



AVIATION



HIGHWAY



MARINE



RAILROAD



PIPELINE

Aviation Investigation Final Report

Location:	ANCHORAGE, Alaska	Accident Number:	ANC00LA120
Date & Time:	September 11, 2000, 13:13 Local	Registration:	N27179
Aircraft:	Piper PA-31-350	Aircraft Damage:	Substantial
Defining Event:		Injuries:	1 None
Flight Conducted Under:	Part 91: General aviation - Positioning		

Analysis

An airline transport pilot was returning from a charter flight in a twin-engine airplane and was in radio and radar contact with an FAA TRACON approach controller in Class C airspace. The pilot was given air traffic advisories for airplanes departing a satellite airport, but was not given an advisory about a McDonnell Douglas MD-11 airplane that was on final approach to land at the Ted Stevens Anchorage International Airport. The pilot said he did not specifically recall seeing the MD-11. The accident airplane encountered wake turbulence from the MD-11 that produced a violent vertical wind shear. The pilot then noticed the MD-11 airplane. After landing at a satellite airport, he notified the FAA of the wake turbulence event. Radar data revealed the MD-11 was on the glide path for landing at Anchorage, and the pilot of the MD-11 was in radio contact with the tower. The accident airplane crossed the flight path of the MD-11 at a 90 degree angle, about 900 feet msl, and about 55 seconds after the MD-11. When the accident airplane encountered the wake turbulence, it was 300 feet below the flight path of the MD-11 and separated by 2.47 miles. A postflight inspection of the airplane revealed substantial damage to the right wing. The Anchorage International Airport is within Class C airspace, which has a high volume mix of air carrier, general aviation, and military aircraft. Class D, Class E, and Class G airspace surround, and underlie the Class C area. In addition, the airspace is subject to Federal Aviation Regulation Part 93 (FAR 93). FAR 93 outlines geographic segments and special rules for operating at airports within the area. An air traffic controller is required to separate small aircraft operating behind heavy aircraft by 5 miles, and issue traffic advisories, and safety alerts including wake turbulence cautionary advisories. The TRACON utilizes certain prearranged coordination procedures to improve the traffic flow of aircraft through TRACON radar segments. Controllers are required to view a full data block on their radar screen when using prearranged coordination. The air traffic controller did not have a full data block displayed. The TRACON procedures manual does not contain a procedure for challenging, and verifying, the use or non-use of prearranged coordination between controllers. The air traffic controller did not notice that an aircraft designation symbol displayed on his screen indicated a heavy aircraft, and he did not issue a wake turbulence advisory. A heavy

aircraft designator ('H' if assigned) is displayed on all radar data blocks (full or partial).

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The failure of the TRACON air traffic controller to issue a wake turbulence advisory to the pilot, and a wake turbulence encounter by the pilot. Factors in the accident were the pilot's inadequate visual lookout, the failure of the TRACON controller to notice an aircraft as a heavy jet, and insufficiently defined TRACON procedures used to facilitate prearranged coordination of aircraft through radar segments.

Findings

Occurrence #1: VORTEX TURBULENCE ENCOUNTERED

Phase of Operation: CRUISE

Findings

1. (F) VISUAL LOOKOUT - INADEQUATE - PILOT IN COMMAND
2. (C) WAKE TURBULENCE - ENCOUNTERED - PILOT IN COMMAND
3. (F) IDENTIFICATION OF AIRCRAFT ON RADAR - INADEQUATE - ATC PERSONNEL(DEP/APCH)
4. (C) SAFETY ADVISORY - NOT ISSUED - ATC PERSONNEL(DEP/APCH)
5. APPROACH CONTROL PROCEDURE
6. (F) CONDITION(S)/STEP(S) INSUFFICIENTLY DEFINED - FAA(OTHER/ORGANIZATION)

Factual Information

HISTORY OF FLIGHT

On September 11, 2000, at 1313 Alaska daylight time, a Piper PA-31-350 airplane, N27179, sustained substantial damage during a wake turbulence encounter, about 3.5 miles northwest of Anchorage, Alaska. The airplane was being operated as a visual flight rules (VFR) cross-country positioning flight under Title 14, CFR Part 91, when the accident occurred. The airplane was operated by Jay Hawk Air, Anchorage. The airline transport certificated pilot, the sole occupant, was not injured. Visual meteorological conditions prevailed, and VFR company flight following procedures were in effect.

