National Transportation Safety Board
Aviation Accident Final Report

Location:	MERCED, CA	**Accident Number:**	LAX93FA177
Date & Time:	04/19/1993, 2320 PDT	**Registration:**	N131CA
Aircraft:	BRITISH AEROSPACE BA 3101	**Aircraft Damage:**	Destroyed
Defining Event:		**Injuries:**	1 Serious, 2 Minor
Flight Conducted Under:	Part 91: General Aviation - Instructional		

Analysis

THE COMPANY CHIEF PILOT/CHECK PILOT WAS GIVING A CHECK FLIGHT TO A COMPANY FIRST OFFICER (F/O). AN FAA INSPECTOR WAS ABOARD TO OBSERVE THE CHECK PILOT'S ABILITY TO GIVE PROFICIENCY CHECK FLIGHTS. SOON AFTER LIFT-OFF ON THE 2ND TAKEOFF, THE CHECK PILOT SIMULATED AN ENGINE FAILURE. THE F/O, WHO WAS WEARING A VISION LIMITING DEVICE, ALLOWED THE AIRPLANE TO DRIFT TO THE LEFT, BUT THE FAA INSPECTOR NOTED THAT THE F/O SUCCESSFULLY REGAINED DIRECTIONAL CONTROL. THE INSPECTOR THEN LOOKED AWAY FROM THE COCKPIT, & WHEN HE LOOKED BACK, THE AIRPLANE WAS DESCENDING. MOMENTS LATER, IT COLLIDED WITH THE GROUND. THE FAA INSPECTOR REPORTED THAT THE CHECK PILOT WAS LOOKING TO THE LEFT, OUTSIDE OF THE AIRCRAFT, & DID NOT HAVE HIS HAND NEAR THE POWER QUADRANT. REVIEW OF THE CVR TAPE REVEALED THAT, FROM THE TIME THE F/O WAS GIVEN THE SIMULATED LEFT ENGINE FAILURE UNTIL IMPACT, THE CHECK PILOT DID NOT SAY ANYTHING TO THE F/O. NO MAINTENANCE DISCREPANCY OR MATERIAL DEFICIENCY WAS NOTED DURING THE INVESTIGATION. THE F/O HAD 3925 HOURS IN THIS MAKE/MODEL OF AIRCRAFT.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: THE FIRST OFFICER'S FAILURE TO MAINTAIN AN ADEQUATE RATE OF CLIMB AFTER A SINGLE-ENGINE LOSS OF POWER WAS SIMULATED, AND THE COMPANY CHECK PILOT'S INADEQUATE SUPERVISION AND FAILURE TO NOTE THE DESCENT. DARKNESS WAS A RELATED FACTOR.

Findings

Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER
Phase of Operation: TAKEOFF

Findings
1. EMERGENCY PROCEDURE - SIMULATED - CHECK PILOT
2. (C) PROPER CLIMB RATE - NOT MAINTAINED - COPILOT/SECOND PILOT
3. (C) DESCENT - NOT CORRECTED - COPILOT/SECOND PILOT
4. (F) LIGHT CONDITION - DARK NIGHT
5. (C) SUPERVISION - INADEQUATE - CHECK PILOT
6. (C) INATTENTIVE - CHECK PILOT

Factual Information

HISTORY OF FLIGHT:

On April 19, 1993, at 2320 hours Pacific daylight time, a British Aerospace BA-3101, N131CA, collided with the terrain during an uncorrected descent after takeoff about 1/4 mile north of the Merced, California, airport. The local area instructional flight was operated by Westair Commuter Airlines, Incorporated, doing business as United Express, under the provisions of 14 CFR Part 91 of the Federal Aviation Regulations. The airplane was destroyed during the impact sequence. The company check airman, an airline transport pilot, received serious injuries. The first officer, an airline transport pilot taking an annual proficiency check ride, received minor injuries. An FAA operations inspector aboard the airplane to observe the company check airman also received minor injuries. Visual meteorological conditions prevailed and a company visual flight rules flight plan was filed.

