



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	BETHEL, AK	<b>Accident Number:</b>	ANC02LA002
<b>Date &amp; Time:</b>	10/16/2001, 2129 AKD	<b>Registration:</b>	N120AX
<b>Aircraft:</b>	Embraer 120ER	<b>Aircraft Damage:</b>	Substantial
<b>Defining Event:</b>		<b>Injuries:</b>	2 Minor
<b>Flight Conducted Under:</b>	Part 135: Air Taxi & Commuter - Non-scheduled		

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## Analysis

The captain and first officer were conducting a localizer DME back course approach to runway 36 in a twin-engine turboprop airplane during a night cargo flight under IFR conditions. The minimum visibility for the approach was one mile, and the minimum descent altitude (MDA) was 460 feet msl (338 feet agl). Prior to leaving their cruise altitude, the first officer listened to the ATIS information which included an altimeter setting of 29.30 inHg. No other altimeter information was received until the crew reported they were inbound on the approach. At that time, tower personnel told the crew that the visibility was one mile in light snow, the wind was from 040 degrees at 22 knots, and the altimeter setting was 29.22 inHg. The crew did not reset the airplane altimeters from 29.30 to 29.22. At the final approach fix (5 miles from the runway), the captain began a descent to the MDA. Thirty-six seconds before impact, the first officer cautioned the captain about the airplane's high airspeed. Due to strong crosswinds, the captain disconnected the autopilot 22 seconds before impact. He said he pushed the altitude hold feature on the flight director at the MDA. Eighteen seconds before impact, the airplane leveled off about 471 feet indicated altitude, but then descended again 9 seconds later. The descent continued until the airplane collided with the ground, 3.5 miles from the runway. The crew said that neither the airport, or the snow-covered terrain, was observed before impact. The crew reported that the landing lights were off. The airplane was not equipped with a ground proximity warning system.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The captain's continued descent below the minimum descent altitude which resulted in impact with terrain during an instrument landing approach. Factors contributing to the accident were the flightcrew's failure to reset the altimeters to the correct altimeter setting, and meteorological conditions consisting of snow obscuration that limited visibility, and the ambient night light conditions.

## Findings

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Occurrence #1: IN FLIGHT COLLISION WITH TERRAIN/WATER

Phase of Operation: APPROACH - FAF/OUTER MARKER TO THRESHOLD (IFR)

### Findings

1. TERRAIN CONDITION - SNOW COVERED
2. (F) ALTIMETER SETTING - IMPROPER - FLIGHTCREW
3. (F) WEATHER CONDITION - OBSCURATION
4. (C) MINIMUM DESCENT ALTITUDE - CONTINUED BELOW - PILOT IN COMMAND
5. (F) WEATHER CONDITION - SNOW
6. (F) LIGHT CONDITION - NIGHT

## Factual Information

### HISTORY OF FLIGHT

On October 16, 2001, at 2129 Alaska daylight time, an Embraer 120ER airplane, N120AX, sustained substantial damage after colliding with terrain during an approach to land, about 3.5 miles south of the Bethel Airport, Bethel, Alaska. The airplane was being operated as an instrument flight rules (IFR) nonscheduled domestic cargo flight under Title 14, CFR Part 135, when the accident occurred. The airplane was operated as Flight 24, by Alaska Central Express Inc., Anchorage, Alaska. The captain and first officer received minor injuries. Dark night instrument meteorological conditions prevailed, and an IFR flight plan was filed from Anchorage to Bethel. The flight originated at the Ted Stevens Anchorage International Airport, Anchorage, at 1949.

The director of operations for the operator reported the captain was conducting his third trip of the day to Bethel. The accident flight was the first officer's second flight of the day to Bethel. The first two flights to Bethel landed in visual flight rules (VFR) conditions.

The following narrative is derived from crew statements, information recorded on the airplane's cockpit voice recorder (CVR), air traffic control communications, and data recorded on the airplane's solid state flight data recorder (SSFDR).

