



National Transportation Safety Board

Aviation Incident Final Report

Location:	San Francisco, CA	Incident Number:	OPS07IA004A
Date & Time:	05/26/2007, 1336 PDT	Registration:	
Aircraft:	Embraer 170	Aircraft Damage:	None
Defining Event:		Injuries:	68 None
Flight Conducted Under:			

Analysis

On May 26, 2007, at 1336 Pacific daylight time, Republic Airlines flight 4912 (RPA4912), an Embraer 170 regional jet, and Skywest Airlines flight 5741 (SKW5741), an Embraer Brasilia turboprop, nearly collided in the intersection of runway 1L and runway 28R at San Francisco International Airport, San Francisco, California. Both aircraft were operating as scheduled passenger flights under 14 CFR part 121 and were operating on instrument flight plans. There were no reported injuries to occupants and no reported damage to either aircraft.

SKW5741 was arriving at SFO after a flight from Modesto, California. The aircraft was cleared for a visual approach by Northern California Terminal Radar Approach Control (NCT) and transferred to SFO tower. The crew contacted the SFO local controller at 1332:29, reporting that they were six miles out on the BRIJJ visual approach. The local controller acknowledged, issued a wake turbulence advisory for a Boeing 757 landing on runway 28L, and cleared SKW5741 to land on runway 28R. According to NCT radar data, the aircraft crossed the runway threshold at 1335:13.

RPA4912 (radio callsign "Brickyard 4912"), taxied to runway 1L and was instructed to taxi onto the runway to hold at 1333:36. RPA4912 was cleared for takeoff at 1335:12. The crew acknowledged.

At 1335:40, during a transmission to an uninvolved aircraft by the local controller, an aural AMASS warning is audible in the background. At 1335:44, the local controller begins attempting to instruct SKW5741 to stop, transmitting, "uh, Skywest HOLD HOLD HOLD".

According to controllers' written statements, SKW5741 came to a stop in the intersection of runways 1L and 28R. RPA4912 lifted off and overflew SKW5741. The initial FAA tower report estimated the aircraft missed colliding by 300 feet. However, the Skywest crew estimated the distance as 30 to 50 feet and the crew of RPA4912 estimated 150 feet. They characterized their estimate as a "guess," noting that they could not actually see the Brasilia as they passed over the top of the aircraft.

SFO ATCT is equipped with an Airport Movement Area Safety System (AMASS) that uses radar

to track aircraft on and near the airport surface, providing conflict detection and aircraft location information to controllers. The system is able to detect conflicts between aircraft using the same runway, and, following a software modification that was installed on February 17, 2007, the system is also able to detect conflicts between aircraft using intersecting runways.

SKW5741's approach was tracked by NCT's ASR-9 terminal radar system located at Oakland International Airport, approximately 8 miles north of SFO. The Oakland radar system does not provide surface coverage at SFO, but it did detect RPA4912 climbing off the airport immediately after the incident. Comparison of the NCT radar time with the AMASS radar time indicated that the AMASS clock was about 15 to 16 seconds fast in relation to the NCT clock. The NCT clock is set and checked every shift, but the AMASS clock time is derived from the internal clock of the computer running AMASS and is more subject to error. Therefore, this report will consider the ARTS clock as authoritative and AMASS times will be corrected accordingly.

The AMASS system recorded data for both RPA4912 and SKW5741, detecting the conflict and alerting controllers at 1335:40. The AMASS targets for the two aircraft merged in the runway intersection at 1335:55. RPA1912 first appears on the OAK ASR-9 just south of taxiway V at 1335:59, climbing through 200 feet.

Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this incident to be: Failure of SFO tower local controller to provide adequate separation between two aircraft departing intersecting runways.

Findings

Occurrence #1: NEAR COLLISION BETWEEN AIRCRAFT
Phase of Operation: TAKEOFF - ROLL/RUN

Findings

1. (C) CONTROL TOWER - IMPROPER

Factual Information

On May 26, 2007, at 1336 Pacific daylight time, Republic Airlines flight 4912 (RPA4912), an Embraer 170 regional jet, and Skywest Airlines flight 5741 (SKW5741), an Embraer Brasilia turboprop, nearly collided in the intersection of runway 1L and runway 28R at San Francisco International Airport, San Francisco, California. Both aircraft were operating as scheduled passenger flights under 14 CFR part 121 and were operating on instrument flight plans. There were no reported injuries to occupants and no reported damage to either aircraft.

SKW5741 was arriving at SFO after a flight from Modesto, California. The aircraft was cleared for a visual approach by Northern California Terminal Radar Approach Control (NCT) and transferred to SFO tower. The crew contacted the SFO local controller at 1332:29, reporting that they were six miles out on the BRIJJ visual approach. The local controller acknowledged, issued a wake turbulence advisory for a Boeing 757 landing on runway 28L, and cleared SKW5741 to land on runway 28R. According to NCT radar data, the aircraft crossed the runway threshold at 1335:13.

RPA4912 (radio callsign "Brickyard 4912"), taxied to runway 1L and was instructed to taxi onto the runway to hold at 1333:36. RPA4912 was cleared for takeoff at 1335:12. The crew acknowledged.

At 1335:40, during a transmission to an uninvolved aircraft by the local controller, an aural AMASS warning is audible in the background. At 1335:44, the local controller begins attempting to instruct SKW5741 to stop, transmitting, "uh, Skywest HOLD HOLD HOLD".

According to controllers' written statements, SKW5741 came to a stop in the intersection of runways 1L and 28R. RPA4912 lifted off and overflew SKW5741. The initial FAA tower report estimated the aircraft missed colliding by 300 feet. However, the Skywest crew estimated the distance as 30 to 50 feet and the crew of RPA4912 estimated 150 feet. They characterized their estimate as a "guess," noting that they could not actually see the Brasilia as they passed over the top of the aircraft.

