure 2 shows the wreckage. The view is of the top of the wings with the left wing on the right side of the photo. A large portion of the left flap can be seen above the left wing. All four jackscrews were found with the traveling nut still attached to the jackscrew and portions of flap structure. The position of the traveling nut on all four jackscrews was within approximately ½ inch from the jackscrew down mechanical stop. According to Gulfstream this position corresponds to flaps in the Full Down or 39 degree position.

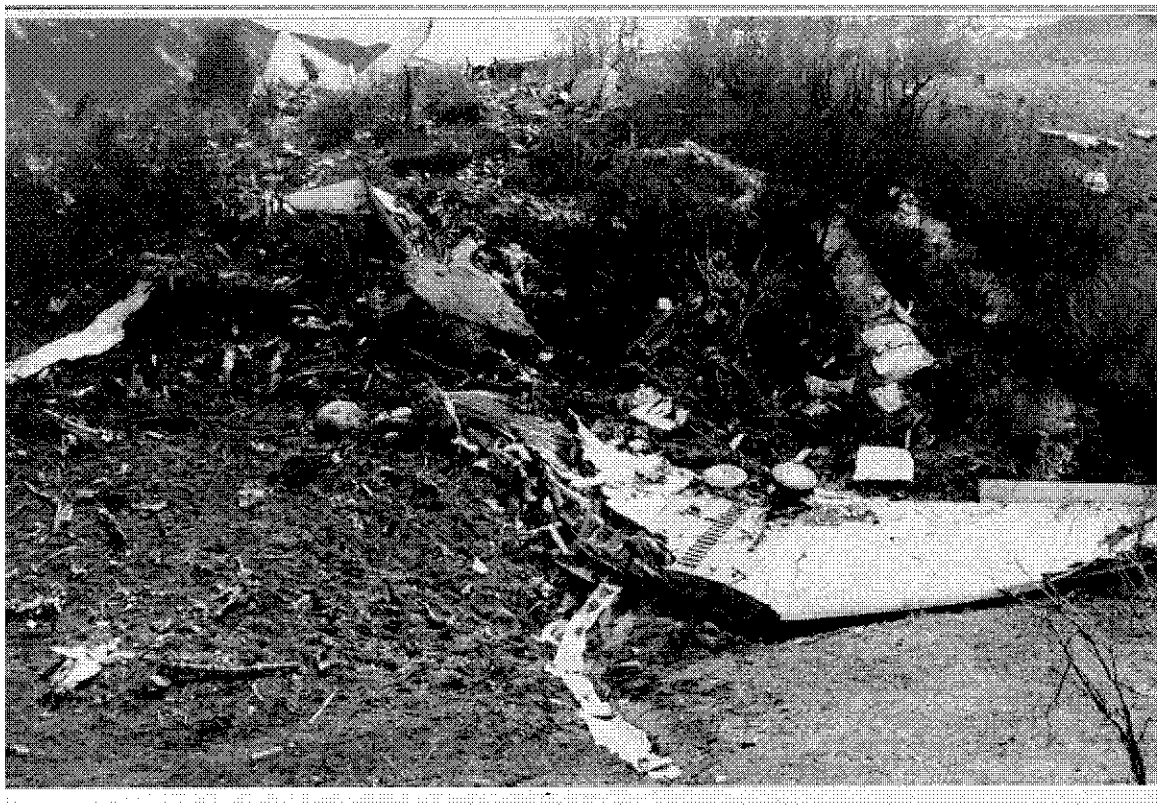

Figure 2. Wings, Flaps, Ailerons and Main Landing Gear.

2.2 Horizontal Stabilizer

The Gulfstream III has a horizontal stabilizer that moves only as a function of flap position. With the flaps in the Full Down position, the stabilizer moves to 6 +/- ¼ degree leading edge down (LED).

The horizontal stabilizer was found still attached to the vertical stabilizer. Figure 3 shows the empennage wreckage. The horizontal stabilizer was determined to be in approximately the 6 degree LED position, as determined by the position of the leading edge relative to index marks on the vertical stabilizer.

2.3 Ailerons

The Gulfstream III has one aileron on each wing, located just outboard of the flap. Both ailerons were found separated from the wing structure, but in the area of the main wreckage. All of the aileron attachment points fractured in the area were the support fittings attach to the rear spar of wing, except the center hinge of the left aileron, which separated due to a fractured hinge bolt.

The right aileron actuator was still attached to the rear spar, but the spar was separated from the wing structure. The actuator had approximately 2 inches of piston showing. However, the piston moved easily and the measurement could not be considered representative of the impact condition. The left aileron actuator was not identified in the wreckage.

2.4 Elevators

Both elevators were still attached to the horizontal stabilizer and the actuators were found intact.

2.5 Rudder

The rudder was still attached to the vertical stabilizer and un-damaged. The rudder actuator was found intact.