Statements were provided by all crew members aboard the aircraft at the time of the accident and by another United Express, Incorporated, first officer who underwent an annual proficiency check ride with the other three crew members the night of the accident. They reported that the purpose of the flight was for the company check airman to administer an annual proficiency check for the first officers. The FAA operations inspector was aboard the airplane to observe the company check airman to determine if he could satisfactorily administer proficiency check rides and to certify him for that function.

The three United Express pilots waited for the FAA operations inspector at the airport in Merced. They reported that they began their oral examination at 1630 hours and completed the oral portion of the proficiency flight check at 1930 hours. After completion of the oral examination, the group of four went to dinner.

Upon returning to the Merced airport, the first proficiency check ride was administered. The FAA operations inspector said the check airman did not pass the first pilot (a first officer) and that the pilot was de-briefed in the airplane at Merced and released. The FAA operations inspector further reported that the remaining first officer and the check airman stayed in the airplane to prepare for the proficiency check ride while he (the FAA operations inspector) went inside a building at the airport for a "short" break. The crew members reported that the pre-flight briefing and preparation for takeoff were completed while the FAA operations inspector was taking a break.

The accident airplane was equipped with a cockpit voice recorder (CVR). A readout of the CVR was conducted at the NTSB headquarters on June 21, 1993, under the supervision of an NTSB electronic engineer. Five parties to the investigation were in attendance at the CVR readout.

Transcripts of the CVR readout and crew member witness statements indicate a safety briefing was conducted; crew member duties were discussed; and checklist items were completed prior to beginning the takeoff for the second period proficiency check ride.

Review of crew member statements and the CVR transcript revealed that the first takeoff was about 2310 hours. The takeoff culminated in the check airman calling for an aborted takeoff. The FAA operations inspector reported that the aborted takeoff was satisfactorily performed by the first officer.

According to the first officer and the FAA inspector, the crew prepared for a second takeoff. They said the first officer was wearing "foggles," a device worn to restrict the vision of the pilot outside the aircraft and to simulate an instrument takeoff.

They said the takeoff began about 2318 hours.

The FAA inspector aboard the airplane said he was sitting in the forward most right side aisle passenger seat, directly behind the first officer. They were separated by a bulkhead that extended from the floor to the ceiling of the airplane. The inspector provided a statement which detailed the takeoff and subsequent accident. He said the takeoff began behind the numbers on runway 30. About 1/4 to 1/2 of the length of the runway, the airplane became airborne. He said that the company check pilot retarded the left throttle to what he thought was about the flight idle position to simulate an engine failure just after takeoff, or just after V1.

The inspector said his view outside the airplane looking through the front windshield was restricted by the bulkhead and by the pilots in their respective seats. He said he could see portions of the instrument panel by looking around the pilots and their seats.

The inspector said that the first officer allowed the airplane to "drift" to the left by up to 70 degrees in heading. He said the first officer then got the airplane back on the required heading and he also noted the vertical speed indicator was indicating a climb of about 500 feet per minute. He said that at that point he thought everything was under control, so he leaned over to his right to get a notebook.

He said that when he looked up again, the vertical speed indicator was indicating level flight; then indicated about a 200 feet per minute rate of descent; and then indicated a 500 feet per minute rate of descent. He further said that he noticed the airplane's airspeed increase from about 120 miles per hour to about 130 miles per hour. He said he looked through the airplane's windscreen and saw trees. He said he did not remember anyone trimming the airplane. He said he did not see the check pilot's hand on the power quadrant and that he noticed the check pilot looking toward the left. He reported that he did not remember the impact sequence from that point until the time the airplane came to a rest. He said he did not remember the check airman saying anything about the airplane's heading or altitude from the time of takeoff until the impact.

In his statement, the first officer said that he thought the airplane only got about 10 to 15 degrees off heading after the simulated loss of the left engine. He said he did not notice the airplane descending and did not remember the impact sequence.