After departure from Anchorage on the accident flight, the crew proceeded toward Bethel. The captain reported that he initially planned a VFR arrival, but as the flight neared King Salmon, Alaska, the weather conditions became IFR. Prior to leaving their cruise altitude, the first officer listened to the recorded automatic terminal information service (ATIS) broadcast at 2104, recorded by the Bethel air traffic control tower (ATCT) controller. ATIS information "Charlie," recorded at 2053, stated: "Bethel tower information 'charlie', 0353 Zulu. Wind, 040 at 20, gust 28. Visibility 10. Ceiling 9,000 overcast. Temperature minus 4. Dew point minus 8. Altimeter 29.30. Visual approach runway 36 in use. Notice to airman, runway 18 locator middle marker out of service. Runway 36 localizer back course unusable seven-tenths DME inbound. Advise on initial contact you have information Charlie."

At 2111, the crew set 29.30 on the airplane altimeters. They were cleared by Anchorage Air Route Traffic Control Center (ARTCC) to descend and maintain 3,000 feet, and to report Bethel Airport in sight. The crew responded by reporting the airport was in sight. Anchorage ARTCC then reported that the visibility at the airport was rapidly dropping, and the crew could expect the localizer approach. At that point, the crew said they were about 28 miles northeast of the Bethel VOR.

At 2114, the captain briefed the first officer on the anticipated localizer approach. He included information about the airport NOTAM by stating: "...this is what cracks me up. Missed approach is .5 DME, but the DME's unusable with the .7 inbound." The first officer responded by stating: "...see we gotta do it at .7.... legally." The captain replied: "...legally. Jee, like that's gonna happen."

At 2116, about 12 miles northeast of the Bethel VOR, the crew was cleared to contact the Bethel ATCT. The crew was subsequently cleared for the localizer DME back course approach to runway 36. The first officer reported that as the airplane crossed over the Bethel VOR, outbound, he again checked the Bethel ATIS, but the recording was silent. The first officer said he thought the ATIS was being updated. According to the FAA, the ATIS information was

turned off at 2113 to update the information, but the weather conditions were changing rapidly. An updated ATIS information "Delta" was not recorded before the accident.

At 2119, the first officer told the captain that the airplane altitude was captured at 3,000 feet (msl), and then proceeded to set 2,500 feet (msl) in the altitude alerter window. At 2120 the altitude annunciator of "Altitude Alert" is heard on the CVR. The crew identified the localizer heading and altitude requirements for the approach, confirming at 2123, that at NAPAC intersection, the airplane could descend to 1,800 feet (msl). At 2123, the "Altitude Alert" annunciator sounded. Also at 2123, the first officer commented to the captain: "It's the first time I've shot a back course in this. Pretty cool."

At 2124, the crew reported to the Bethel tower that they completed the procedure turn and were inbound on the localizer. The Bethel tower controller acknowledged by stating: "Ace Air 24, report NAPAC, and uh, visibility has dropped down to about a mile, with uh, light snow and the ceiling 1,200 broken. Altimeter 29.22. Wind 040 at 22." The crew responded to the radio transmission by stating: "24 thanks a lot. We'll call you NAPAC inbound."

At 2125, the captain told the first officer he was at 1,800 feet (msl) and requested what was next (on the approach). The first officer replied at 2126: "460 (feet msl) at NAPAC." The captain said, "Okay, I'll put 400 in here."

At 2128, the crew configured the airplane for landing by putting the landing gear down, and positioning the flaps to 25 degrees. The crew then reported to the Bethel tower they were at NAPAC. The tower controller replied, "Ace Air 24, not in sight, runway 36, cleared to land." The first officer told the captain, "good to 460 (feet msl)." At NAPAC intersection, with the airplane at 1,800 feet msl, the captain said he began a 1,000 fpm descent for the minimum descent altitude of 460 feet msl.