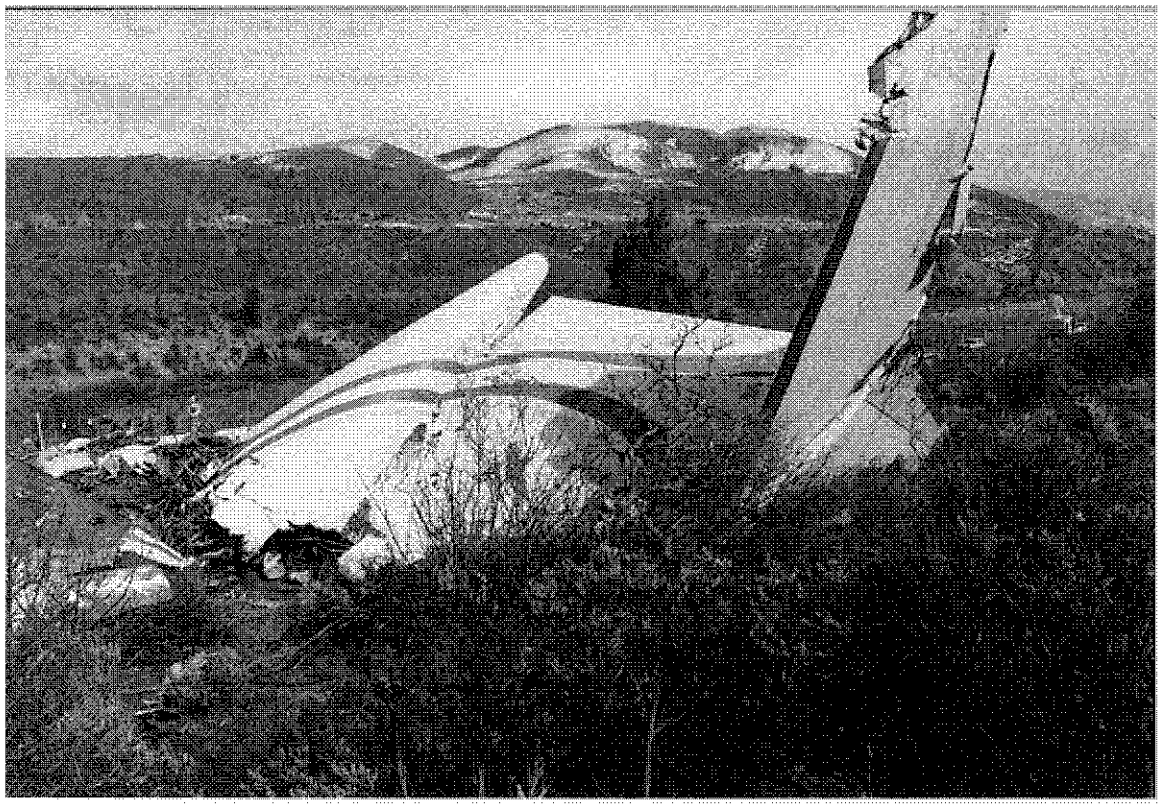

Figure 3. Empennage.

3.0 Alerting and Warning Systems

According to Avjet records this airplane was equipped with a Collins, FPA-80 Flight Profile Advisory (FPA) unit, as well as an AlliedSignal Mark VI Ground Proximity Warning Computer (GPWC). These units provide alerts and warnings to guard against inadvertent controlled flight into terrain.

The FPA is capable of providing announcements of radio altitude from 1000 feet to 100 feet in 100 foot increments. It can also provide alerts for deviation from selected altitude and for extreme attitude. Any of the alerts can be inhibited, if desirable, by modification of airplane wiring.

The GPWC can provide alerts for excessive descent rate (SINK RATE, PULL UP), excessive closure rate to terrain (TERRAIN TERRAIN, PULL UP), insufficient terrain clearance (TOO LOW TERRAIN, TOO LOW GEAR, TOO LOW FLAPS), altitude callouts (500, 200) and excessive bank angle (BANK ANGLE).

A review of the cockpit voice recorder revealed that both systems were providing overlapping altitude callouts. According to the Collins manual for the FPA, "It is not desirable to have two different systems providing a callout for the same condition." It also states that particular callouts can be inhibited by altering the airplane wiring.

The GPWC was located in the wreckage and retained for possible future testing.

4.0 Landing Gear

The Left Main Landing Gear was found still attached and mostly undamaged; tires inflated with little mud on inboard tires, wheels or brakes (Figure 4). The struts and tires were pressurized. The side brace actuator was attached at the both ends. The gear was in the up position, but up past the normal full up position. No damage to the strut attachment points at the wing structure (sponson rib) was observed.

Figure 4. Left Main Landing Gear

The Right Main Landing Gear was found still attached and mostly undamaged; tires inflated with little mud on inboard tires wheels or brakes. The struts and tires were pressurized (Figure 5). The side brace actuator was attached to the gear on one side, but was separated from the endcap at the wing rear beam attach fitting. The gear was past the full up position. No damage to the attachment points (sponson rib) was observed.