The check pilot was interviewed by an FAA inspector about two weeks after the accident. The check pilot did not remember the impact sequence nor any details of the accident.

The transcript of the CVR readout indicated that the airplane's engines began to "spool up" one minute and fifty one seconds prior to what the CVR readout group thought was the sound of an impact. The transcript indicated the company check pilot called "V1 rotate" one minute and 40 seconds before impact. The exact time of the check pilot giving the simulated engine failure was not included in the transcript. Thirty seconds prior to impact, the transcript noted a sound similar to that of a gear warning horn. According to a British Aerospace Technical Representative, the gear warning horn is activated when the landing gear is retracted and one or both engines are retarded to the flight idle position.

The transcripts indicated nothing was said until about one second before the sound similar to that of the impact. The check pilot was identified by the CVR group as saying "Mike." The FAA inspector was identified by the same group as saying "look out," about seven tenths of a second prior to the identified impact sound.

On scene investigation indicated the airplane collided with the terrain at about the airport boundary, northwest of the airport. The airplane came to a rest in a plowed field, across a road from the airport boundary, about 1/4 mile from the airport.

According to the Merced County Sheriff's Report (case number 9309356), an individual who lives close to the accident site heard a "loud bang" and decided to investigate. He located the airplane in the field and told his wife to dial "911" to report the accident. The individual and the responding Sheriff's Deputy located the FAA inspector and the First Officer outside the airplane. The report stated the individual who reported the accident and the Sheriff's Deputy then removed the check pilot from his seat in the fuselage.

The accident site is located about 37 degrees and 18 minutes north latitude and 120 degrees and 31 minutes west longitude.

CREW INFORMATION:

FAA airman record files and company records were reviewed. According to those records, all three occupants hold Airline Transport Pilot certificates and type ratings in the BA-3101 aircraft. Review of all records examined revealed that the company check airman and first officer were qualified for the operation conducted in accordance with applicable Federal Aviation Regulations.

According to United Express dispatch records and statements by United Express management personnel, the check airman, who is also the company's chief pilot for the BA-3101, was off duty for the two days prior to the accident. On the day of the mishap, he began the duty day at about 0630 hours with a scheduled commuter flight. After completing the flight, it was reported that he went home at 1045 and slept from 1130 to 1530. At 1600, he departed his residence and drove to the training airplane's location in Merced, arriving there about 1710 hours.

According to the statements provided by the two first officers, they flew from their respective domiciles in the San Francisco, California, area and arrived in Merced just prior to the check airman.

The FAA operations inspector reported that he was working what the FAA terms as a "modified work day." He said that he began the work day at 1430 hours. He said that he drove from Fresno to Merced and arrived there at 1615 hours.

AIRCRAFT INFORMATION:

A detailed review of the airplane's maintenance records was conducted. The review of the records revealed no unresolved maintenance discrepancies documented against the aircraft prior to departure the day of the accident.

METEOROLOGICAL INFORMATION:

A weather observation was taken at Castle Air Force Base, located about eight miles northwest of the accident site, at 2355 hours. That observation, in part, was: "Thin overcast at 25,000 feet above ground level; no ceiling reported; visibility 10.0 statute miles; temperature 55

degrees fahrenheit; dew point 48 degrees fahrenheit; altimeter setting of 30.02 inches of mercury; and calm wind."

The FAA inspector reported that there was very little ambient light in the accident area.

WRECKAGE AND IMPACT INFORMATION:

The accident site is located about one quarter of a mile northwest of the Merced Airport. The site is characterized by flat terrain and sparse vegetation primarily in the form of trees and grass. The first noted ground scar was located about 500 feet from the departure end of runway 30, the takeoff runway. The ground scar was measured to be on a magnetic bearing of about 290 degrees. Red plexi glass was found at the first scar and the ground around the scar was disturbed with grass removed from the ground which exposed the dirt. The scar measured about 38 feet wide and was on airport property immediately adjacent to an airport boundary chain link fence.

