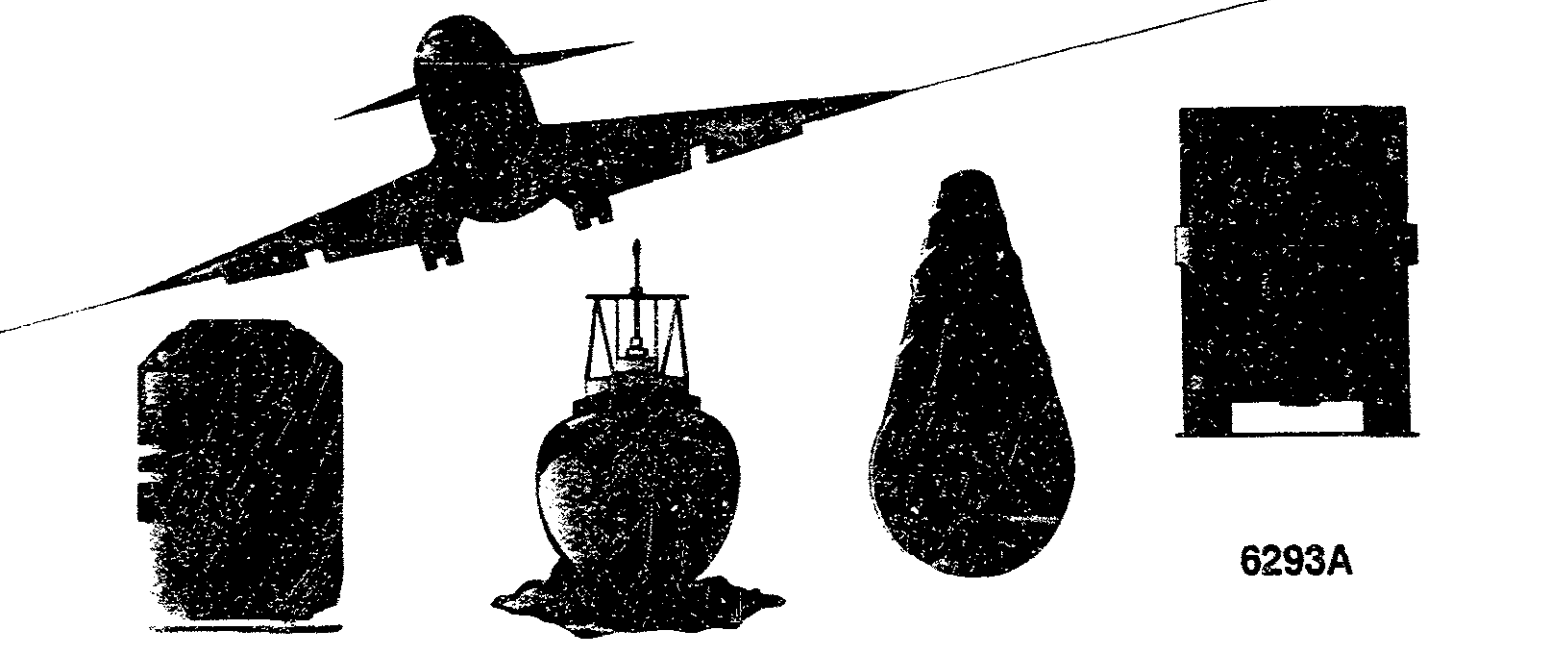
PB94-910408
NTSB/AAR-94/06

NATIONAL TRANSPORTATION SAFETY BOARD

WASHINGTON, D.C. 20594

AIRCRAFT ACCIDENT REPORT

OVERSPEED AND LOSS OF POWER ON BOTH ENGINES DURING DESCENT AND PQWER-OFF EMERGENCY LANDING SIMMONS AIRLINES, INC., d/b/a AMERICAN EAGLE FLIGHT 3641, N349SB FALSE RIVER AIR PARK, NEW ROADS, LOUISIANA FEBRUARY 1,1994



6293A

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OVERSPEED AND LOSS OF POWER ON BOTH ENGINES DURING DESCENT AND POWER-OFF EMERGENCY LANDING

SIMMONS AIRLINES, INC., d/b/a AMERICAN EAGLE FLIGHT 3641, N349SB FALSE RIVER AIR PARK, NEW ROADS, LOUISIANA FEBRUARY 1, 1994

Adopted: September 27, 1994
Notation 6293A

Abstract: This report explains the emergency landing of American Eagle flight 3641, a Saab 340B airplane, at False River Air Park, New Roads, Louisiana, on February 1, 1994. The safety issues in the report focused on the safety hazards involved with the in-flight operation of propellers in the beta mode in airplanes for which such operation is prohibited. The Safety Board reiterated Safety Recommendation A-94-62, which is intended to prevent the in-flight beta operation unless the airplane is certificated for such use.

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EXECUTIVE SUMMARY

On February 1, 1994, at 2140 central standard time, Simmons Airlines/American Eagle flight 3641, a Saab 340B, registration N349SB, operating under Title 14 Code of Federal Regulations, Part 121, sustained substantial damage during a forced landing at False River Air Park, New Roads, Louisiana. Of the 23 passengers, 2 flightcrew, and 1 flight attendant aboard the airplane, there was one minor injury to the flight attendant during evacuation. There was no postcrash fire.

The National Transportation Safety Board determines that the probable causes of this accident were the captain's movement of the power levers below flight idle in flight, the inadequate certification requirements and consequent design of the airplane's power levers that permitted them to be moved below the flight idle position into the beta range, either intentionally or inadvertently, while in **flight,** and the inadequate action taken to require a positive means to prevent beta operation on airplanes for which such operation is prohibited.

The safety issues in this report focused on the safety hazards involved with the in-flight operation of propellers in the beta mode in airplanes for which such operation is prohibited. The Safety Board reiterated Safety Recommendation A-94-62, which **is** intended to prevent the in-flight beta operation unless the airplane is certificated for such use.

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SIMMONS AIRLINES, INC., d/b/a AMERICAN EAGLE FLIGHT 3641, N349SB FALSE RIVER AIR PARK, NEW ROADS, LOUISIANA FEBRUARY 1, 1994

1. FACTUAL INFORMATION

1.1 History of the Flight

On February 1, 1994, at 2140 central standard time (cst),[1] Simmons Airlines/American Eagle flight 3641, a Saab 340B, registration N349SB, operating under Title 14 Code of Federal Regulations (CFR), Part 121, sustained substantial damage during a forced landing at False River Air Park, New Roads, Louisiana. The 23 passengers and 2 pilots aboard the airplane were not injured. The one flight attendant received a minor injury during evacuation.

At 2114:25, while en route at flight level 210 (FL210), in visual meteorological conditions (VMC), on a direct flight from Dallas/Fort Worth International Airport (DFW) to Baton Rouge Airport (BTR), Houston air route traffic control center instructed the flight to "descend at pilot's discretion...maintain one one thousand [feet]...," in preparation for an approach to BTR. The first officer acknowledged the transmission. The captain was the "flying pilot" (operating the flight controls and engine controls), and the first officer was performing the "nonflying pilot" duties.

During, the descent, at. 2120:09, the cockpit voice recorder (CVR),[2] recorded through the cockpit area microphone (CAM), the start of a sound similar to

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[1] Unless otherwise indicated, ail times are cst, based on a 24-hour clock.

[2] The transcript of the CVR is contained in appendix B.

the airspeed overspeed warning. The warning sound stopped about 13 seconds later.

At 2120:35, the first officer began to read to the captain the automated terminal information service (ATIS) "information Whiskey" for BTR. The information indicated "visuals [approaches] to [runways] three one and two two right,'

When told by the first officer that the wind speed at BTR was "light and variable," the captain said, "well what the heck's wrong with the instrument landing system [ILS] to runway one three?" The first officer responded, "...nothing, they'll probably give it to us."

The first officer then said, at 2121:25, "Let's *see,* the airport's on the sixty-three radial, eight miles from Baton Rouge...so the airport's on this ah (nah)...the airport's on the other side of the VOR [very high frequency omnidirectional radio range]."

At 2121:47, the captain said, "Well, what I was thinking about instead of going clear around and coming back in is just making a (unintelligible word)...yah know instead of going out and back just come out like that." The first officer replied, "He91 prc'sably yeah...he'll probably let us do it...two eighty-four you got it *set* in?"

At 2*t22:*10, the captain stated, *"Man,* we're almost the speed of heat here...two sixty-four...or two-sixty two...three sixty-two.'" At 2124:32, he said, "gosh, we gotia come down."

At 2125:01, the flightcrew was told by the Houston air route traffic control center to contact Baton Rouge approach control (BTR). When *the* flightcrew checked in with BTR, at 2125:16, the first officer reported that the flight was out of "fifteen [thousand] five [hundred feet] for one one thousand [feet]." When told by the BTR controller, 'Wind is calm expect a visual approach...what would you like," the first officer replied, "How about [runway] one three, we'll just shoot straight in there."

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[3]In the postaccident interview, the captain stated that the airplane's speed was high in the descent, and that as the airplane descended from about 12,000 fect through about 10,000 feet, turbulence began to increase.

The BTR controller then instructed the flight, "Roger, fly heading one one zero, intercept the localizer, expect the visual approach runway one three...descend and maintain two thousand...." The flight responded, "Okay ...down to two thousand ...."

Still in the descent, at 2125:51, the captain said, 'Weil, let's go ahead and *hit* the lights and the seatbelt and all." The first officer responded, "Okay." The captain then said, "Scream this baby down some more...I'll get 'em."

The captain announced to the passengers on the public address system, at 2126:03, that they were, "About thirty-five miles from Baton Rouge, be on the ground in a b u t ten minutes."

At 2127 19, the captain said, "A little bouncy bouncy here. I wonder what's causing that?" The first officer replied, "I don't know ...with calm winds down there you got something right in that this cloud layer or something." The captain replied, "Yeah."

The captain then said, at 2127:41, "Yeah, we'll just ...kinda slow this baby up a little bit." About 5 seconds later, the CVR recorded through the CAM a sound similar to that of the autopilot disconnect chime.

About 6 seconds later, at 2127:52, the CVR recorded a sound of an increase in propeller/engine revolutions per minute (rpm) frequency and amplitude.

At 2127:56, 4 seconds after the onset of the sound of an increase in propeller/engine rpm frequency and amplitude, and after the sound of the master caution waming chime, the first officer said, What happened'?" The captain replied, "What the (expletive)."

The first officer stated, "Your both engines flamed out;" and "Both engines flamed out...you've got an airport underneath you."

At 2128:18, the first officer said to the captain, "Turn on your dome [light]," and, 3 seconds later, the CVR recorded a sound similar to that of a decrease in propeller/engine frequency and amplitude.[4]

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[4]The sound of the decrease occurred about 26 seconds after the onset of a sound of an increase in propeller/engine frequency and amplitude.

At 2128:43, the first officer broadcast a "MAYDAY," to BTR, stating that they had lost both engines and asking, "...is there an airport right underneath us?" The BTR controller replied, "...yes sir, the False Rise; airport and ah it should be lit, and ab believe five thousand feet [runway]. stand by."

The captain flew a circling. power-out descent to a landing to the south, on the 5.000-foot by 75-foot runway (18/36) at False River Air Park. The first officer lowered the landing gear, using the hydraulic pump-override, shortly before touchdown. Following initial touchdown, the airplane became airborne again, with about 1,600 feet of runway remaining, then touched back down on the runway about 606 feet from the departure end, leaving intermirtent tire braking or skid marks until the airplane departed the end of the runway.

At 213403, about 4 seconds after the CAM picked up a squeal sound similar to that of wheel touchdown, the captain said. "No brakes."

After departing the end of the runway. the airplane traversed soft, grass-covered soil and a 25-foot-wide by 6-foot-deep ditch. then went through a combination steel post. chain link, and barbed wire fence. it came to rest, upright, in a sugar cane field, approximately on runway heading. about 1.425 feet from the departure end of the runway. (See figures 1 and 2a and 2b.)

The pilots stated that engine and airspeed indications were readable on the indicator panels. There was a loss of cabin lighting, reported by the passengers, just before the airplane touched down on the runway. A loss of cockpit lighting was indicated by the flightcrew's conversation during the descent ("turn on your dome light") and confirmed in interviews. No loss of cockpit indicators was noted by the flightcrew. The first officer stated that he may have secured the cabin emergency lighting just before touchdown, and the cabin emergency lighting switch in the cockpit was found in the "OFF" position.

The flight attendant stated that, after hearing a loud "whine," she saw flames come from the rear of the right engine. One of the passengers described hearing a roar and feeling a significant vibration for about 20 seconds, followed by red sparks or molten bits of metal coming from the left engine. The passenger stated that he was an engineer, and that when he saw the sparks come from the rear of the engine, he had the distinct impression that it was due to pieces of the engine coming out.