Figure 5. Right Main Landing Gear.

The inboard main landing gear doors separated from the wing box structure. The left door was located approximately 40 feet south of the location of the left wing. The door had slight damage; the forward lower corner was bent outboard. The right door was located approximately 10 feet south of the location of the wing box. The door had very slight structural damage. The door actuators were detached from the doors, but remained attached to the support structure in the wing box, and were in the extended position.

The Nose Landing Gear fractured at two places. The tires were on the wheels and attached to the shock strut piston, which was fractured below the steering unit (Figure 6). The wheels and tires were coated with a heavy layer of mud. The nose gear steering shock strut cylinder fractured near the upper trunnion attachment point (Figure 7). The segment which included the steering shock strut cylinder was located closest to the initial impact point, in the bottom of the ravine. The upper trunnion attachment point was approximately 40 yards southeast of the cylinder in the wreckage, which included the flight compartment. The segment which included the wheels was approximately 25 yards southeast of the upper trunnion attachment point.

The nose gear doors were found in the nose wheel well structure. The doors were damaged in compression.

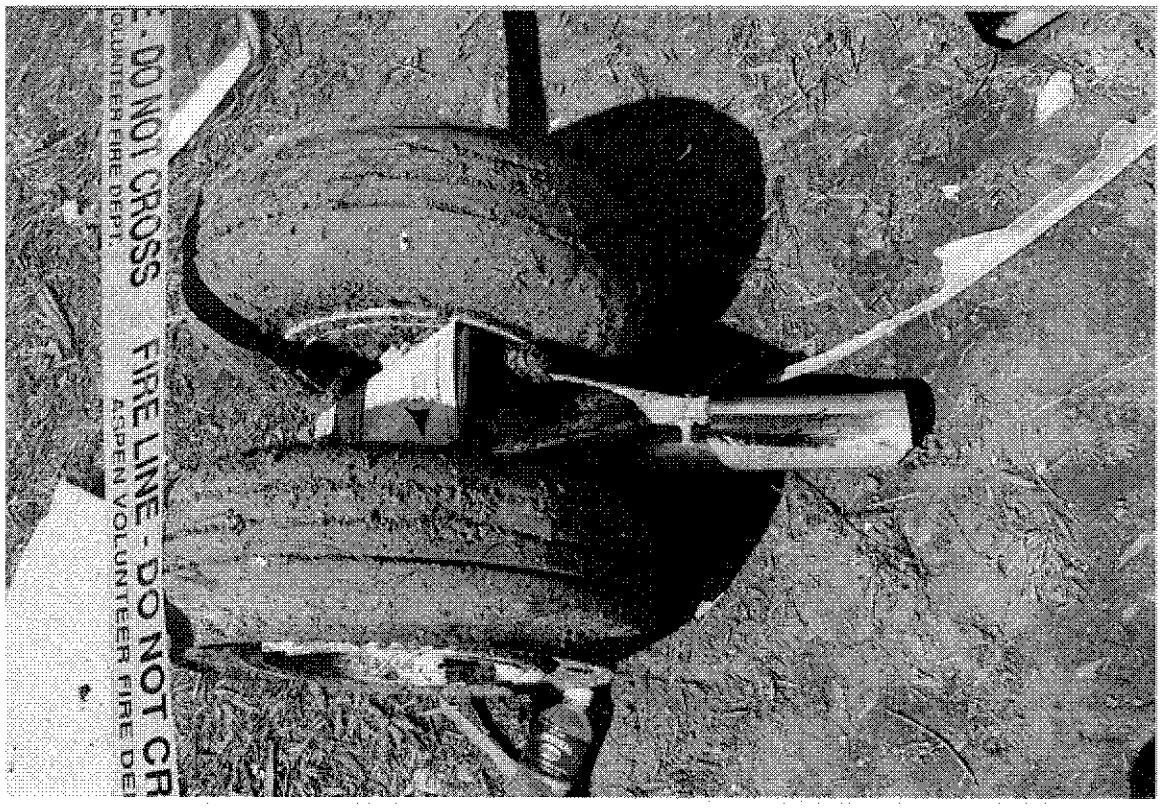

Figure 6. Nose Gear Wheels and Portion of Strut Piston.


Figure 7. Nose Gear Steering Shock Strut Cylinder.

5.0 Pneumatics

The Engine Bleed Air Regulator and Shutoff Valves were located, one on each engine. The engine #1 valve was found in the closed position. The engine #2 valve was found in a position between closed and open.

6.0 Auxiliary Power Unit

The APU was intact, contained within its stainless steel enclosure. There was no evidence of fire.

7.0 Examination of the Landing Gear Handle Lights

The lights were removed from the landing gear handle. The red outer lens cover was cut away from both lights to reveal the bulbs. The bulbs were washed and examined under a stereo microscope. The filaments in each bulb exhibited signs of general deformation, as well as multiple fractures.

Steven H. Magladry, Aerospace Engineer