About 2128:58, recorded data from the SSFDR indicated the airplane pitched nosed down about 5.5 degrees, and the airplane began descending.

At 2129:19, the first officer cautioned the captain by stating: "careful on the speeds. We got flaps 25." About 2129:27, SSFDR data indicated the airplane was 8.3 degrees nose down, and the airspeed reached 172.4 knots, (the operator reported that the maximum airspeed at 25 degrees of flaps is 150 knots).

The captain reported that during the approach, strong wind conditions kept pushing the airplane left of the localizer centerline. The autopilot was engaged during the approach, but due to the strong winds, the autopilot was having difficulty maintaining the centerline. About 700 to 800 feet msl, the captain said he disconnected the autopilot and hand-flew the airplane.

At 2129:26, the "Altitude Alert" annunciator sounded, and at 2129:33, the sound of three chimes (similar to the autopilot disconnect signal) was heard on the CVR, followed at 2129:35 by an audio annunciator of "autopilot."

The captain said that upon reaching 460 feet (msl), he pushed altitude hold on the flight director, and noticed the airplane was slightly left of the localizer centerline.

Recorded data on the SSFDR indicated the airplane began to level off about 2129:36, about 471 feet msl (indicated altitude with an altimeter setting of 29.30 inHg). About 2129:45, SSFDR data indicated the airplane began another descent that continued until the data ended.

Sounds of impact were heard at 2129:54, and the CVR recording ended at 2129:56. The crew

reported that neither the airport, or the snow-covered terrain, were observed before impact. The crew reported that the landing lights were off.

The airplane collided with the ground on the 186 degree radial of the Bethel VOR, 3.5 miles from the threshold of runway 36. The crew said that after ground contact, an orange flash was seen in the right engine. The airplane's engine fire extinguishers were pulled by the crew. The airplane sustained damage to the fuselage, wings, and engines. After the collision, the first officer reported seeing 390 feet (msl) displayed on his altimeter.

#### AIRCRAFT INFORMATION

Although not required for cargo operations, the airplane was equipped with a cockpit voice recorder and a solid state flight data recorder. The recorder equipment was not removed when the airplane was converted from commuter seating to a cargo configuration. Data from the recorded airplane parameters are stored in the SSFDR after being processed by the airplane's digital flight data acquisition unit (DFDAU).

The airplane is equipped with an automatic flight control system that integrates the air data system, autopilot, flight director, and an electronic flight instrument system (EFIS). The EFIS includes two cathode ray tube/electronic flight displays in front of each pilot that display attitude, heading, and navigation information. An electronic multifunction display in the center of the instrument panel presents radar, navigation, and airplane system information.

The automatic flight control system is a fully integrated three axis flight control system. It consists of the flight director system and the autopilot system. The flight director system consists of the flight control panel and the flight guidance computer. The flight control panel contains, among others, an altitude hold button, and an altitude select button, utilized in conjunction with the altitude alerter, to capture a preselected altitude.

The altitude hold mode works in conjunction with the air data sensor to maintain a selected altitude. The airplane's training manual notes that as the airplane approaches the desired altitude, the vertical speed should be reduced to less than 500 fpm, and the ALT button pressed as the altitude is reached.

The altitude alerter system, if utilized, provides visual and aural warnings when the airplane approaches a preselected altitude. It receives altitude information from the servo altimeter, and compares it with the altitude set in the alerter panel. It has an electronic generated female voice that states "Altitude Alert." During a descent, the "Altitude Alert" voice activates when the airplane is 400 feet above, or 200 feet below, a preselected altitude. In addition, an annunciator light is generated. During a descent, the annunciator light illuminates when the airplane is between 400 to 200 feet above a preselected altitude, and illuminates again when the airplane is 200 feet below a preselected altitude.