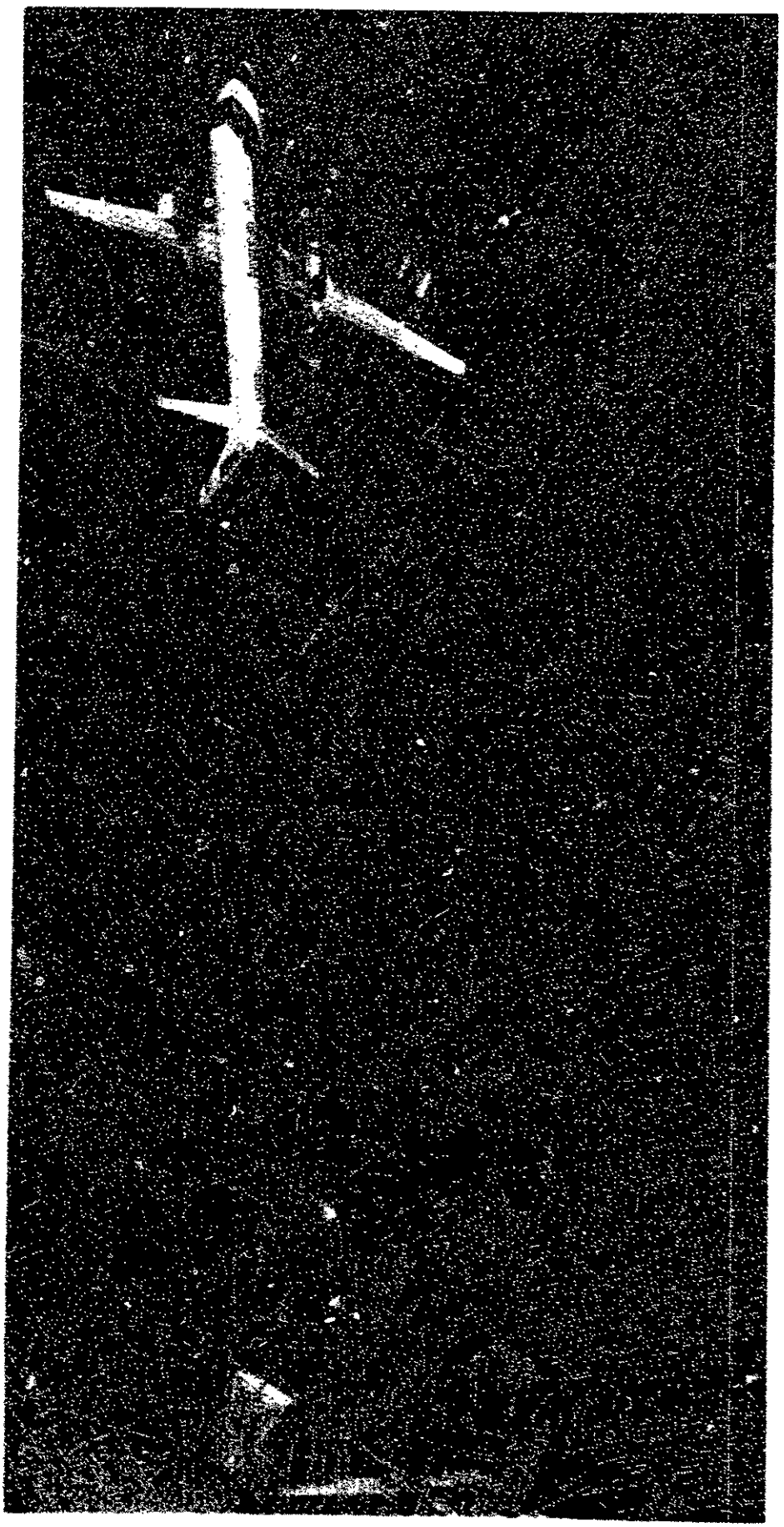


Figure 1.--Resting position of airplane.

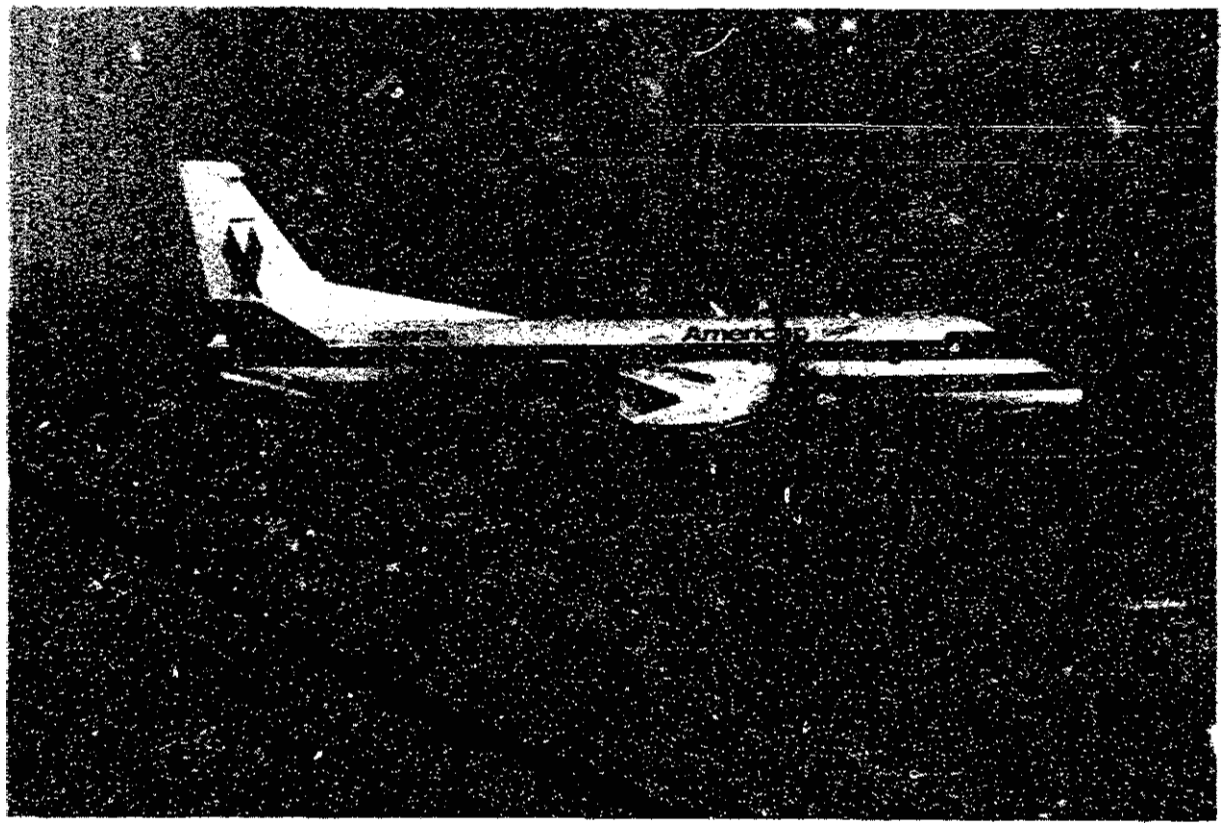


Figure 2a.--Airplane **in** sugar cane **field** with fence visible on landing gear.

Figure 2b.--Airplane after recovery showing radome, puncture (in front of logo), and dented leading edge of wing.

The accident occurred during the hours of darkness. The coordinates of the accident were 30° 43' 10" north latitude and 91° 28' 43" west longitude.

1.2 Injuries to Persons

Injuries	Crew	Passengers	Other	Total
Fatal	0	0	0	0
Serious	0	0	0	0
Minor	1	0	0	1
None	2	23	0	25
Total	3	23	0	26

1.3 Damage to Aircraft

The airplane sustained substantial damage. Repairs accomplished at False River Air Park included removing and replacing both engine and propeller systems, and associated gearboxes, as well as structural items. About 3 weeks after the accident, following a Federal Aviation Administration (FAA) inspection, which deemed the airplane airworthy, N349SB was flown to the operator's maintenance facility, Lawton, Oklahoma, for further examination and repair.

The cost of repairing the airplane was $1.75 million.

1.4 Other Damage

The airplane left grooves in the soil beyond the departure end of runway 18, False River Air Park, and damaged a combined chain link and barbed wire fence.

Reported property damage was $10,000.

1.5 Personnel Information

1.5.1 The Captain

The captain, age 52, was hired by Simmons Airlines on January 6, 1986. He held an airline transport pilot certificate, with type rating for the Saab 340B. His most recent FAA first class medical certificate was issued on

September 1, 1993. with the limitation: "Holder shall wear correcting lenses while exercising the privileges of his airman certificate." Simmons Airlines/American Eagle records indicate that at the time of the accident, the captain had accumulated over 20,000 hours total flight time. He had logged about 300 hours in the Saab 340, virtually all of which was as captain. Before that, he flew the Jetstream 3100 and the Shorts 330. He estimated his time in the Jetstream 3100 as 4,000 hours and his time in the Snorts 330 as 1,000 hours. His experience also included Bight time as a contract pilot in the 690 Commander and the Piper Navajo, and more than 10,000 hours in Beech 18s.

The captain received his initial ground school and proficiency check in the Saab 340B as a captain, completing the training on August 31, 1933. He received his type rating in the Saab 340B on September 1, 1993. He completed his initial operating experience and received a line check on September 15, 1993, which was also his last line check prior to the accident.

The captain bid the accident flight. From his residence in Oklahoma, he drove to Oklahoma City and took a 1430 flight to DFW. The accident flight was his only flight in crew status on February 1, 1994.

1.5.2 The First Officer

The first officer, age 43, was hired by Simmons Airlines on July 13, 1987. He held an airline transport pilot certificate, with type rating for the Saab 340B. His most recent FAA first class medical certificate was issued on January 7, 1994. without limitations or waivers. Company records indicate that at the time of the accident. the first officer had accumulated approximately 6,500 total flying hours, of which approximately 1,700 were in the Saab 340B.

The first officer completed initial ground school in the Saab 345 on December 22, 1988. He completed Saab 340 flight training on January 9, 1989. His initial operating experience and line check were completed on January 17, 1989. He was subsequently upgraded PO captain on the Saab 340, completing that training and initial operating experience on November 23. 1990. He was qualified as a captain. but flew on the accident flight as the first officer.

The first officer started the day of the accident flight on "reserve" status. His home was in Florida. He stayed at a "crash pad" in a suburb near DFW, which another pilot owned and in which pilot.; OR reserve status regularly stayed.

He was called about 1000 and assigned to two round-trip flights, DFW to Fayetteville, Arkansas, followed by DFW to Tyler-Longview, Texas- He flew the assigned flights as captain. He stated that he did not know that he would be part of the flightcrew of flight 3641 until about 50 minutes before the flight. He said that he just happened to be at the airport when he was assigned to the flight.

1.53 The Flight Attendant

The flight attendant had been a previous employee of the airline in a nonflying position. She completed flight attendant training 8 months prior to the accident and had been in a flight status since that time.

I.6 Aircraft Information

The accident airplane, registration N349SB, Serial No. 340B-349, was a Saab 340B, manufactured in Sweden. It was owned by AMR Leasing, and was issued an FAA registration certificate on November 4, 1993, as a new airplane. The airplane was operated by Simmons Airlines, since It was acquired in November 1993.

The accident airplane had accumulated 528.3 flight hours and 540 cycles, including the zccident flight. The last phase inspection (scheduled every 150 hours) was completed on January 9, 1994, at 399.6 aircraft hours. The last preventive service check (scheduled every 25 hours) was completed the morning of the accident flight, at 516.8 aircraft hours. The two General Electric (GE) CT7-9B engines were installed at the factory with zero time since new. There were no minimum equipment iist (MEL) or other discrepancies with the airplane at the time it was dispatched.

The calculated departure gross takeoff weight for the accident flight was 26,128 pounds, 2,872 pounds below the maximum allowable takeoff weight. The airplane was configured with seats for 34 passengers (two abreast on the right side of the cabin, with a single seat row on the left side). The calculated load was within aircraft center of gravity (CG) limits for both takeoff and landing.