During an interview with the National Transportation Safety Board (NTSB) investigator-in-charge (IIC), on September 12, the pilot, who is the director of operations for the operator, said he was returning from a charter flight to Crescent Lake, near Sleetmute, Alaska. He was planning to land at Merrill Field, Anchorage, and was eastbound, about 160 knots indicated airspeed, along the north shore of the Cook Inlet. Near Point Mackenzie, a VFR reporting point in the Class C airspace for the Anchorage area, the pilot was in radio and radar contact with a Federal Aviation Administration (FAA) Terminal Radar Approach Control (TRACON), air traffic control specialist. Point Mackenzie is about 5 miles on a 320 degree bearing from the Anchorage Airport. The pilot said he was provided with several air traffic advisories for airplanes departing the Lake Hood Seaplane Base, but was not given an advisory about a McDonnell Douglas MD-11 airplane (call sign "FedEx 14 heavy") that was on final approach to land on Runway 14, at the Anchorage International Airport. The pilot said he did not specifically recall seeing the MD-11 before the airplane encountered wake turbulence that produced a violent, vertical wind shear, during which the gear warning horn sounded. The pilot then noticed the MD-11 airplane.

In the Pilot/Operator report (NTSB form 6120.1/2) filed by the pilot, the pilot reported that during the wake turbulence encounter, the airplane lurched down violently, and then upward. He wrote that his hands and feet were pulled from the airplane controls, and his radio headset was knocked off. After the encounter, the airplane pitched down about 20 degrees, and rolled about 20 degrees to the right. The pilot said he regained control of the airplane, and continued his flight to Merrill Field. After landing, he notified the FAA of the wake turbulence event.

COMMUNICATIONS

Review of the air-ground radio communications tapes maintained by the FAA at the Anchorage TRACON revealed that the accident airplane pilot communicated with the position of north low radar. No unusual communications were noted between the TRACON facility and the accident airplane during the review of the tapes, however at the time of the wake turbulence encounter,

the sound of a warning horn was heard on the approach control radio frequency.

A transcript of the air to ground communications between the airplane and the Anchorage TRACON facility is included in this report.

RADAR DATA

In a review of recorded radar data maintained at the Anchorage TRACON facility depicting the flight paths of the two airplanes, the accident airplane appeared to cross the flight path of the MD-11 at a 90 degree angle, about 900 feet msl, and about 55 seconds after the MD-11. When the accident airplane encountered the wake turbulence, it appeared to be about 300 feet below the flight path of the MD-11, and separated by 2.47 miles. An FAA automation specialist reported the MD-11 airplane was cleared for the instrument landing system (ILS) approach to runway 14, and intercepted the glide slope at 1,560 feet. The MD-11 was on the glide path for runway 14, and at the time of the wake turbulence encounter, the pilot of the MD-11 was in radio contact with the Anchorage Tower.

WEATHER DATA

On September 11, 2000, at 1300, an Automatic Terminal Information Service (ATIS) weather broadcast at Anchorage was reporting, in part: Wind, 140 degrees (magnetic) at 10 knots; visibility, 10 statute miles; clouds, 3,100 feet scattered, 9,000 feet overcast; temperature, 52 degrees F; dew point, 42 degrees F; altimeter, 29.55 inHg.

DAMAGE TO AIRCRAFT

The accident airplane has been modified with wingtip winglets. A postflight inspection of the airplane revealed that the right winglet mounted landing light cover, and the landing light assembly, departed the airplane. The right wing had upward bending and wrinkling of the upper wing surface at the right winglet attach point. Additional wrinkling was noted on the upper-right wing surface, at the mid-span/mid-chord area. Slight upward bending was found at the left winglet attach point.