The fence was knocked down and paint transfers were located on two of the fence posts. The area where the fence was knocked down was about 38 feet wide. Trees which were adjacent to and on the outside of the airport boundary fence were noted to have scars, and branches were on the ground beside the trees. Paint transfers were noted on the trees. Portions of the left wing and right wing were found in the area of the scarred trees.

A road running generally north and south is immediately adjacent to the trees and fence. A scar was located on the road. The scar was perpendicular to the road and was noted to be on a magnetic bearing of about 290 degrees. According to the Deputy Sheriff who responded to the accident site, the airplane's fiberglass baggage pod was found on the road.

Portions of the airplane's left wing, including the aileron, were located about 300 feet from the first noted point of impact and were across the road and across an irrigation canal. The left propeller, which was separated from its engine, was located about 325 feet from the first noted ground scar and on a magnetic bearing of about 290 degrees.

From the left engine propeller, a ground scar was noted in the freshly plowed field that was on a magnetic bearing of about 270 degrees and continued for about 315 feet. The main wreckage was located at the end of this ground scar. The main wreckage, consisting of the fuselage, both engines, portions of both wings, and the right engine's propeller, was located on a magnetic bearing of about 300 degrees.

The airplane was examined on scene.

The airplane's fuselage was crushed on the left forward side. The nose portion of the fuselage was broken off the airplane forward of the pressure bulkhead. The lower half of the forward pressure bulkhead was pushed aft. The underside of the fuselage from Station FS75 to FS223 was torn open (a diagram of the airplane is attached as item 8). The main cabin door would open at the top. It was restricted to further opening because of its location in relation to the ground. The left pilot's seat in the cockpit was displaced and was found to be on a right angle of about 20 degrees from its installed position.

The right propeller was attached to its engine. All four propeller blades had "s" twists, rearward bent tips, and leading edge damage. A wire which matched the wires of the fence at the airport boundary was found wrapped around the propeller hub. The left propeller was detached from its engine aft of the propeller flange. All four propeller blades had "s" twists, rearward bent tips, and leading edge damage.

Both wings were broken off about 2 feet outboard from their respective engines, at station WS 187. The separated portions of the wings had aft crushing from the leading edge rearward. The airplane's empennage was intact and remained attached to the fuselage.

Control continuity was established for the elevator and the rudder from the cockpit. Control continuity for the ailerons could not be established due to wing damage.

The trim actuators for the elevator and the rudder were neutral. The aileron trim was set at full right aileron on the trim indicator. The chain drive (trim jack) for the aileron trim was determined to be consistent with the trim indicator and was found to be in the full right trim position.

The airplane's flap indicator was 10 degrees. A physical examination fo the flap jack indicated they were retracted. The landing gear was found in the retracted position and in the three wheel wells.

The engines were removed from the airplane for further examination.

TESTS AND RESEARCH:

During the engine examination, both engines were found to have rotational scoring to their sun gears; foreign object damage to their compressor impeller blades; compressor shroud metal spray deposits on the exit radii of the second stage compressor impeller shrouds; dirt and debris throughout the gas paths; and turbine rotor blade tip rubs with corresponding turning stator blade tip shroud rubs.

The right engine also had rotational scoring to the propeller shaft; compressor shroud metal spray deposits on the second stage compressor blade platforms; and compressor shroud metal spray deposits on the second stage compressor diffuser vanes.

The left engine also had rotational scoring to the planet gear oil jet; foreign object damage to the second stage compressor diffuser vanes; and airflow tracts on the combustion chamber. No pre-existing conditions were found on either engine which would have prevented normal engine operation.

ADDITIONAL INFORMATION:

The aircraft wreckage was released to Ken Steiner, representing the owner, on June 16, 1993.