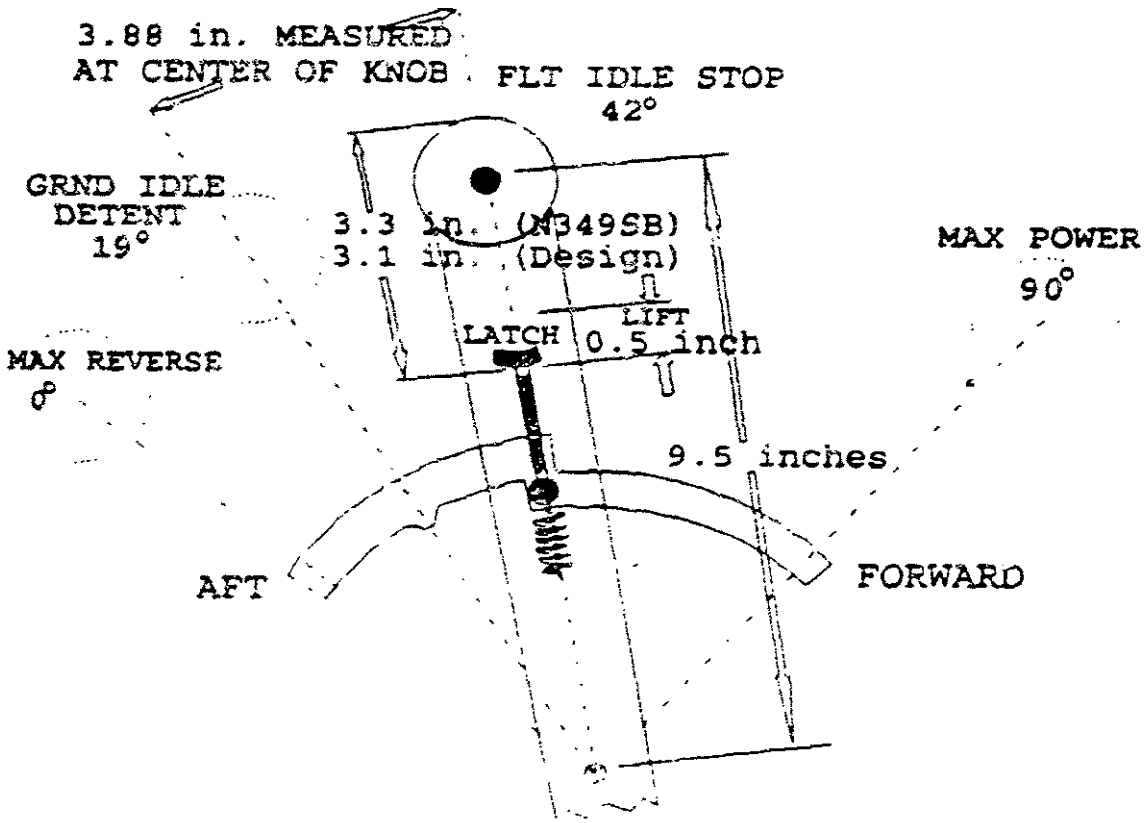
The calculated fuel weight at takeoff from DFW was 2,675 pounds. The planned arrival fuel load at BTR was 1,200 pounds. The estimated fuel remaining on the airplane at the accident site was 1,850 pounds.

1.6.1 Engine and Propeller Information

The Saab 340B is powered by two General Electric CT7-9B turbine engines, each driving a Hamilton Standard 14RF-19 four-bladed, constant speed, full feathering and full reversing propeller. The engine consists of a gas generator section, comprised of a compressor, combustor, and turbine, and a free power turbine driven by hot gas from the gas generator. The power turbine is directly coupled to the propeller through a reduction gearbox. Fuel is metered and supplied to the engine by a hydro-mechanical unit (HMU) as a function of the position of the power lever, as selected by the pilot. The Digital Electronic Control (DEC) is a supervisory control for the HMU and provides fuel schedule trimming, fuel bypass for power turbine overspeed protection, and flameout protection.

The power lever schedules fuel over the entire power range from reverse to maximum, as selected by the pilot. From reverse to just below the flight idle stop, the power lever also directly controls propeller blade angle (beta). (See figure 3). This range is commonly called the beta range. Operation in this range is prohibited in flight. From flight idle to maximum power, the power lever schedules fuel flow at the HMU, and propeller blade angle is controlled by the constant speed governor in the propeller control unit (PCU). The condition lever, at its lowest end of travel below the "MIN SPEED" position, operates the fuel shutoff in the HMU and operates the feathering valve in the PCU. In the upper range of travel between the MIN SPEED and MAX SPEED positions, the condition lever adjusts the constant speed governor to maintain propeller speed as selected by the pilot. This range is from 75 percent (1,038 rpm) to 100 percent (1,384 rpm).

Power turbine overspeed protection is provided over the entire range of engine operation by the DEC, which receives a power turbine speed signal and shuts off fuel flow at the HMU when power turbine speed reaches 25,000 rpm. Propeller overspeed protection in flight is provided by an overspeed governor driven by the reduction gearbox. At 105 percent propeller speed (1,456 rpm), oil pressure from the overspeed governor is directed by the PCU to the propeller to increase blade angle and limit the propeller to that speed. This function, and the constant speed governor function, are taken out of the system when the power lever is moved below flight idle into the beta range. As the propeller blade angle moves below the flight idle position, a switch is activated in the PCU to illuminate an annunciator light on the center instrument panel, adjacent to the engine torque indicators, to inform the crew that the propellers are in the beta range. In that range at low forward speeds on the ground, the propeller is at low blade angles, producing little



NOTES:

1. Left latch movement began with 3.0 pounds of lift and topped at 7.0 pounds.
   Right latch movement began with 3.0 pounds of lift and topped at 5.5 pounds.
   Saab design calls for beginning of 2.5 pounds and 7.0 pounds at .5 inch lift.
2. Dimensions measured on N349SB and confirmed with Saab documents.

Figure 3.--Power lever.

thrust, and blade angle is controlled only by power lever position. When the same condition occurs in flight, the governors have no control of blade angle, and high airspeeds can windmill the propeller to high rotational overspeeds. In this condition, because the propeller is driving the power turbine, the fuel shutoff function of the DEC is ineffective in preventing: power turbine overspeed.

1.6.2 Maintenance Records Examination

Following the accident, a maintenance records examination was conducted at the facilities of the operator at DFW.

The maintenance records examination revealed that the airplane had undergone phase 1, 2, and 3 inspections on November 30, 1993, December 20, 1993, and January 10, 1994, respectively. The master inspection records and associated work cards were reviewed, and no discrepancies, trends, or problem areas were noted.

The records audit for the airplane indicated that maintenance was in compliance with all outstanding FAA and Swedish Civil Aviation Authority (CAA) airworthiness directives, as well as applicable Saab service bulletins.

The operator's maintenance management program documents were examined. They were found to have been authorized by the FAA, and all of the maintenance documentation on the accident airplane was found to be in compliance with the approved maintenance program.

1.7 Meteorological Information

The accident flight was conducted in VMC.

There were no significant meteorological (SIGMET) advisories in effect for the BTR area before or after the accident. The weather conditions reported at BTR at 2156, about 22 minutes after initial touchdown at False River Air Park, were as follows:

> 7,500 scattered, ceiling–measured 12,000; visibility--10 miles; temperature--37 degrees F.; dew point--26 degrees F; winds--220 degrees at 3 knots; altimeter--30.39 inches.

1.8 Aids to Navigation

There were no known difficulties with aids to navigation.

1.9 Communications

There were no known difficulties with communications.

1.10 Aerodrome Information

At the time of the accident, False River Air Park (airport identifier: LA-30) had a single 5,000-foot by 75-foot asphalt runway. The runway was located approximately 2 miles northwest of New Roads, in the Pointe Coupee Parish, Louisiana, and 16.9 miles northwest of the Baton Rouge VORTAC [VOR/ultra high frequency tactical air navigation aid]. The runway's elevation was 39 feet above mean sea level (msl). The airport was attended daily from 0800 to 1700, and was served by a UNICOM station (122.8 MHz) during normal operating hours.

The approach end of runway 18 was located approximately 1/2 mile south of an earthen dike that paralleled the south side of the Mississippi river. A grassy area, a two lane road, and a grass overrun were between the dike on the south side of the river and the approach end of runway 18. An approximately 1,005-foot grass overrun, through which the accident airplane traversed, was located at the departure end of runway 18. Beyond the grass overrun was a drainage ditch, and a few small hardwood trees were near the ditch. A combination steel post, chain link and barbed wire fence paralleled the south side of the ditch. A sugar cane field was south of the fence (some of the fencing materials were dragged by the airplane's landing gear). The plowed furrows in the sugar cane field also ran north and south. The airplane came to a stop in the sugar cane field.

The Aircraft Owners and Pilots Association (AOPA) Directory indicated that runway lights were available for night use by keying a radio transmitter 5 times in 5 seconds on the UNICOM frequency. However, following the accident. the airport manager stated that they had been unable to change the lights from high intensity to low since about January 20, 1994. Consequently, on January 31, 1994. the day before the accident, the lights were set to high intensity and were left at that setting until repairs could be made.

1.11 Flight Recorders

The CVR and FDR were removed from the accident airplane by Safety Board investigators and taken to laboratories at Safety Board Headquarters, Washington, D.C.

1.11.1 Cockpit Voice Recorder

The CVR, Serial No, 61006, was manufactured by Fairchild. The recording contained four channels of audio information received from the following sources: the cockpit area microphone (CAM), the captain's microphone, the f i t officer's microphone, and the passenger cabin's public address system. The recording was of excellent quality, enhanced by the use of an intracockpit intercommunications system by the two pilots. The recording duration was about 30 minutes and 57 seconds. On February 15, 1994, the captain and first officer listened to the CVR in the Safety Board's audio laboratory, and they reviewed the transcript.

1.11.2 Flight Data Recorder

The FDR was manufactured by Fairchild as Model F800, Part No. 17M703-261, and Serial No. 4964. The FDR continuously recorded 128 data parameters. To verify the accuracy of the recorded power lever position information, another FDR was placed on the accident airplane for the ferry flight from False River to the maintenance base. FDR power lever data from the accident flight was compared with data from previous flights of N349SB and with FDR data from the ferry flight. The comparisons confirmed the accuracy of the engine power lever position readings.

The FDR readout showed that in the descent, N349SB's engine parameters[5] remained steady for about 1 minute prior to the first indication of movement of the power ievers (at 2127:43) associated with an overspeed event. The

[5] ATC radio transmissions were used to establish a time correlation between the FDR and CVR. The CVR transcript (correlated to local time by use of the ATC transmissions) gave the beginning of each transmission in local time, and the FDR recorded VHF microphone keying. The time correlation between FDR elapsed time and local time was established by matching the time between radio transmissions on each recorder.

power levers remained near the flight idle stops after 2126:39.[6] Left and right propeller rpm remained steady at about 1,225 rpm, and left and right gas generator speed remained steady at 78 to 79 percent during this approximately 1-minute period. At 2127:43, the data showed the power levers beginning to move aft of the flight idle stop position. The airspeed was recorded as 226 knots indicated airspeed (KIAS), and the airplane was descending through about 9,232 feet msl.

About 9 seconds later at 212754, as flight 3641 was descending through about 9,040 feet at 217 KIAS, the FDR showed a rapid rise of both propeller rpms from the steady reading of about 1,225 rpm to an rpm value at or above the maximum recordable FDR reading of 1,500 rpm. At this time, the engine power levers had moved about 4 inches aft of the flight idle gate to positions aft of the ground idle detents. This point in the FDR data corresponds to the beginning of the sound of an increase in propeller and engine rpm frequency and amplitude, which was recorded at 212:52 on the CVR.

The propeller rpm of both engines remained at or above the maximum recordable FDR reading of 1,500 rpm for about the next 6 seconds (See section 1.16.1 for additional details). The propeller rpm for both engines then began to decrease below 1,500 for the next 8 seconds, until the loss of FDR data, which occurred about 2128:07.

Electrical power was lost to the FDR twice during the accident sequence. The first power loss was for 40 seconds, from 2128:07 to 2128:47, during the time the engines were shut down. The recording then resumed and the FUR operated for another 2 minutes and 51 seconds. Power was again lost on the recorder at 2131:38. The recording indicated a transition from newest-to-oldest data (from a previous flight). Because of the second power interruption to the recorder, the airplane's touchdown on the runway and subsequent events in the zccident sequence were not recorded on the FDR.

Following the overspeed event and return of electrical power after the first loss of data, the FDR showed significant time periods of data in which there were variable engine indications, with several seconds of engine rpm in the 1,200 to

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[6] The captain stated that at the time the engine roar and overspeed incident began, he had the power levers at the flight idle stops where he had set them after the airplane had passed through about 12,000 feet

1,400 range, accompanied by fuel flow and small torque indications for both engines.

1.12 Wreckage and Impact Information

1.12.1 Airplane Structure

Structural damage to the airplane included dents and puncture.. in wing leading edge panels and flap panels, a horizontal crease in the left nose structure at the radome, and crushing of the composite radome. There was a 2- by 3-inch hole surrounded by a 6- **by** 12-inch dent in the fuselage aft of the main cabin door upper edge. **Also,** there was a 3-inch tear near the forward hinge point for the right nose landing gear door, a buckled skin and former section on the left side of the left nacelle, and **a bend** in the lower forward spar cap at the root of the left wing. Figures 4a and 4b illustrate the wreckage site and damage to the airpiane.