The airplane was not equipped with a ground proximity warning system (GPWS). The airplane was equipped with a radar (radio) altimeter incorporated in the EFIS. Since the airplane was not equipped with a GPWS, no radio altitude related annunciator warnings were available. The radio altimeter altitude is displayed below 2,500 feet agl in the EFIS.

A decision height (DH) may be selected and displayed in the EFIS. When the airplane crosses the selected DH, the DH letters flash for five seconds and then become steady. The DH extinguishes when the radio altitude is 50 feet or less.

#### METEOROLOGICAL INFORMATION

On October 16, at 2124, a special weather observation at Bethel was reporting in part: Wind, 060 degrees (true) at 22 knots, gusts to 27 knots; visibility, 3/4 statute mile in light snow; clouds and sky condition, 1,200 feet broken, 3,700 feet overcast; temperature, 25 degrees F; dew point, 20 degrees F; altimeter, 29.22 inHg; remarks, peak wind 070 degrees at 29 knots, occurring at 2103.

At 2132, a special weather observation was reporting in part: Wind, 060 degrees (true) at 22 knots, gusts to 28 knots; visibility, 1 statute mile in light snow and mist; clouds and sky condition, 800 feet broken, 3,500 feet overcast; temperature, 25 degrees F; dew point, 22 degrees F; altimeter, 29.21 inHg.

At 2136, a special weather observation at Bethel was reporting in part: Wind, 060 degrees (true) at 20 knots, gusts to 28 knots; visibility, 1 statute mile in light snow and mist with a vertical visibility (indefinite ceiling) of 600 feet; temperature, 25 degrees F; dew point, 20 degrees F; altimeter, 29.20 inHg; remarks, snow began at 2114.

#### AIDS TO NAVIGATION

The location of the accident was between NAPAC intersection (5.0 miles from the runway threshold) and the runway. The localizer DME backcourse approach to runway 36 has a published altitude of 1,800 feet msl from the 12 DME arc of the Bethel VOR, to NAPAC. Crossing NAPAC inbound on the 005 degree radial, airplanes may descend to 460 feet msl (338 feet agl) until the runway environment is observed, or until reaching the missed approach point, 0.7 mile from the runway. The minimum visibility required for the approach is 1 statute mile.

Following the accident, the FAA's Airways Facilities Branch reported that the Bethel VOR, localizer, and DME equipment functioned normally.

#### COMMUNICATIONS

Review of the air to ground radio communications tapes maintained by the FAA, revealed that the airplane crew successively and successfully communicated with Anchorage ARTCC, and Bethel ATCT. A transcript of the air to ground communications is included in the public docket for this accident.

Bethel tower communications are conducted on a frequency of 118.70 mhz.

ATIS information is broadcast on a frequency of 119.80 mhz.

#### AERODROME AND GROUND FACILITIES

The Bethel Airport, elevation 123 feet msl, is owned and operated by the State of Alaska, Department of Transportation. The airport has a hard-surfaced runway on a 360/180 degree magnetic orientation. Runway 36 is 6,398 feet long by 150 feet wide, and is equipped with high intensity runway lights, and runway end identifier lights. The terrain around the airport is comprised principally of flat tundra, and at the time of the accident, it was snow-covered.

The Bethel air traffic control tower is an FAA contract tower, operated by Serco Management Services Inc. The airport is surrounded by Class E airspace. No terminal radar approach service is available at the airport.

#### FLIGHT RECORDERS

The airplane's cockpit voice recorder and the solid state flight data recorder, were examined at

the NTSB's Office of Research and Engineering, Vehicle Recorders Division. The NTSB Vehicle Recorders Division specialist's reports are included in the public docket for this accident.

The SSFDR records airplane flight information in one-second subframes. The recording begins at subframe reference 186279, and contains valid data up to subframe reference 192301, two seconds before recorder data ended. Two additional subframe reference numbers contained data that could not be verified as valid and are not included in the specialist's report. The reason for the invalid data was not determined. Additionally, the recorded data contained abnormalities or inconsistent fluctuations in data values for some parameters.