WAKE TURBULENCE INFORMATION

According to the FAA's Aeronautical Information Manual (AIM), wake turbulence is characterized as two counterrotating cylindrical vortices trailing behind an airplane, generated by the airplane's airfoil. The strength of the vortex is governed by weight, speed, and shape of the wing of the generating airplane. The greatest vortex strength occurs when an airplane is heavy, with a clean configuration, and when slow.

The AIM also states that airport traffic controllers shall apply procedures for separating aircraft under instrument flight rules (IFR). A controller will also provide VFR aircraft the position, altitude, and the direction of flight of large aircraft, including the phrase "caution,

wake turbulence" if in the controller's opinion, wake turbulence may adversely affect another aircraft. The AIM continues by stating: "Whether or not a warning has been given, however, the pilot is expected to adjust his/her operations and flight path as necessary to preclude serious wake encounters." In addition, the AIM states that "...flight disciplines necessary to ensure vortex avoidance during visual operations must be exercised by the pilot using the same degree of concern as in collision avoidance since vortex encounters frequently can be as dangerous as collisions."

AIRPORT/AIRSPACE INFORMATION

The Ted Stevens Anchorage International Airport is equipped with two parallel hard-surfaced runways on a 060 to 240 degree magnetic orientation, and a single hard-surfaced runway on a 140 to 320 degree magnetic orientation. On the day of the accident, runway 14 was in use for landing traffic.

The airport is within Class C airspace. The Anchorage area has a high volume mix of air carrier, general aviation, and military aircraft. Class D, Class E, and Class G airspace surround, and underlie the Class C area. The arrival corridor for runway 05 at the Elmendorf Air Force Base (7.5 miles north-northeast of Anchorage International Airport) is perpendicular to the arrival corridor for runway 14 at Anchorage. The Point Mackenzie VFR reporting point is an area of high concentration of general aviation airplanes inbound to, and outbound from, the Anchorage area. In addition, the Anchorage area airspace is subject to Federal Aviation Regulation Part 93 (FAR 93). FAR 93 outlines geographic segments and special rules for operating at airports within the Anchorage area.

The Anchorage TRACON is equipped with an airport surveillance radar (ASR) model 8, automated radar terminal system (ARTS) IIE system. Radar settings, selected by a controller, are not recorded.

The Anchorage TRACON is a terminal radar approach control facility that provides Class C services. The wake turbulence encounter occurred in the north low radar segment. At the time of the encounter, the outer low and north low radar segments were combined.

TRACON PROCEDURES

According to FAA personnel at the Anchorage air traffic control facility, the radar screen viewed by the air traffic control specialists displays, among other items, a data block (information about each aircraft participating in the Anchorage airspace), radar segments, some geographic reference points, and symbology identifying aircraft positions. A full data block associated with each aircraft includes, among other options, altitude, ground speed, call sign, transponder code, type of aircraft, scratch pad data, a target position symbol, and an aircraft category/TCAS indicator. A partial data block includes a target position symbol, altitude (if within a controller specified altitude filter), scratch pad data, an aircraft/TCAS indicator, and transponder code, if selected.

An "H" designating a heavy aircraft (if assigned), is present as an aircraft category designation in all data blocks (full or partial). A controller may select a full or partial data block at any time.

According to the Anchorage TRACON facility handbook, when an air traffic control specialist relieves another controller, a briefing checklist should be utilized to ensure all pertinent information about aircraft being handled in the sector is exchanged (Section 5-2-2). The checklist is contained within the integrated display system (IDS). The IDS is a separate computer screen used to view a variety of additional data, such as weather data, or ATIS data.

A review of the Anchorage TRACON facility handbook revealed that heavy aircraft outside Class C airspace will be vectored to intercept the final approach course for runway 14, no closer than 10 DME (distance measuring equipment), at or above 3,000 feet msl. Within Class C airspace, heavy aircraft shall be restricted to 2,500 feet msl until they are established on the final approach course. Landing traffic for runway 14, operating south of the north shore of the Cook Inlet, may operate at any altitude. Large twin engine airplanes, operating south of the Beluga power lines (about 10 miles northwest of the Anchorage International Airport), are restricted to 1,600 feet.