Five of the six tires were found to have lost pressure. Each of the four main landing gear tires were found tc have tread and cord ground away in a flattened area. The flattened area of three of the main tires had breached the inner wall of the tire, and the tires were depressurized. The inboard tire of *the* left main landing gear exhibited a flattened section that extended through the tread and four **plies,** but the tire retained pressure. The beads of the nose tires were found to have separated from the rims.

The most northerly of the tire marks found on the runway aligned with the right inboard main tire track at about 1,594 feet from the southern end of the runway. Similar marks began again in line with the former, about 606 feet From the departure end of runway 18, and continued off the end of the runway. The northernmost marks on the runway that led to the left main landing gear were found 586 feet from the departure end of the runway. The most northern nose landing gear mark was found in the grass, a b u t 15 feet south of the end of the runway.

To the south of runway 18, the tire tracks crossed a 1,005-foot grass overrun, **a** 25-foot-wide by 6-foot-deep drainage ditch, an airport boundary fence, and part of **a** sugar cane field, with the tire tracks parallel to the plowed rows in the cane field. **Tie** airplane came to rest 1,425 feet beyond the departure end of the runway, with 270 feet of fence material trailing from the landing gear- The landing gear remained down and ***locked.*** The main landing gear were found sunk in the soil

COORDINATES OF TIRE TRACKS ON RUNWAY.

The coordinates have been rounded to the nearest foot and use the southeast corner of the runway as a reference point. The SAAB 3408 tires are labeled #1 through #4 from left to right. The beginning and end of each mark are shown as two (X-Y) numbers. The first number gives the distance from the departure threshold and the second number provides the distance from the east edge of the 75 foot wide runway. For example, the first mark associated with the #3 tire began 1594 feet from the departure threshold, 44 feet from the eastern edge of the pavement, and ended at 1534 feet (60 feet from the beginning), 43 feet from the eastern edge.

Mark Aligned With Tire Number							
#1 (Left Outboard)		#2 (Left Inboard)		#3 (Right Inboard)		#4 (Right Outboard)	
Begin	End	Begin	End	Begin	End	Begin	End
				1594/44	1534/43	1592/44	1541/45
				606/37	524/36	604/38	540/38
581/15	529/15	586/16	520/15				
				403/35	336/35	402/36	328/36
334/13	287/11	341/14	278/13				
				266/34	211/33	263/35	211/34
178/11	0 / 9	204/12	0/11	175/33	0 /31	125/34	0 /33

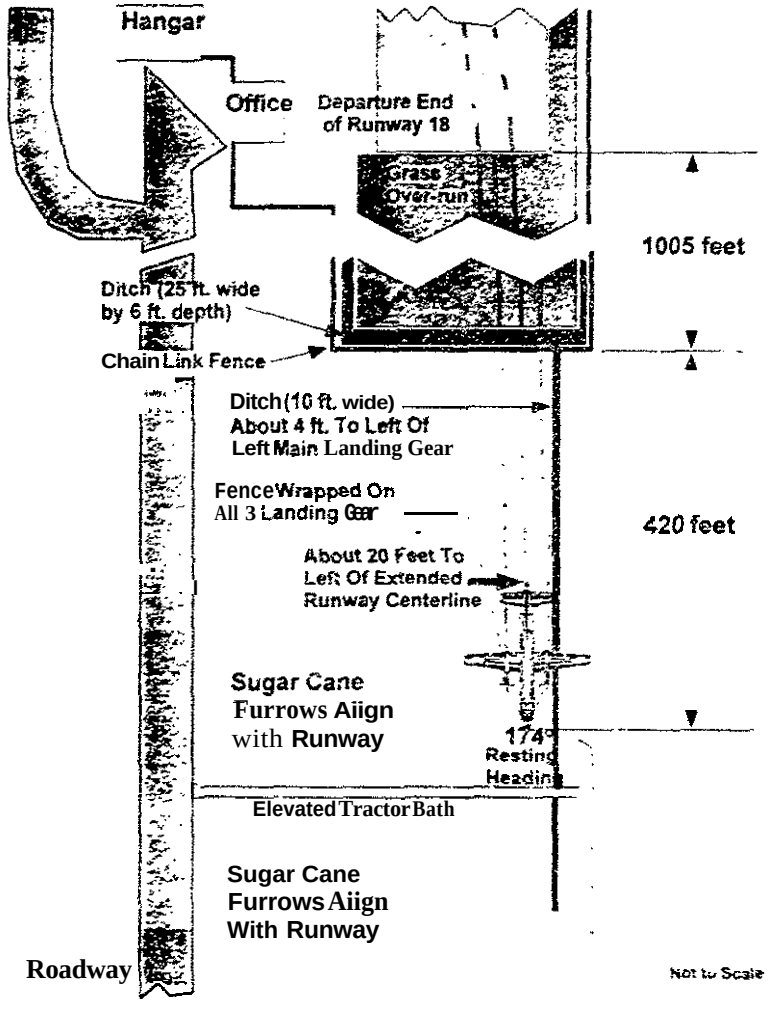

Figure 4a.--Wreckage site and airplane damage.

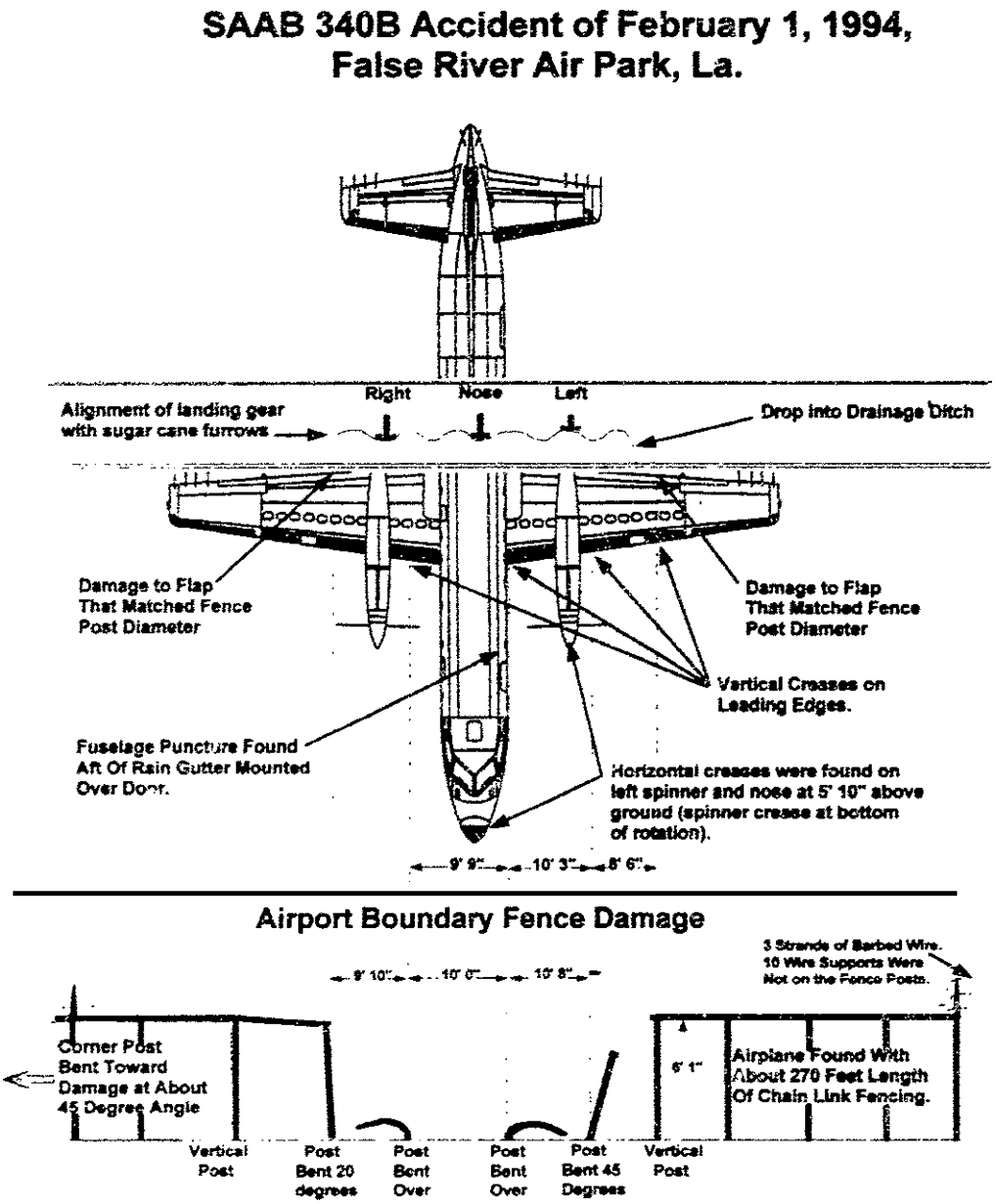

Figure 4b.--Wreckage site and airplane damage.

to the depth of the tops of the tires. The tops of the nose landing gear tires were below ground level. Approximately 4 feet to fie left of the left main landing gear, where the airplane came to rest, was the edge of a water-filled drainage ditch that ran parallel to the north-south path of the airplane and the plowed furrows.

1.12.2 Powerplants

Both engine cowlings remained intact. There was no external physical damage to either engine. Examination of the engines revealed no evidence of in-flight fire or uncontained engine failure. The gearboxes exhibited no sign of engine oil or fuel leaks. The gas generator oil level sight gauge and the propeller gear case oil level sight gauge indicated that all oil quantities were in the normal range for both engines. Examination of the tailpipes of both engines indicated that in each case there was nearly identical thermal and mechanical damage to the fourth stage power turbine blades. and that the airfoi! sections for that stage were missing.

The gas generators on both engines rotated freely. A borescope inspection revealed that both engines had ingested small amounts of soft foreign material, including small sticks and reeds. This ingestion resulted in light foreign object damage to the gas generator compressor blades. Light rotational rubbing of both engine compressors was also observed. The gas generator turbines and nozzles were undamaged.

There was extensive and similar damage to the power turbine sections of each engine. The third stage power turbine nozzle vanes exhibited moderate trailing edge damage, with missing fragments and small cracks in most of the vanes. The blade tip shroud and 25 to 50 percent of the airfoil areas on all third stage power turbine blades on both engines were missing. No damage was noted on the third stage disks.

The fourth stage power turbine nozzle vanes for both engines were found in place but extensively damaged, with segments of the airfoils missing on both the vane leading and trailing edges. There was also extensive cracking of the remaining vane airfoil areas for both engines. Over an arc from 7:30 to 11:00, at least 25 percent of the nozzle vane midspan airfoil was missing. The blade tip shrouds and SO to 70 percent of the airfoil areas of the fourth stage power turbine section blades were missing. No damage was found to the fourth stage disks.

The gas generator and propeller gearbox chip detectors for both engines were found free of any ferrous materials. The oil screens contained only small carbon deposits.

Following the examinations at False River Air Park, the airpiane's powerplants were packaged, sealed, and shipped to the General Electric Aircraft Engine Maintenance Center, Strouther Field, Arkansas City, Kansas, for further examinations. Also, the airpime's propeller systems were packaged, sealed, and shipped to the manufacturer, Hamilton Standard Division, United Technologies, East Windsor, Connecticut, for examination. The examinations, under Safety Board supervision, revealed no preexisting faults that would have precipitated the in-flight engine/propeller overspeed and subsequent loss of power.

1.12.3 Engine Controls and Propulsion System

Airframe components associated with the engine and propeller systems were examined in detail after the airplane was moved from the crash site to a parking area next to a hangar on the airport facility.

The engine control paths were inspected from the cockpit to the engines and propeller governors. The tension of three cables exceeded the high tolerances by about 3 percent, and all but one rig pin was installed. The exception was out of alignment by less than 1/64 inch. Power and condition lever control path components were found to have been chafing on insulation adjacent to cable passageways beneath the cabin floorboard. The cockpit lever movements were smooth and unrestricted, and prescribed full travel was available. There was smooth cable movement from the cockpit controls to the engine and propeller controls on the engines.

The force of the spring-loaded triggers on the power levers, which had to be lifted before the power levers could be pulled aft of the flight idle stops, was measured. The force was measured as a total of 12.5 pounds for both power lever triggers. The left power lever trigger required 7.0 pounds, and the right power lever trigger required 5.5 pounds of pull. Both triggers had an initial force pull of 2.5 pounds.[7]

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[7] The manufacturer-specified forces are 2.5 pounds at the initiation of lifting the triggers and 7.0 pounds at 0.5 inch of lift.

Cockpit beta annunciator lights and circuits were found to operate normally when they were functionally tested.

1.12.4 Cabin Emergency Lighting

A functional test of the emergency cabin light switches was performed at False River Air Park. The system was found to function normally.