The airplane's altitude (msl) was recorded as pressure altitude, based on an altimeter setting of 29.92 inHg (standard atmosphere). Attachment I of the flight recorder specialist's report contains several plots of the airplane's parameters. The recorder specialist provided derived airplane altitude data based on altimeter settings of 29.30 inHg, and 29.22 inHg, the current altimeter setting at the time of the accident. Altitude/pressure correction data utilized by the recorder specialist is contained in tables established by the National Bureau of Standards. At the last valid subframe, the airplane's altitude, based on 29.30 inHg, was about 295 feet msl. The airplane's altitude, based on 29.22 inHg, was about 219 feet msl. Also, at the last valid subframe, the airplane's parameters were: flaps, 25 degrees; airspeed, 131 knots; roll, 14 degrees left wing down; pitch, 6 degrees nose down; magnetic heading, 359 degrees.

The airplane's digital flight data acquisition unit (DFDAU) was examined by the manufacturer, Teledyne Controls, Los Angeles, California. There were no "event or exceedance reports" associated with the accident flight.

#### TESTS AND RESEARCH

An FAA inspector examined the airplane after the accident. He noted that the altimeters in the airplane were both set to 29.30 inHg.

The inspector sent the altimeters to Kollsman, Inc., Merrimack, New Hampshire, for inspection. The inspection facility reported one altimeter read 45 feet at a zero setting, and was sticky. The second altimeter read 70 feet at a zero setting, and a shockwatch clip (utilized to signify an impact), had been activated.

#### WRECKAGE RELEASE

The Safety Board did not take custody of the airplane wreckage. The airplane's CVR and DFDAU were retained by the Safety Board for examination until their release on June 3, 2002. The airplane's SSFDR was retained by the Safety Board for examination until released on July 25, 2002.

## Pilot Information

<b>Certificate:</b>	Airline Transport; Commercial	<b>Age:</b>	36, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land; Single-engine Sea	<b>Seat Occupied:</b>	Left
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 2 Valid Medical--no waivers/lim.	<b>Last Medical Exam:</b>	04/30/2001
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	06/29/2001
<b>Flight Time:</b>	8526 hours (Total, all aircraft), 961 hours (Total, this make and model), 4129 hours (Pilot In Command, all aircraft), 298 hours (Last 90 days, all aircraft), 93 hours (Last 30 days, all aircraft), 8 hours (Last 24 hours, all aircraft)		

## Co-Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	28, Male
<b>Airplane Rating(s):</b>	Multi-engine Land; Single-engine Land	<b>Seat Occupied:</b>	Right
<b>Other Aircraft Rating(s):</b>	None	<b>Restraint Used:</b>	Seatbelt, Shoulder harness
<b>Instrument Rating(s):</b>	Airplane	<b>Second Pilot Present:</b>	Yes
<b>Instructor Rating(s):</b>	None	<b>Toxicology Performed:</b>	No
<b>Medical Certification:</b>	Class 1 Valid Medical--no waivers/lim.	<b>Last Medical Exam:</b>	08/29/2001
<b>Occupational Pilot:</b>		<b>Last Flight Review or Equivalent:</b>	04/30/2001
<b>Flight Time:</b>	2725 hours (Total, all aircraft), 644 hours (Total, this make and model), 1000 hours (Pilot In Command, all aircraft), 200 hours (Last 90 days, all aircraft), 60 hours (Last 30 days, all aircraft), 5 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Manufacturer:</b>	Embraer	<b>Registration:</b>	N120AX
<b>Model/Series:</b>	120ER	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Transport	<b>Serial Number:</b>	120-164
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	4
<b>Date/Type of Last Inspection:</b>	10/13/2001, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	26433 lbs
<b>Time Since Last Inspection:</b>	115 Hours	<b>Engines:</b>	2 Turbo Prop
<b>Airframe Total Time:</b>	26295 Hours	<b>Engine Manufacturer:</b>	Pratt & Whitney
<b>ELT:</b>	Installed, activated, did not aid in locating accident	<b>Engine Model/Series:</b>	PW-118
<b>Registered Owner:</b>	ALASKA CENTRAL EXPRESS INC.	<b>Rated Power:</b>	1800 hp
<b>Operator:</b>	ALASKA CENTRAL EXPRESS INC.	<b>Air Carrier Operating Certificate:</b>	On-demand Air Taxi (135)
<b>Operator Does Business As:</b>		<b>Operator Designator Code:</b>	YADA