In an interview on October 16, 2000, with the TRACON air traffic specialist who was working the north low radar position, he said he relieved a controller working the north low position. He received a briefing about the traffic situation, and within a few minutes, began working the accident airplane. The accident airplane was going to Point McKenzie between 1,200 to 900 feet msl, and then to Merrill Field. The controller said the IDS was inoperative.

A review of the Anchorage TRACON daily equipment record notes that since September 8, 2000, the IDS was out of service at the north radar, and the supervisors position.

The controller said his radar display had a "limited" data block, selected by the previous controller. He provided traffic advisories to the accident airplane about VFR airplanes departing satellite airports. The controller said he did not provide the accident airplane with a traffic advisory about the MD-11 because he thought there was sufficient lateral separation between the two airplanes. The controller said that based on his experience and training, he can accurately estimate separation distances. The controller said he did not notice an "H" (heavy aircraft) in the limited data block. He said that if a full data block had been displayed, he would have recognized the inbound airplane to runway 14 as an MD-11.

According to the FAA's Air Traffic Control handbook, (Section 2-1-20) wake turbulence cautionary advisories to include the position, altitude if known, and direction of flight of a heavy jet, are required when VFR aircraft are not being vectored, but are behind heavy jets, or to VFR arriving aircraft that have previously been radar vectored, and the vectoring has been discontinued. In addition, a controller should issue cautionary information to any aircraft if, in the controller's opinion, wake turbulence may have an adverse effect on it. When the traffic is known to be a heavy aircraft, the controller should include the word "heavy" in the description.

According to the FAA's Air Traffic Control handbook, (Section 5-5-4.d.4) a controller should provide 5 miles of separation between small or large aircraft directly behind, or directly behind and less than 1,000 feet below, any heavy aircraft conducting an instrument approach.

According to the FAA's Air Traffic Control handbook, (Section 7-8-2) Class C airspace services include sequencing of all aircraft to the primary airport, standard IFR services to IFR aircraft, separation, traffic advisories, safety alerts between IFR and VFR aircraft, and mandatory traffic advisories and safety alerts between VFR aircraft. Section 7-8-3 states that VFR aircraft should be separated from IFR aircraft by visual separation, including issuing wake turbulence cautionary advisories, separate aircraft by 500 vertical feet, and when using broadband radar, separate aircraft by target resolution.

PREARRANGED COORDINATION

Aircraft that are being vectored within the Class C airspace, and are transitioning from one segment to another, are subject to certain TRACON protocols which necessitate coordination between the controllers of each segment.

According to the Anchorage TRACON facility handbook, prearranged coordination (Section 3-2-19) describes standardized procedures that allow aircraft to penetrate, or transit another controller's airspace in a manner which assures standard separation, without individual coordination for each aircraft. This prearranged coordination facilitates an improved air traffic flow within the TRSA. Without prearranged coordination, manual coordination must be accomplished on an individual or selected aircraft basis. Among other items, prearranged coordination is not authorized when a full data block for each aircraft is not displayed on each air traffic control specialists radar screen.

The TRACON procedures manual does not contain a procedure for challenging, and verifying, the use or non-use of prearranged coordination between controllers. The manner in which prearranged coordination is enabled, is if each controller is viewing a full data block on their screen. Without a full data block, a controller would have to assume, and then verify, that manual coordination was in effect.

The final north radar position controller cleared the MD-11 for an ILS approach to runway 14. The final north position description includes the responsibility to sequence aircraft to runway 14. Per prearranged coordination, the final north controller can descend aircraft into the north low's airspace until established on final, or within 10 miles of the runway. The north low radar position, by prearranged coordination, monitors inbound aircraft and is responsible for separation of each aircraft, and is required to have a full data block displayed.

According to FAA Quality Assurance personnel, if the controller decided to view a "limited" or partial data block, he would then be required to disregard prearranged coordination procedures, and should resume manual coordination. The controller did not resume manual

coordination.