1.13 Medical and Pathological Information

Both members of the flightcrew submitted urine samples on February 2, 1994. The samples were tested for amphetamines, phencyclidine, cocaine, cannabinoids, and opiates, in accordance with Federal requirements. The results of the examinations were negative for both pilots.

1.14 Fire

Cabin occupants reported seeing flames or sparks coming from the rear or tailpipes of both engines during or immediately following the period of loud noise and vibration. There was no evidence of heat or fire damage external to the engines or elsewhere on the airplane.

There was no postcrash fire.

1.15 Survival Aspects

1.15.1 Prelanding Preparation

All of the passengers were interviewed by Safety Board investigators. They stated that the flight was uneventful until the loud noise and vibration **began.** Passengers reported that before the event, one of the pilots reported on the public address system that they were about 10 minutes out for landing at **BTR.** After the announcement from the cockpit, the flight attendant made an announcement instructing the passengers to fasten their seatbelts, stow their tray tables, and advising that she would be collecting service items.

The flight attendant stated that **as** she walked through the cabin, she heard the beginning of a loud "whining" sound. She later saw flames coming from the rear of the right engine, and she went to the cockpit. She saw that the pilots

were busy in an apparent emergency situation but did not tell them that she had seen fire emit from the right engine. The flight attendant stated that the first officer instructed her to take her seat and fasten her seatbelt.

Several passengers stated that subsequent to the noise and vibration, they saw flames coming from either the left or right engine. No passenger reported seeing flames come from both engines. One passenger noted that he believed he saw "molten pieces of the engine falling away from the rear portion of the [left] engine."

Passengers stated that there were no announcements from the cockpit about the emergency. A female passenger unfastened her seatbelt and stood up. The flight attendant called to her to sit down and to fasten her seatbelt, and the passenger next to the standing passenger pulled her down into her seat. The flight attendant said that she had spoken earlier in the flight to the passenger who stood up because the passenger had stated that she was afraid of flying.

Some passengers stated that after the flight attendant returned from the cockpit, she did not instruct the passengers to fasten their seatbelts and that she neither warned them of an emergency landing nor told them to assume the brace position. Some passengers noted that an emergency landing or crash was apparent after the roar, and that vibrations and flames at the rear of the engines had stopped.

1.15.2 Landing and Aircraft Evacuation

Some passengers stated that as the airplane touched down, with the landing a little harder than normal, the airplane rolled on the runway for several seconds. They then felt a jolt, followed by the airplane bumping up and down, before it came to rest.

All of the 18 passengers stated that the cabin lights went out shortly before touchdown. Except for the flickering on and off one or two times after the airplane came to rest, the cabin lights did not come on during the evacuation. The first officer stated that he may have turned off the cabin emergency lights prior to landing.

After the airplane came to a stop, the first officer exited the cockpit. After he observed fencing materials wrapped around the landing gear, he lowered the airstair door to assist passengers exiting the cabin so that they would not jump

into the fencing. Simultaneously, the flight attendant, using her flashlight, attempted to direct passengers out the forward right emergency exit. Seeing the fencing material under the right front door, she directed the passengers toward the left door, which the first officer opened.

Passengers characterized the evacuation as rapid, calm, and efficient. None of the passengers was injured during the impact or evacuation. The flight attendant later reported a back injury (an inflamed disc) sustained while she opened a door during the evacuation.

1.16 Tests and Research

1.16.1 Sound Spectrum Study

Sound spectrum analysis of the CVR engine/propeller frequencies showed that both propellers had been operating steadily at about 1,200 rpm for several seconds before the overspeed event. After the power levers were moved into the beta range, the spectrum showed that one propeller reached about 1,965 rpm and the other propeller reached about 2,190 rpm, or about 142 percent and 158 percent of red line rpm, respectively. The sound spectrum study did not identify which engine reached the higher rpm.

1.17 Additional Information

1.17.1 Operating Procedures and Regulations on Power Lever Movement

According to the Airplane Flight Manual (AFM), the power levers should never be moved aft of the flight idle stop while the airplane is in flight. Operation below the flight idle stop is authorized only for ground operations. The AFM contains warnings that include the following:

> Warning:
>
> It is prohibited to move the PL [power lever] below FLT IDLE [flight idle] when airborne. If PL is moved below FLT IDLE when airborne, the propeller will go into low pitch angle, the propeller speed will increase uncontrolled with consequential extremely high drag and uncontrolled flight.

The Federal regulation governing the design criteria applicable to the Saab 340B power levers (14 CFR 25.1155) states:

> Reverse thrust and propeller setting below the flight regime.
>
> For turbine engine installations, each control for reverse thrust and for propeller pitch settings below the flight regime must have means to prevent its inadvertent operation. The means must have a positive lock or stop at the flight idle position and must require a separate and distinct operation by the crew to displace the control from the flight regime (forward thrust regime for turbojet powered airplanes).

The Saab 340B design met the regulatory provisions by the incorporation of spring-loaded latches to prevent inadvertent movement of the power levers aft of the flight idle stops and into the *beta* range. To move the power levers aft of the flight idle stops and into the beta range, the latches on the power levers must first be lifted about 1/2 inch using two fingers in order to overcome the combined spring force of 12 pounds. In the beta range, a tactile detent is provided to distinguish the threshold between ground idle and propeller reverse pitch.

1.17.2 History of Corrective Actions

The Safety Board has investigated other turbopropeller airplane accidents resulting from operating the propellers in the beta range while in flight. On October 17, 1988, following the Construcciones Aeronauticas, S.A. (CASA) C-212 accidents that occurred on March 4, 1987, at Detroit Metropolitan/Wayne County Airport, Romulus, Michigan, and on May 8, 1987, at Mayaguez, Puerto Rico, the Safety Board issued Safety Recommendations A-88-92 through -105 to the FAA. The Safety Board found that the CASA C-212 met the provisions of 14CFR 25.1155. It was also found that the beta latch mechanisms in the CASA C-212 were not substantially different than the designs incorporated in other turbcpropeller airplanes, and the service history showed that the design was not foolproof. The pilots had to consciousiy avoid positioning their fingers on the beta latch arms during aft movement of the power levers to the flight idle position to avoid inadvertent movement into the beta range. In fact. the Safety Board observed that in the CASA C-212, movement of the power levers below the flight idle stop and into the beta range was possible in some cases without lifting or touching the beta lockout mechanisms. Safety Recommendations A-88-103 through -105

addressed further means to prevent the inadvertent, operation of turbopropeller airplanes in the beta range in flight. The recommendations asked the FAA to:

A-88-103

Require the aircraft evaluation group during the type certification process of turbopropeller airplanes to review carefully the design of propeller pitch controls in order to identify and establish appropriate flightcrew training guidelines and emphasis on the proper use of these controls to prevent inadvertent operation in the beta mode in flight where prohibited by the airplane manufacturer.

A-88-104

Require the principal operations inspectors for operators of turbopropeller airplanes to review carefully flightcrew training programs to verify that appropriate information is provided by the operators on the proper use of propeller pitch controls to prevent inadvertent operation in the beta mode in flight.

A-88-105

Amend Title 14 Code of Federal Regulations 25.1155 and 23.1155 to provide for a positive means to prevent inadvertent operation of the propellers at blade pitch settings below the flight regime in those airplanes where such operation of the propellers is prohibited.

On July 27, 1989, Safety Recommendation A-88-104 was classified "Closed--Acceptable Action," after the FAA issued Air Carrier Operations Bulletin (ACOB) 89-1, "Inadvertent Operations in Beta Mode/Turbopropeller Airplanes." The ACBB requested that principal operations inspectors review turbopropeller airplane operators' flightcrew training programs to ensure that. appropriate information is provided to prevent inadvertent operation in the beta mode in flight. Safety Recommendation A-88-103 was classified "Closed--Acceptable Action," on July 23, 1991, when the FAA advised the Safety Board that ACBB 89-1 had been provided to aircraft evaluation groups and that the groups were requested to carefully review the design of propeller pitch controls during the type certification process of turbopropeller airplanes.

The FAA responded to Safety Recommendation A-88-105 on May 1, 1990, stating that an FAA Inter-Directorate Propeller Installation Review Team had completed a review of current turbopropeller installations with respect to the means of controlling propeller biade pitch. The team had determined that changes to 14CFR Parts 23 and 25 were not necessary, providing that the propeller control levers and control systems were designed to comply with 14 CFR 23.1155 or 25.1155. The FAA concluded, however, that in view, of recent accidents and continuing issues related to the beta mode, it was considering the possible need for regulatory changes or the issuance of advisory materials. Safety Recommendation A-88-105 was therefore classified "Open--Acceptable Response." The Safety Board did not receive any subsequent updates from the FAA regarding the regulatory changes considered above. This recommendation was classified "Closed--Acceptable Action/Superseded" upon the issuance of Safety Recommendations A-94-61 through -63 discussed below.

Following another CASA C-212 accident on December 1, 1989, at the Patuxent River Naval Air Station, Maryland, the FAA issued airworthiness directive (AD) 90-04-11, effective on February 26, 1990, to require the revision of the CASA C-212 flight manuals to state:

> Do not retard the power lever of an operating engine aft of FLIGHT IDLE while airborne. WARNING: An immediate out-of-control situation may develop from which recovery cannot be accomplished.

Subsequent to its investigation of the December 1, 1989, accident, the Safety Board's concern that Federal regulations and previously approved airplane certifications had not provided adequate protection against inadvertent or intentional operation of the beta range in flight was heightened. In a December 19, 1990, safety recommendation letter to the FAA, the Safety Board stated, "If in-flight use of the beta mode is not to be permitted, then a more positive means of locking cut beta mode use muse be required on all turbopropeller airplanes." To address the inadequacy, the Safety Board reiterated Safety Recommendation A-88-105 and issued the following additional safety recommendations to the FAA:

A-90-181

Issue an Airworthiness Directive applicable to the CASA C-212, to require the design and installation of a system that provides a positive means of preventing the power levers from being placed below the flight idle position while the airplane is airborne.

A-90-182

Conduct a directed safety investigation of all Garrett TPE-331 engine powered turbopropeller airplanes. This investigation should evaluate the potential for in-flight use of the beta mode, and the effects of incorrectly adjusting the blade pitch angle of the propeller during maintenance activities and, following the directed safety investigation, take appropriate action to preclude in-flight beta operation on airplanes not approved for such operation.

On April 22, 1991, in response to Safety Recommendation A-90-182, the FAA readvised the Safety Board of its issuance of ACOB 89-1 and stated *that* it had requested that its aircraft certification offices review airplane flight manuals (AFMs) and applicable *service* histories for all small/commuter-category turbopropeller-powered airplanes to determine whether the beta range could be used safely in flight. Changes would be required to the AFMs if warranted by the FAA review. The FAA again advised the *Safety* Board that it was considering a revision io 14 CFR Part 23 to preclude the in-flight use of beta, unless approved for in-flight use. The recommendation status was classified "Open--Acceptable Response," pending further response. However, the FAA did not subsequently update the Safety Board on these proposed actions. This recommendation was classified "Closed--Acceptable Action/Superseded" by A-94-61 through -63 as discussed below.

On May 7, 1991, Safety Recommendation A-90-181 was classified "Closed--Acceptable Action," after the FAA issued AD 91-03-10. The AD required modification of the CASA C-212 propeller speed and pitch control system to prevent movement of the propellers into reverse blade angles and adjustment of the propeller pitch settings below the flight regime while in flight. This AD superseded AD 90-04-11.

In addition to the known accidents involving the CASA C-212, the Safety Board became aware of eight accidents and incidents involving Embraer EMB-120 airplanes that were also attributed to in-flight operation of the propellers in the beta range. As a result of those accidents and incidents, the FAA issued ADs T88-16-51 and 88-16-51R1, which addressed changes to EMB-120 operational procedures. The FAA also issued AD 90-14-09, which required the installation of lockout devices in the EMB-120 to prevent power lever movement into the beta range.

After the FAA issued AD 90-14-09, the Safety Board investigated a July 21, 1992, incident in Denver, Colorado, in which an EMB-120 experienced propeller overspeeds in both engines, although a flight idle lockout system was installed as per AD 90-14-09. The pilot said that he had been resting his hand on the power levers while descending in turbulence. Investigators found that the incident airplane's circuit breakers for the lockout system would occasionally trip when the power levers were pulled aft to the flight idle stops. After the circuit breakers were reset, the system functioned satisfactorily. Following the incident, AD T92-16-51 was issued to require daily visual inspections of the flight idle solenoid circuit breakers, as well as functional tests.