## Meteorological Information and Flight Plan

<b>Conditions at Accident Site:</b>	Instrument Conditions	<b>Condition of Light:</b>	Night/Dark
<b>Observation Facility, Elevation:</b>	PABE, 123 ft msl	<b>Observation Time:</b>	2132 AST
<b>Distance from Accident Site:</b>	3 Nautical Miles	<b>Direction from Accident Site:</b>	360°
<b>Lowest Cloud Condition:</b>		<b>Temperature/Dew Point:</b>	-4° C / -6° C
<b>Lowest Ceiling:</b>	Broken / 800 ft agl	<b>Visibility</b>	1 Miles
<b>Wind Speed/Gusts, Direction:</b>	22 knots/ 28 knots, 42°	<b>Visibility (RVR):</b>	
<b>Altimeter Setting:</b>	29.21 inches Hg	<b>Visibility (RVV):</b>	
<b>Precipitation and Obscuration:</b>			
<b>Departure Point:</b>	ANCHORAGE, AK (PANC)	<b>Type of Flight Plan Filed:</b>	IFR
<b>Destination:</b>	BETHEL, AK (PABE)	<b>Type of Clearance:</b>	IFR
<b>Departure Time:</b>	1949 ADT	<b>Type of Airspace:</b>	Class E

## Airport Information

<b>Airport:</b>	BETHEL (PABE)	<b>Runway Surface Type:</b>	Asphalt
<b>Airport Elevation:</b>	123 ft	<b>Runway Surface Condition:</b>	Snow--compacted
<b>Runway Used:</b>	36	<b>IFR Approach:</b>	LOC-backcourse
<b>Runway Length/Width:</b>	6398 ft / 150 ft	<b>VFR Approach/Landing:</b>	None

## Wreckage and Impact Information

Crew Injuries:	2 Minor	Aircraft Damage:	Substantial
Passenger Injuries:	N/A	Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	2 Minor	Latitude, Longitude:	60.778333, -161.836667

## Administrative Information

Investigator In Charge (IIC):	SCOTT ERICKSON	Adopted Date:	04/01/2003
Additional Participating Persons:	ROGER BROWN; FAA-AL-ANC FSDO 03; ANCHORAGE, AK MIKE MURPHY; ALASKA CENTRAL EXPRESS; ANCHORAGE, AK MANUAL MONTEIRO; EMBRAER AIRCRAFT CORP.; FT. LAUDERDALE, FL		
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 <a href="mailto:pubinq@ntsb.gov">pubinq@ntsb.gov</a> , or at 800-877-6799. Dockets released after this date are available at <a href="http://dms.nts.gov/pubdms/">http://dms.nts.gov/pubdms/</a> .		

The National Transportation Safety Board (NTSB), established in 1967, is an independent federal agency mandated by Congress through the Independent Safety Board Act of 1974 to investigate transportation accidents, determine the probable causes of the accidents, issue safety recommendations, study transportation safety issues, and evaluate the safety effectiveness of government agencies involved in transportation. The NTSB makes public its actions and decisions through accident reports, safety studies, special investigation reports, safety recommendations, and statistical reviews.

The Independent Safety Board Act, as codified at 49 U.S.C. Section 1154(b), precludes the admission into evidence or use of any part of an NTSB report related to an incident or accident in a civil action for damages resulting from a matter mentioned in the report.