Pilot Information

Certificate:	Airline transport; Commercial	Age:	47,Male
Airplane Rating(s):	Single-engine land; Single-engine sea; Multi-engine land	Seat Occupied:	Left
Other Aircraft Rating(s):	None	Restraint Used:	
Instrument Rating(s):	Airplane	Second Pilot Present:	No
Instructor Rating(s):	None	Toxicology Performed:	No
Medical Certification:	Class 2 Valid Medical--w/ waivers/lim	Last FAA Medical Exam:	April 7, 2000
Occupational Pilot:	Yes	Last Flight Review or Equivalent:	
Flight Time:	15200 hours (Total, all aircraft), 1000 hours (Total, this make and model), 14800 hours (Pilot In Command, all aircraft), 400 hours (Last 90 days, all aircraft), 110 hours (Last 30 days, all aircraft), 3 hours (Last 24 hours, all aircraft)		

Aircraft and Owner/Operator Information

Aircraft Make:	Piper	Registration:	N27179
Model/Series:	PA-31-350 PA-31-350	Aircraft Category:	Airplane
Year of Manufacture:		Amateur Built:	
Airworthiness Certificate:	Normal	Serial Number:	31-7752091
Landing Gear Type:	Retractable - Tricycle	Seats:	8
Date/Type of Last Inspection:	June 20, 2000 100 hour	Certified Max Gross Wt.:	7250 lbs
Time Since Last Inspection:	39 Hrs	Engines:	2 Reciprocating
Airframe Total Time:	4718 Hrs	Engine Manufacturer:	Lycoming
ELT:	Installed, not activated	Engine Model/Series:	IO-540-JSBD
Registered Owner:	A.C.E. FLYERS INC.	Rated Power:	350 Horsepower
Operator:		Operating Certificate(s) Held:	On-demand air taxi (135)
Operator Does Business As:	JAY HAWK AIR	Operator Designator Code:	JKWC

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual (VMC)	Condition of Light:	Day
Observation Facility, Elevation:	PAN ,144 ft msl	Distance from Accident Site:	4 Nautical Miles
Observation Time:	13:00 Local	Direction from Accident Site:	140°
Lowest Cloud Condition:	Scattered / 3100 ft AGL	Visibility	10 miles
Lowest Ceiling:	Overcast / 9000 ft AGL	Visibility (RVR):	
Wind Speed/Gusts:	10 knots / None	Turbulence Type Forecast/Actual:	/
Wind Direction:	140°	Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29 inches Hg	Temperature/Dew Point:	11°C / 6°C
Precipitation and Obscuration:	No Obscuration; No Precipitation		
Departure Point:	SLEETMUTE	Type of Flight Plan Filed:	Company VFR
Destination:	ANCHORAGE (PAMR)	Type of Clearance:	VFR
Departure Time:	11:00 Local	Type of Airspace:	Class C;TRSA;FAR 93

Airport Information

Airport:	ANCHORAGE INTERNATIONAL PANC	Runway Surface Type:	
Airport Elevation:	144 ft msl	Runway Surface Condition:	
Runway Used:	0	IFR Approach:	None
Runway Length/Width:		VFR Approach/Landing:	None

Wreckage and Impact Information

Crew Injuries:	1 None	Aircraft Damage:	Substantial
Passenger Injuries:		Aircraft Fire:	None
Ground Injuries:	N/A	Aircraft Explosion:	None
Total Injuries:	1 None	Latitude, Longitude:	61.159118,-149.989791(est)

Administrative Information

Investigator In Charge (IIC):	Erickson, Scott
Additional Participating Persons:	ANDREW REMBERT (FAA); ANCHORAGE , AK MONA BOYLE (NATCA); ANCHORAGE , AK SUSAN HAGGERTY (FAA); ANCHORAGE , AK
Original Publish Date:	July 10, 2001
Last Revision Date:	
Investigation Class:	Class
Note:	
Investigation Docket:	https://data.nts.gov/Docket?ProjectID=50260

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