On March 2, 1994, as a result of the subject accident, the Safety Board issued Safety Recommendations A-94-61 through -63, as follows:

> Issue an airworthiness directive applicable to Saab 340 airplanes that would require installation of a system that prevents the power levers from moving aft of the flight idle stops into the beta range in flight regardless of pilot action. Until the system is installed, cockpit placards should be installed in Saab 340 airplanes to warn pilots not to move the power levers into the beta range while in flight. (Class I, Urgent Action) (A-94-61)
>
> Revise Title 14 Code of Federal Regulations Parts 25.1155 and 23.1155 to require a positive means to prevent operation of the propeller in the beta mode while in flight, unless the airplane is certificated for such use. (Class II, Priority Action) (A-94-62)

Review all other turbopropeller airplane designs to determine whether in-flight engine operation in the beta range should be prohibited. Issue appropriate airworthiness directives applicable to those airplanes to install a system to prevent movement of power levers into the beta range, and require appropriate warnings in airplane operating manuals and on cockpit placards to warn pilots not to move power levers into the beta range in flight, unless the airplane is certificated for such use. (Class II, Priority Action) (A-94-63)

On March 31, 1994, Saab issued Service Bulletin (SB) 340-76-033 that describes procedures for the installation of a placard in the cockpit of SF340 airpianes. The placard warns the flightcrew about nor moving the power levers below "flight idle" (beta mode) when the airplane is airborne.

On Aprii 29, 1994, the FAA issued AD 94–09-09, effective on May 16, 1994. The AD made the provisions of SB 340-76-033 mandatory. The AD contained the following statement: "This is considered to be interim action until final action is identified. at which time the FAA may consider further rulemaking."

The FAA responded formally to these recommendations on May 16. 1994, stating:

A-94-61

The FAA agrees with the intent of this safety recommendation. Saab is currently developing a design to preclude the power levers from moving aft of the flight idle stops while the airplane is airborne. Saab will present that design to the FAA for review and comment. Once the FAA accepts the design. Saab will issue a service bulletin to provide instructions to install the in-flight beta lockout system. The FAA wili consider the issuance of a notice of proposed rulemaking proposing to require the installation of an in-flight beta lockout system in accordance with the new service bulletin. As an interim measure. the FAA issued an emergency airworthiness directive (AD) on April 20, 1994, to require that a placard be installed on Saab SF340A and 340B series airplanes to inform the flightcrew of the prohibition against moving the power lever below flight idle (beta mode) when the airplane is airborne.

A-94-62

The FAA has initiated rulemaking action proposing to amend 14 CFR 23.1155 and 14 CFR 25.1155 to require a means to preclude inadvertent or intentional selection of the beta range in flight. The FAA considers any design that allows the selection of the beta mode in flight to be unsafe unless the airplane is certificated for such use. The FAA will use the provisions of 14 CFR 21.21(b)(2) so prevent this practice on new design and approvals until 14 CFR 23.1155 and 14 CFR 25.1155 are amended.

A-94-63

The FAA agrees that for existing turbopropeller airplanes there should be a system to prevent movement of power levers into the beta range and such systems should be proposed for retrofit through an AD. Airplanes properly certificated for in-flight *beta* operation will be excluded from the AD process.

The FAA is reviewing all turbopropeller airplane designs to determine whether in-flight operation in the beta range should be prohibited. The FAA is also working with the aircraft manufacturers and other civil airworthiness authorities to evaluate existing designs and develop new beta lockout systems. When this effort is completed. the FAA will propose appropriate ADs to install these systems.

On June 17, 1994, these safety recommendations were classified "Open--Acceptable Response," based on the May 16, 1994, FAA response. To date. the Safety Board has not received further progress reports from the FAA on these safety recommendations.

2. ANALYSIS

2.1 General

The flightcrew and flight attendant were properly trained and qualified to conduct the flight They had received sufficient rest before the flight and had no critical life events that should have adversely affected their performance of duties.

Although the captain remarked about not having brakes, the evidence revealed that the brakes functioned properly. The loss of braking effectiveness was caused by the blown tires.

Weather and handling by air traffic control were not factors in the cause of the accident.

The airplane had been properly maintained in accordance with the FAA-approved program. There were no preexisting discrepancies with the airplane that contributed to the accident. The minor chafing of the power lever control cables in the area under the floor was no! a factor and did not affect the proper operation of the power levers. The minor rigging discrepancies found in the cable tension and rigging were not a factor in the accident.

The accident occurred when the power levers were moved from the flight idle position. over the flight idle gates. into the beta range, which led to extreme overspeed of both propellers and power turbines. The overspeed caused substantia! damage to both engines. and the flightcrew was unable to regain power from the engines. They made an emergency landing, during which the airplane departed the runway surface and came to a stop in a field.

The analysis of this accident focused on the actions of the pilots that led to the movement of the power levers into the beta range, as well as the design and certification of the power levers that permitted such movement.

2.2 The Accident

The captain was operating the flight controls and power levers during the flight and at the time of the accident. The first officer was performing the duties of the nonflying pilot.

The evidence from the CVR and FDR indicates that immediately preceding the accident, the captain was making a high speed descent when the airplane encountered turbulence. About 8 minutes before the event, the airspeed overspeed warning sounded for about 13 seconds, indicating that the captain allowed the airspeed to exceed the maximum allowed. There were also comments made by the pilots about the high speed and the need to get to a iower altitude. The high rate of descent was necessary because of a taii wind at altitude and the pilots' decision to land straight in on runway 13.

When the airpiane encountered turbulence, the captain rnaae a remark about slowing the airplane down, and the autopilot was disconnected. Shortly thereafter, the sound of the overspeeding propellers was heard on the CVR. The correlation of the CVR and FDR data revealed that the power levers were moved from the flight idle position into the ground idie position and further into the reverse range at the time that the overspeed sounds were recorded on the CVR.

The HDR data for power lever angle, fuel flow, and torque provided conclusive evidence that the power levers were moved into the beta range and aft of the ground idle detent. Examination of the pow-er lever mechanical linkages and rigging revealed no evidence of a malfunction that would have permitted inadvertent movement of the levers into the reverse range without intentional operation of the triggers that permitted them to be moved aft of the flight idle stops. Although the force to lift one power lever trigger was slightly below the specified value, this fact did not contribute to the cause of the power levers being moved into the beta range.

The movement of the power levers into beta caused the propellers to overspeed significantly. The engine overspeed protection system functioned properly and cut the fuel flow to both engines to preclude rupture of a turbine disk. However, because the propellers and power turbines were driven by air loads due to the high airspeed, and not by gas generator exhaust, the overspeed condition continued until the turbine blades separated. Although the pilots were able to restart both gas generators, extensive damage to the power turbines precluded the generation of propeller power sufficient for the pilots to continue flight

An emergency power-off landing was made on runway 18 at False River Air Park; however, the landing speed was too fast and the touchdown was too far down the runway for the airplane to stop on the runway. The airplane traversed rough terrain and came to rest upright with minimai damage. The occupants evacuated successfully.

2.3 Pilot Actions

Fallowing the accident, both the captain and first officer stated that they did not intentionally move the power levers below the flight idle stop into the beta range. Further, neither indicated that they were aware of unintentionally raising the triggers on the ievers to permit movement into the beta range. The first officer was performing the nonflying pilot duties, and the Board believes it unlikely that he touched the power levers. The captain recalled moving the power levers to flight idle a few minutes before the engine overspeed event, but he could not recall where his hand was when the overspeed occurred.

The pilots' recollections notwithstanding, the FDR data conclusively show that the power levers were moved below the flight idle gate and into the beta range.

The FDR data confirmed the captain's awareness that both power ievers were at the flight idle gate (about 43 degrees) for about 1 minute before they were moved past the gate. The rate of movement of the levers in the beta range averaged *3* degrees per second, and the Board believes that this is consistent with a deliberate action, rather than an inadvertent or sudden acricn. The power levers passed the ground idle position (19 degrees) at 2127:51.05, 8.5 seconds after transitioning the flight idle gate. The power levers reached a minimum position of 14.3 degrees at 2127:51.55. The beginning of the sound of an increase in propeller/engine rpm frequency began at 2127:52. The power levers started moving forward at that moment and were past the ground idie position and flight idle gates, into the flight range, within 1 second.

In order to prevent inadvertent movement of the power levers below the flight idle position, the lever mechanism is designed so that a distinct movement of the hand and finger is required to raise the triggers and release the flight idle stop. The mechanism functioned normally during postaccident tesfs. The Safety Board therefore concludes that the captain manipulated the triggers and moved the power levers into the beta range.

Although the captain's actions may have been unintentional. the Safety Board is concerned that the captain and other pilots might be moving the power levers below the flight idle stop routinely and without thought in order to use the increased propeller drag to slow the airplane or increase the descent rate. Although such action is prohibited in flight, and, as this accident indicates, is unsafe, rhe

propeller speed can be controlled until the power levers are moved below the ground idle detent, a nearly 4-inch movement of the power lever knobs below the flight idle position.

When the propeller overspeed occurred, the airplane was in a high speed descent and was encountering turbulence. Because the power levers were already at flight idle, to slow the airplane to make the ride more comfortable for the passengers, the captain would have to reduce the descent rate and slow the airspeed using airplane pitch. The only other option was to increase propeller drag by using beta range. The disengagement of the autopilot a few seconds after he made the comment about slowing the airplane suggests that he intended to fly the airplane manually and decrease the airspeed. The Board believes it to be significant that the overspeed occurred 11 seconds after the captain's comment "yeah we'll just...kinda slow the baby up a bit" Moreover, the Safety Board cannot understand how the significant amount of power lever travel from the flight idle gate into the reverse range (43 degrees to 14.3 degrees) and the significant time (9 seconds) in the beta range could have gone unnoticed by the captain. That amount of movement and the time associated with the movement should have been readily apparent and would be an unnatural movement while in flight The rapid (within 1 second) forward movement of the power levers back to the flight regime at precisely the time that the loud propeller/engine sounds occurred strongly suggests that the movement was prompted by the captain's realization that the event was associated with power lever position.

Regardless of why the power levers were moved into beta, the fact that such a dangerous action was permitted by the design and certification of the airplane is of concern to the Safety Board.

2.4 Design and Certification of the Power Levers

The power lever design and certification for the Saab 340 met the current regulations. The certification process did not require that the Saab 340 airplane power lever system prevent intentional or inadvertent operation in the beta mode in Right. Consequently, the design did not do so. The Safety Board acknowledges that a design. such as a solenoid lockout that prevents movement into beta in flight, could lead to difficulties for ground operations. That is, mechanical failures could prevent the selection of reverse power after touchdown and during landing roll. This possibility should be accounted for during the design and Certification of the system to prevent the selection of beta In flight.

However, several serious incidents and accidents have occurred in the past that involved turbopropeller airplanes in which the propellers were moved into the beta range in flight. The causes of these occurrences involved several factors. In some cases, wear and poor maintenance of the triggers and flight idle stops allowed inadvertent movement of the power levers into beta. In other cases, inrentional movement of the power levers into beta was involved. Lastly, there have been cases of inadvertent movement of the power levers into beta with a properly maintained and certified system.

As a result of these accidents, several safety recornmendations have been issued by the Safety Board and several corrective actions, including design changes by AD action, have been initiated and/or taken by the FAA and manufacturers to prevent similar occurrences on the CASA-212 and EMB-120 airplanes. Despite the AD actions to modify these airplanes, the Safety Board believes that the airframe and engine/propeller manufacturers, as well as the certification authorities, were slow to act as a result of the previous occurrences, and that actions taken thus far have been inadequate for the Saab 340 and other turbopropeller airplanes.

The record of multiple in-flight beta events on various model airplanes that led to serious incidents and accidents should have prompted more timely fleet-wide corrective actions. The Safety Board has made several safety recommendations to the FAA regarding the issue of in-flight beta operation on turbcpropeller airplanes. About 6 years ago, on October 17, 1988, the Safety Board urged the FAA to amend Parts 23.1 155 and 25.i 155 "...to provide for a positive means to prevent inadvertent operation of the propellers at blade pitch settings below the flight regime in those airplanes where such operation is prohibited." The FAA declined to act on this recommendation (A-88-105), stating that a Propeller installation Review Team had studied the situation and found that the provisions of the certification rules were adequate. Although the FAA stated at that time that it would consider the need for regulatory changes, it failed to promulgate rulemaking.

If the FAA had acted on A-88-105 by promulgating rulemaking to positively prevent beta operation in flight for airplanes in which such operation was prohibited, this accident would have been prevented. The FAA's conclusions relative to the lack of a need for rulemaking action proved to be wrong, and accidents involving in-flight beta operation continued. Furthermore, the airframe and engine/propeller manufacturers failed to lake appropriate actions based on the apparent safety hazards.

The FAA only recently has indicated that it plans to initiate rulemaking action in response to Safety Recommendation A-94-62. However, it is important to note that the specific intent of A-94-62 is essentially the same as A-88-105 that was issued about 6 years ago. Although some of the previous safety recommendations regarding this issue have led to actions by the FAA on specific airplanes, it appears that the FAA was more reactive than proactive. Consequently, the inadequate action taken to require more widespread design changes to prevent in-flight beta operation on airplanes for which such operation is prohibited is considered causal to this accident.