Pilot Information

Certificate:	Airline Transport; Flight Instructor	**Age:**	50, Male
Airplane Rating(s):	Multi-engine Land; Single-engine Land	**Seat Occupied:**	Left
Other Aircraft Rating(s):	Helicopter	**Restraint Used:**	Seatbelt, Shoulder harness
Instrument Rating(s):	Airplane	**Second Pilot Present:**	Yes
Instructor Rating(s):	Airplane Multi-engine; Airplane Single-engine	**Toxicology Performed:**	No
Medical Certification:	Class 1 Valid Medical--w/ waivers/lim.	**Last FAA Medical Exam:**	11/19/1992
Occupational Pilot:		**Last Flight Review or Equivalent:**	
Flight Time:	16990 hours (Total, all aircraft), 600 hours (Total, this make and model), 16110 hours (Pilot In Command, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	BRITISH AEROSPACE	**Registration:**	N131CA
Model/Series:	BA 3101 BA 3101	**Aircraft Category:**	Airplane
Year of Manufacture:		**Amateur Built:**	No
Airworthiness Certificate:	Transport	**Serial Number:**	787
Landing Gear Type:	Retractable - Tricycle	**Seats:**	21
Date/Type of Last Inspection:	Continuous Airworthiness	**Certified Max Gross Wt.:**	15212 lbs
Time Since Last Inspection:		**Engines:**	2 Turbo Prop
Airframe Total Time:	8873 Hours	**Engine Manufacturer:**	ALLIED SIGNAL
ELT:	Installed	**Engine Model/Series:**	TPE 331-1-10
Registered Owner:	FIRST SECURITY BANK OF UTAH	**Rated Power:**	940 hp
Operator:	WESTAIR COMMUTER AIRLINES, INC	**Operating Certificate(s) Held:**	Commuter Air Carrier (135)
Operator Does Business As:	UNITED EXPRESS	**Operator Designator Code:**	WTAA

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	**Condition of Light:**	Night/Dark
Observation Facility, Elevation:	MER, 1531 ft msl	**Distance from Accident Site:**	6 Nautical Miles
Observation Time:	2355 PDT	**Direction from Accident Site:**	340°
Lowest Cloud Condition:	Thin Overcast / 25000 ft agl	**Visibility**	10 Miles
Lowest Ceiling:	None / 0 ft agl	**Visibility (RVR):**	0 ft
Wind Speed/Gusts:	Calm /	**Turbulence Type Forecast/Actual:**	/
Wind Direction:		**Turbulence Severity Forecast/Actual:**	/
Altimeter Setting:	30 inches Hg	**Temperature/Dew Point:**	13°C / 9°C
Precipitation and Obscuration:			
Departure Point:	(MCE)	**Type of Flight Plan Filed:**	Company VFR
Destination:	(MCE)	**Type of Clearance:**	None
Departure Time:	2319 PDT	**Type of Airspace:**	Class D

Airport Information

Airport:	MERCED MUNICIPAL (MCE)	**Runway Surface Type:**	Asphalt
Airport Elevation:	1531 ft	**Runway Surface Condition:**	Dry
Runway Used:	30	**IFR Approach:**	None
Runway Length/Width:	5904 ft / 150 ft	**VFR Approach/Landing:**	None

Wreckage and Impact Information

Crew Injuries:	1 Serious, 2 Minor	**Aircraft Damage:**	Destroyed
Passenger Injuries:	N/A	**Aircraft Fire:**	None
Ground Injuries:	N/A	**Aircraft Explosion:**	None
Total Injuries:	1 Serious, 2 Minor	**Latitude, Longitude:**	

Administrative Information

Investigator In Charge (IIC):	RICHARD V CHILDRESS,	**Report Date:**	08/31/1994
Additional Participating Persons:	RICHARD TABOR; FRESNO, CA R M CALLAHAN; SAN LUIS OBISPO, CA R J MARRS; SAN FRANCISCO, CA HARLOW VOORHEES; FRESNO, CA		
Publish Date:			
Investigation Docket:	NTSB accident and incident dockets serve as permanent archival information for the NTSB's investigations. Dockets released prior to June 1, 2009 are publicly available from the NTSB's Record Management Division at pubinq@ntsb.gov, or at 800-877-6799. Dockets released after this date are available at http://dms.ntsb.gov/pubdms/.		