The Safety Board reiterates Safety Recommendation A-94-62 and urges expeditious actions by the FAA to complete the rulemaking project,

2.5 Cabin Safety Issues

Although the pilots were extremely busy during the emergency landing, the fist officer instructed the flight attendant to prepare the cabin for an emergency landing. However, the instruction was broadcast to BTR on the air traffic control frequency instead of the public address system. Although the flight attendant entered the cockpit, she did not obtain instructions from the pilots. Nevertheless, she certainly should have had enough cues to determine than an emergency landing was in progress. Consequently, she should have instructed the passengers to prepare for an emergency landing. The lack of coordination left the passengers ill prepared for the potential crash landing. However, the performance of the flightcrew and flight attendant was excellent after the airplane came to a stop. Under other circumstances, the lack of proper preparation of the passengers for the emergency landing could have led to serious injuries or death.

3. CONCLUSIONS

3.1 Findings

1. The flightcrew and flight attendant were properly trained and qualified to conduct the flight.

2. Weather and air traffic control handling were not factors in the accident.

3. The airplane had been maintained in accordance with its approved maintenance program, and there were no preexisting defects that contributed to the accident.

4. The captain actively moved the power levers from the *flight* idle gate into the *beta* range for undetermined reasons. Operation of the propellers in the beta range while in flight is prohibited by the airplane flight manual.

5. There were no mechanical failures of the power lever systems that could have permitted the movement of the power levers into the beta range without positive action by the pilot.

6. The propellers and engines experienced extreme overspeed when propeller and engine governing was lost while operating in the beta range. The engines were substantially damaged during the overspeed and necessitated a power-off emergency landing.

7. Although the design and certification of the power levers met existing requirements, those requirements were inadequate because they permitted a design that did not prevent movement into the beta range in flight.

8. The airframe and engine manufacturing industry, the FAA, and the certification authorities from other countries were slow in reacting to several previous in-flight beta occurrences that led to serious incidents and accidents.

9. The flightcrew and Right attendant **failed** to prepare the passengers for the emergency landing, although they performed **a** timely and effective emergency evacuation once the airplane came to a **stop.**

3.2 Probable Cause

The National Transportation Safety Board determines that the probable causes of this accident were the captain's movement of the power levers below flight idle in flight, the inadequate certification requirements and consequent design of the airplane's power levers that permitted them to be moved below the flight idle position into the beta range, either intentionally or inadvertently, while in flight, and the inadequate action taken to require a positive means to prevent beta operation on airplanes for which such operation is prohibited.

4. RECOMMENDATIONS

As a result of the investigation of this accident, the Safety Board reiterates the following safety recommendation and urges early rulemaking action:

--to the Federal Aviation Administration:

A-94-62

Revise Title 14 Code of Federal Regulations Parts 25.1155 and 23.1155 to require a positive means to prevent operation of the propeller in the beta mode while in flight, unless the airplane is certificated for such use.

BY THE NATIONAL TRANSPORTATION SAFETY BOARD

James E. Hail
Acting chairman

John K. Lauber
Member

John Hammerschmidt
Member

Carl W. Vogt
Member

September 27, 1994

5. APPENDIXES

APPENDIX A

INVESTIGATION AND HEARING

1. Investigation

The National Transportation Safety Board was notified of the accident about 2315 eastern standard time on February 1, 1994. An investigative team was dispatched from Washington, D.C., by the first available commercial flight and arrived at the accident site about 1400 cst, February 2, 1994. Other investigators launched from the Safety Board's Dallas/Fort Worth Regional Office preceded the arrival of the Washington team.

The following investigation groups were formed:

Systems/Structures
Powerplants
Cockpit Voice Recorder
Flight Data Recorder
Maintenance Records
Operations

A Survival Factors group was not formed, but two Safety Board investigators interviewed passengers by telephone and the flight attendant in person.

The following were parties to the investigation:

Air Line Pilots Association
Federal Aviation Administration
Flight Dispatchers, Meteorologists, and Operatior Specialists Union
General Electric Aircraft Engines
Hamilton Standard
Pointe Coupee Parish Sheriffs Office
Saab Aircraft AB
Simmons Aircraft/American Eagle

The Government of Sweden was invited to participate in accordance with the provision of Annex 13 to the Convention on International Civii Aviation. It elected not to participate.

2. Public Hearing

A public hearing was not held in conjunction with this investigation. Both members of the flightcrew submitted formal depositions at the Safety Board Headquarters, Washington, D.C., on February 15,1994.

APPENDIX B

COCKPIT VOICE RECORDER TRANSCRIPT

Legend of communication descriptions, abbreviations, acronyms and symbols used in the attached CVR transcript.

CAM	Cockpit area microphone
INT	Intra-cockpit intercom system
-1	Voice (or position) identified as Captain
-2	Voice (or position) identified as First Officer
-?	Unidentifiable voice
HST	Houston Air Route Traffic Control Center
BTR	Baton Rouge Approach Contrcl
COM	Radio transmissions received by accident aircraft front sources other than those specifically listed herein.
OPS	Company Operations
PA	Aircraft public address system
*	Unintelligible word
#	Expletive deleted
...	Pause
()	Questionable text
[]	Editorial insertion
-	Break in continuity

INTRA-COCKPIT COMMUNICATION

TIME & SOURCE	CONTENT
2107:11 **CAM**	[start of recording]
2107:38 INT	[3:40 minutes of non-pertinent conversation between the captain and the first officer starts]
2111:04 INT-2	I'm a li'l tired ... I didn't sleep worth a hoot last night.
2111:07 INT-1	where were you at?
2111:08 INT-2	ah I stay over there at Steve Tester's on a crash pad.
2111:11 INT-1	oh.
2111:15 INT-2	yeah it's a hell of a life .. I'll tell yah.
2111:20 INT-2	somebody's always yat! know coming in late or on the phone or -

AIR-GROUND COMMUNICATION

TIME & SOURCE	CONTENT
2107:22 RDO-2	**eagle** thirty-six forty-one at two one oh.
2107:24 HST	eagle flight thirty-six forty-one houston center roger.

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	*CONTENT*	**TIME & SOURCE**	**CONTENT**
2111:39 INT-1	yeah it's .. it be pretty hard to be in a crash pad.		
2111:52 **CAM**	[:10 minutes of mostly unintelligible conversation between captain and flight attendant concerning non-operational attendant chime]		
2112:17 INT	[2:15 minutes of non-pertinent conversation between the captain and the first officer starts		
		2114:25 HST	eagle flight thirty-six forty-one descend at pilot's discretion .. maintain one one thousand .. the baton rouge altimeter three zero four zero.
		211433 **RDO-2**	three zero four zero and **PD** to one one thousand thirty-six forty-one.
2: 14:38 INT-2	thirty-forty ... **PD** to one one.		
2114:45 INT	[3:25 minutes of non-pertinont conversation between the captain and the first officer starts]		
2117:57 INT-2	ah let me call and see if I can get the hotel started on the way.		

INTRA-COCKPIT COMMUNICATION

TIME & SOURCE	CONTENT
211822 INT-2	gate lour.
2118:23 INT-1	okay.
2118:24 INT-2	I told him **we'd** be should be there in about fifteen minutes shouldn't we with this speed?

AIR-GROUND COMMUNICATION

TIME & SOURCE	CONTENT
2118:02 RDO-2	baton rouge ah thirty-six forty-one's in range.
2118:09 OFS	okay thirty-six forty-one ah we'll see yah at gate four ... how many minutes out are you?
2118:11 RDO-1	eagle flight ah thirty-six forty-one we're descending out of flight level two one oh for one one thou.
2118:15 RDO-2	gate four ah we should be there in about fifteen minutes
2118:19 OPS	okay I'll call the van.
2118:20 RDO-2	thank you.

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2118:28 INT-1	yeah (ought be).		
211830 INT-2	(sound of sigh] what time we due in .. lets see?		
211835 INT-1	fifty ah lets see .. we're out at five .. should be ah they're calling it forty-five should be ten till.		
2118:41 INT-2	fifty .. yeah .. yeah.		
2118:45 INT-2	in at fifty we .. we'll probably beat that.		
2118:49 INT-1	yeah.		
2118:50 INT-2	twenty minutes .. thirty-five.		
2119:15 INT-2	well the son-of-a4 boy now it's gonna get hot .. #.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
		2119:25 COM-2	[sound of frequency change tone] * one thousand overcast .. visibility more then ten ... temperature three eight .. dew point two five .. winds light and variable .. altimeter throe zero four one ... visual approaches runway three one and two two fight in us0 .. all arrivals east and north of runway three one contact approach on one two six point five .. all others use one two zero point three ... clearance delivery is combined with ground control on one two on0 point niner ... advise on initial contact you have inlormation whiskoy.
		2120:02 COM-2	* * * metropolitan airport inlormation whiskey time zero two live live zulu .. baton rouge weather .. six thousand live hundred scattered .. measured ceiling eight thousand broken ... or.3 one thousand overcast .. visibility more then ten .., temperature three eight .. daw point two five .. winds light and variable .. altimeter three *zero* lour one ... visual approaches runway three one and two two right in use .. all arrivals east and north of runway three one contact approach on one two six point five .. all others use - [sound of frequency change tone]
2120:09 INT	(sound similar to that of overspeed warning starts]		
2120:22 INT	[sound similar to that 01 ovarspeed warning stops]		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME a SOURCE	CONTENT	TIME & SOURCE	CONTENT
2120:35 INT 2	whiskey sixty five hundred scattered ... measured eight thousand broken eleven thousand overcast .. thirty-eighl degrees .. wind is calm .. three zero four one on Ihe meter .. visuals lo three one and two lwo right.		
2120:55 INT-1	that gets you six one a hall dozen of the other three one and two two.		
2120:59 INT-2	yeah two two yah might.		
2121:00 INT-1	whal was the wind speed again?		
2121:02 INT-2	it's light and variable		
2121:11 INT-1	well what the heck's wrong with the ILS lo runway one three?		
2121:16 INT-2	* nolhing they'll probably give it to us.		
2121:18 INT-1	that's what I would .. believe I'd like to have		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2121:25 INT-2	lets see the ah airport's on the sixty-three radial eight miles from baton rouge .. so the airport's on this ah (nah) ... the airport's on tho other side of the VOR.		
2121:47 INT-1	well what I was thinking about instead of going clear around and corning back in is just making a * .. yah know in stead of going out and back just come out like that.		
2121:52 INT-2	he'll probably .. yeah .. he'll probably let us do it .. two eighty-four you got it set in?		
2122:01 INT-2	I don't see why he won't .. ten three.		
2122:04 INT-2	that son-of-a-# .. #.		
2122:10 INT-1	man we're almost the speed of heat here .. two sixty-four .. or two-sixty two .. three sixty-two.		
2122:15 INT-2	that's about the best that's about as good as I've ever seen.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2122:20 INT-2	okay altimeter well lets see we're coming through eighteen it's thirty forty-one.		
2122:25 INT-1	yeah .. you can run the descent check anytime you want to.		
2122:38 INT-1	I'll get the lights and the stew light at ten.		
2122:40 INT-2	okay ... altimeter is set pressurization's set for baton rouge ice protection as required fuel panel balance checks is within limits .. CTOT will be good for all of it sterile cockpit light .. we'll get through ten ..seatbelt sign and all that through ten.		
2123:03 INT-2	landing data .. your speeds are gonna be sixteen and twenty-six .. twenty-live twenty-eight.		
2123:10 INT-2	sixteen twenty-six.		
2123:13 INT-1	okay I got that set,		
2123:15 INT-2	and I'll ask for the ah ILS to one three.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2123:19 INT-1	yeah .. **what** was the temperature up here?		
2123:20 INT-2	ah thirty-eight.		
2123:22 INT-1	thirty and a little bit cool **lor** baton rouge.		
2123:25 INT-2	yeah I'll hold on the bleeds and stuff .. I'll re-run that when we get a little lower.		
2123:30 INT-1	okay.		
2123:30 INT-2	# almighty .. now it's hot as hell in here isn't that something .. and **I** turned it it's down to **... I just** whipped it down some more.		
2123:40 INT-1	* no airplane anyway		
2123:54 INT	[:40 minutes of non-pertinent conversation between the captain and first officer starts]		
2124:32 INT-1	gosh we gotta come down.		

INTRA-COCKPIT COMMUNICATION

TIME & SOURCE	CONTENT

AIR-GROUND COMMUNICATION

TIME & SOURCE	CONTENT
2125:01 HST	eagle flight thirty-six forty-one contact baton rouge approach one two zero point three so long.
2125:06 RDO-2	twenty point three good night sir.
2125:16 RDO-2	baton rouge approach eagle thirty-six forty-one we're out of fifteen five for one one thousand whiskey.
2125:25 BTR	eagle flight thirty-six forty-one baton rouge approach good evening the wind is calm expect a visual approach .. what runway would you like?
2125:31 RDO-2	how about ah one three we'll just ah shoot straight in there.
2125:34 BTR	eagle flight thirty-six forty-one roger fly heading one one zero intercept the localizer expect the visual approach runway one three .. descend and maintain two thousand.
2125:45 ROO-2	okay one one zero to intercept the localizer down to two thousand thirty-six forty-one.

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	**CONTENT**
2125:51 INT-1	well lets go ah d and hit the lights and the seatbelt and all.		
2125:54 INT-2	okay.		
2125:54 INT-1	scream this baby down some more ... I'll get 'em.		
2125:56 INT-2	you got 'em?		
2125:57 INT-1	yeah.		
2125:57 INT	[sound of seatbelt chime]		
2125:58 INT-2	okay ... the that makes the sterile cockpit lights on seatbelts on exterior lights are on.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2126:03 PA-1	hi folks ah we're about ah thirty-five miles from baton rouge be on the ground in about ten minutes .. like for you to put up those electronic devices at this time and put your seatbelt on .. temperature's thirty-eight degrees and there are a few clouds in the area .. but the moon is visible ... been our pleasure having you with us tonight we look forward to having you back again real soon ... let me assure you we do appreciate your business .. the winds up here in baton rouge are calm .. thanks a lot .. have a good night.		
2126:06 INT-2	pressure bleeds are off.		
2126:31 INT-1	okay		
2126:33 INT-2	okay .. it's ah high pressure bleeds off speeds are set .. you did the landing PA?		
2126:37 INT-1	no I just ah told them about the put up the electronic devices -		
2126:41 INT-2	oh okay.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME a SOURCE	CONTENT	TIME & (SOURCE	CONTENT
2126:43 INT-1	I didn't hit her ah I'll leave that for whenever you want to do it.		
2126:45 INT-2	alright ... 111 go ahead and get it out of the way.		
2126:51 PA-2	folks ah we'll be landing in just a few minutes flight attendant please prepare the cabin *for* landing .. thanks.		
2126:57 INT-2	well it's all done.		
2127:04 INT-2	wonder what the # is this down here ... on the edge of a lake or something?		
2127:07 IN'T-1	looks like the outline of a shore line.		
2127:09 INT-2	one three and two and three two eighty-four okay.		
2127:14 INT-1	okay there's ten here come the lights.		
2127:17 INT-2	okay.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2127:18 **PA-3**	[flight attendant announcement to passenger cabin]		
2127:19 INT-1	a little bouncy bouncy here.		
2127:28 INT-1	I wonder what's causing that?		
2127:29 INT-2	I don't know .. with calm winds down there you got something right in that this cloud layer or something.		
2127:35 INT-1	yeah		
2127:41 INT-1	yeah we'll just .. kinda **slow** this baby up a little bit.		
2127:46 INT	[sound similar to that **of the** autopilot disconnect chime]		
2127:52 **CAM**	[sound of increase in prop/engine rpm froqusncy and amplitude]		
2127:55 INT	(sound similar to that of master warning (triple) chime]		
2127:56 INT-2	what happened?		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2127:58 INT-1	what the #.		
2128:00 INT-2	your both engines flamed out.		
2128:00 INT	[sound similar to that of master warning chime]		
2128:01 INT-1	huh		
2128:02 INT-2	both engines flamed out .. you've got an airport underneath you.		
2128:06 INT	[sound similar to that of master warning chime]		
2128:07 INT-1	what the hell do we do here?		
2128:09 INT	[sound similar to that of a configuration warning horn starts]		
2128:11 CAM	[sound similar to that of an electrical power interruption to CVR unit]		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2128:12 INT	(sound similar to that of master warning chime]		
2128:13 INT-2	see that airport underneath yah?		
2128:16 INT	[sound sirnilar to that of a conliguration warning horn stops]		
2128:17 INT	[sound similar to that of master warning chime]		
2128:18 INT-2	turn on your dome.		
2128:20 INT-1	huh.		
2128:21 **CAM**	[sound similar to that of decrease in prop/engine frequency and amplitude]		
2128:22 INT	[sound similar to that of master warning chime]		
2128:25 INT	[sound similar to that of a conliguration warning horn cycles three times]		

INTRA-COCKPIT COMMUNICATION

TIME & SOURCE	CONTENT
2128:26 INT-2	hang on .. you've got an import right underneath you.
2128.27 INT	[sound similar to that of master caution chime]
2128:27 INT-1	okay . where's it at
2128.29 INT 2	straight underneathyah see it.
2128 31 INT-1	whe e
2128 32 INT 2	okay lets see what's goin'
2128.34 INT-1	we've lost everything
2128:38 INT-1	where's the airport?
2128:39 INT-2	right underneathyah.. e l?
2128:41 INT-1	okay get a hold of the radio.

AIR-GROUND COMMUNICATION

TIME & SOURCE	CONTENT

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
		2128:43 RDO-2	thirty-six forty-one ah mayday ah we've lost it there is there an airport right underneath us here we've lost both engines.
2128:46 INT	[sound similar to that of autopilot disconnect alert]		
		2128:50 BTR	eagle flight thirtysix forty-one yes sir the False River airport and ah it should be lit and ah believe five thousand feet stand by.
2128:58 INT-1	okay checklist		
2129:03 INT-2	engine failure twenty-five		
2129:08 INT-3	flight idle power levers flight **idle** .. **bus** tie connect light is ah on.		
2129:15 INT-2	condition **lever** failed engine fuel on.		
		2129:15 BTR	eagle **flight** thirty-six lorty-one say your flight conditions
2129:20 INT-1	see if you can get me anything going.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
		2129:27 HDO-2	ah we're VFR circling down to the field
		2129:30 BTR	eagle flight thirty-six forty-one roger we'll notify the ah sheriff's department at False River.
2129:36 INT-2	see what's happen(ing) here		
2129:37 INT-1	what's happening?		
2129.42 INT-2	you've got engines .. don't yah?		
2129:44 INT-1	I don't know .. I've got temperatures but I've got .. I don't know what's happened to my power.		
		2129:54 BTR	eagle flight thirty-six forty-one wind at baton rouge is calm .. altimeter three zero four zero.
2129.58 INT-1	what (have we done) here		
2130:02 INT-1	do I have any .. I don't have any power		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2130:06 INT-2	okay you got that airport underneath us		
2130:07 INT-1	yeah.		
2130:09 INT-2	generator switch failed engine ah off .. bus tie connect on .. you keep it keep it in sight .. keep circling.		
2130:15 CAM	[sounds similar to that of several fluctuations in propiengine noise]		
2130:19 INT-1	' just don't have any power.		
		213021 RDO-2	okay we've got the airport in sight say again sir.
		2130:25 BTR	eagle flight thirty-six forty-one wind at baton rouge is two live zero at three .. altimeter three zero lour zero .. and you're presently one eight miles northwest of the baton rouge airport understand you do have the False River airport in sight.
		2130:39 RDO-2	yeah we're trying to get some power restored here and ah and ah stand by we'll let you know.

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2130:47 INT-2	twenty-six both engines flame out .. power levers flight idle condition levers fuel off alright you you fly it alright?		
2130:53 INT-1	alrigm		
2130:53 CAM	[sound similar to that of fluctuation in prop/engine noise]		
2130:54 INT-2	airspeed a hundred and thirty knots.		
2130:56 INT-1	okay.		
2130:57 INT	[sound similar to that of master warning chime]		
2130:58 INT-2	alright airspeed a hundred and thirty .. electrical circuits off .. okay fuel standby pump switches are ah are ah on .. hang on .. override.		
2131:02 INT	[sound similar to that of master warning chime starts and continues]		
2131:08 INT-2	alright you just keep circling.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	**CONTENT**
2131:09 INT-1	okay.		
2131:10 INT-2	fuel stand by pump switches on autocoarsen is off ... ignition switches both on .. you keep flying.		
2131:18 INT-1	okay.		
2131:20 INT-2	ignition switches both on .. batteries switches both override.		
2131:27 INT-2	okay generator switches both off ... you **keep** her in sight .. keep her corning down you got a big glider.		
2131:31 INT-1	I got her.		
2131:33 INT-2	left condition lever start ... okay		
		2131:38 BTR	eac 3 flight thirty-six forty-one that runway is five th ousand feet by seventy-five feet.
2131:41 INT	(sound similar to that of a configuration warning horn starts and continues]		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	**CONTENT**
2131:43 INT-2	start switch left side.		
		2131:45 RDO-2	say again sir.
2131:47 INT-1	that's alright.		
		2131:46 BTR	the runway at the False River airport which you're circling over is five thousand feet by seventy-five feet.
2131:48 CAM	[reduction in CVR audio amplitude]		
2131:58 INT-1	ask him what the ah-		
		2131:59 RDO-1	what's the field elevation of it?
		2132:01 BTR	ah field elevation at False River airport is ah three niner thirty-nine feet.
2132:09 INT-1	okay		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2132:09 INT	[:11 minutes of unintelligible communication because of reduction in CVR audio amplitude]		
2132:20 CAM	[sounds similar to those of master warning chime and configuration horn stops]		
2132:20 INT-1	okay better warn the flight attendant		
		2132:24 RDO-2	flight attendant please prepare for emergency landing we've got an airport right underneath us here folks we're trying to restore power we don't know what happened please remain calm prepare for emergency landing.
2132:32 INT-1	gear		
		2132:34 BTR	okay and that was on baton rouge approach.
2132:35 CAM	[sound similar to that of master caution chime starts and continues]		
2132:38 CAM	[unintelligible announcement to flight attendant]		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	CONVENT
2132:50 INT-2	damn I never saw I don't know what the hell happened.		
2132:5? INT-1	flaps fifteen.		
213258 INT-2	alright you got her in sight?		
2132:59 INT-1	*yeah.*		
		2133:00 BTR	eagle flight thirty-six forty-one when able say souls and fuel on board.
2133:01 INT-1	flaps -		
		213305 RDO-2	twenty-three hundred with ah about ah eight hundred pounds of fuel.
		2133:09 BTR	alright thank you.
2133:12 INT-2	man this **son-of-a#** is just dead .. it won't *do #.*		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	**CONTENT**
2133:15 INT-I	have I got gear .. pump the gear down pump the gear down quick .. hurry up I need it.		
2133:20 INT-2	ah .. # let me get **yo** to override on **this.**		
2133:25 **CAM**	[sound similar to that of hydraulic pump running)		
2133:24 INT-1	okay.		
2133:26 INT-2	alright you got gear you got gear you got gear.		
2133:28 INT-1	okay .. give me **flaps.**		
2133:32 INT-2	slip it if you have to **slip** it.		
2133:38 INT-2	slip it.		
		2133:47 BTR	eagle flight thirty-six forty-one understand-
2133:5 I INT-2	bounce **it** got it on.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2133:53 INT-1	I'll get it.		
2133:59 CAM	[sound of squeal similar to that of wheel touchdown]		
2134:03 INT-1	no brakes.		
2134:06 INT-2	#.		
2134:08 INT-2	oh # ... I don't know what's out here .. hang on.		
2134:15 CAM	[sounds of rumbling and impacts start and continue for :11 minutes]		
2134:24 INT-1	okay.		
2134:25 INT-2	we're alive #.		
2134:26 INT-1	okay now then we got to ah pan pan pan.		
2134:29 INT-2	get this son -		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	CONTENT	TIME & SOURCE	CONTENT
2134:30 CAM	[sound similar to an interrupt in CVR electrical power]		
2134:31 INT-2	get this scn-of-a-# out.		
2134:32 INT-1	okay get pan pan pan ... pan pan pan.		
2134:39 CAM	[sound similar lo that of hydraulic pump shutting off)		
2134:45 CAM	[sound similar to an interrupt in CVR electrical power]		
2134:49 CAM	[sound Similar to that of turbine(s) spooling down]		
2134:55 CAM	[1:00 minutes of voices and sounds similar lo that of aircraft evacuation starts]		
2135:21 CAM	[sound similar to an interrupt in CVR electrical power]		
2135.50 CAM-?	good job.		
2136:05 CAM-?	great job captain.		

INTRA-COCKPIT COMMUNICATION		AIR-GROUND COMMUNICATION	
TIME & SOURCE	**CONTENT**	**TIME & SOURCE**	**CONTENT**
		213627 COM	ah eagle thirty-six forty-one do you read two six six.
2136:37 CAM 1	* what in the # happened?		
2136.44 CAM-1	you got a flashlight.		
		2137:15 COM	eagle thirty-six forty-one do you road two six six
		2137:28 ROO-2	hey baton rouge approach baton rouge approach
		2137:47 RDO-2	rnayday rnayday anybody on twenty-one live
		2137:56 ROO-2	baton rouge approach baton rouge approach eagle thirty-six forty-one.
2:38 08 CAM	[end of recording]		