SFO ATCT is equipped with an Airport Movement Area Safety System (AMASS) that uses radar to track aircraft on and near the airport surface, providing conflict detection and aircraft location information to controllers. The system is able to detect conflicts between aircraft using the same runway, and, following a software modification that was installed on February 17, 2007, the system is also able to detect conflicts between aircraft using intersecting runways.

SKW5741's approach was tracked by NCT's ASR-9 terminal radar system located at Oakland International Airport, approximately 8 miles north of SFO. The Oakland radar system does not provide surface coverage at SFO, but it did detect RPA4912 climbing off the airport immediately after the incident. Comparison of the NCT radar time with the AMASS radar time indicated that the AMASS clock was about 15 to 16 seconds fast in relation to the NCT clock. The NCT clock is set and checked every shift, but the AMASS clock time is derived from the internal clock of the computer running AMASS and is more subject to error. Therefore, this report will consider the ARTS clock as authoritative and AMASS times will be corrected accordingly.

The AMASS system recorded data for both RPA4912 and SKW5741, detecting the conflict and alerting controllers at 1335:40. The AMASS targets for the two aircraft merged in the runway intersection at 1335:55. RPA1912 first appears on the OAK ASR-9 just south of taxiway V at

1335:59, climbing through 200 feet.

PERSONNEL INFORMATION

The crew of RPA4912 consisted of a captain, first officer, and 1 flight attendant. The crew of SKW5741 included an upgrade captain receiving initial operating experience training, a check airman acting as first officer, and 1 flight attendant. Certification and flight experience information for the crews was not requested. The local controller involved entered on duty with the FAA in 1988, and has been fully certified as a tower controller at SFO since 1999. Following the incident, the controller was decertified, required to complete additional training, and recertified by SFO tower management.

AIRCRAFT INFORMATION

RPA4912 was an Embraer 170 regional jet, registration N757AT. SKW5741 was an Embraer 120 turboprop, registration N232SW.

METEOROLOGICAL INFORMATION

At 1956 UTC, the SFO weather observation was wind 320 at 13 knots, visibility 10 miles, few clouds at 1,100 feet, temperature 18, dew point 10, altimeter 29.95 inches.

WRECKAGE AND IMPACT INFORMATION

No damage was reported to either aircraft.

ADDITIONAL INFORMATION

Air Traffic Control Information

SFO Air Traffic Control Tower (ATCT) is an ATC-10 level facility responsible for aircraft operations on the airport surface and in the class B airspace in the immediate vicinity of the airport. Arrivals and departures are handled by Northern California Terminal Radar Approach Control (NCT), located in Rancho Cordova, GA.

The tower is equipped with an Airport Movement Area Safety System (AMASS) ground radar, which is used by controllers to track and identify aircraft operating on the airport surface. AMASS provides a limited conflict detection capability that permits it to alert controllers about certain types of ground conflicts between aircraft as well as inadvertent use of closed or inactive runways. According to AMASS technical support personnel, in a scenario such as this conflict, AMASS is designed to provide an alert 15 seconds before the aircraft reach the conflict point, and the system performed as designed.

Pilot Information

Certificate:	Age:	
Airplane Rating(s):	Seat Occupied:	
Other Aircraft Rating(s):	Restraint Used:	
Instrument Rating(s):	Second Pilot Present:	Yes
Instructor Rating(s):	Toxicology Performed:	
Medical Certification:	Last FAA Medical Exam:	
Occupational Pilot:	Last Flight Review or Equivalent:	
Flight Time:		

Aircraft and Owner/Operator Information

Aircraft Manufacturer:	Embraer	Registration:
Model/Series:	170	Aircraft Category: Airplane
Year of Manufacture:		Amateur Built: No
Airworthiness Certificate:	Serial Number:	
Landing Gear Type:	Seats:	
Date/Type of Last Inspection:	Certified Max Gross Wt.:	
Time Since Last Inspection:	Engines:	
Airframe Total Time:	Engine Manufacturer:	
ELT:	Engine Model/Series:	
Registered Owner:	Rated Power:	
Operator:	Operating Certificate(s) Held:	Flag carrier (121)
Operator Does Business As:	Operator Designator Code: REPA	

Meteorological Information and Flight Plan

Conditions at Accident Site:	Visual Conditions	Condition of Light:
Observation Facility, Elevation:	SFO	Observation Time: 1256
Distance from Accident Site:		Direction from Accident Site:
Lowest Cloud Condition:	Few / 1100 ft agl	Temperature/Dew Point: 18°C / 10°C
Lowest Ceiling:		Visibility 10 Miles
Wind Speed/Gusts, Direction:	13 knots, 320°	Visibility (RVR):
Altimeter Setting:	29.95 inches Hg	Visibility (RVV):
Precipitation and Obscuration:		
Departure Point:	San Francisco, CA (SFO)	Type of Flight Plan Filed: IFR
Destination:	Los Angeles, CA (LAX)	Type of Clearance: IFR
Departure Time:	1335 PDT	Type of Airspace:

Airport Information

Airport:	SAN FRANCISCO INTL (SFO)	Runway Surface Type:
Airport Elevation:	11 ft	Runway Surface Condition:
Runway Used:		IFR Approach:
Runway Length/Width:		VFR Approach/Landing:

Wreckage and Impact Information

Crew Injuries:	4 None	Aircraft Damage:	None
Passenger Injuries:	64 None	Aircraft Fire:	
Ground Injuries:	N/A	Aircraft Explosion:	
Total Injuries:	68 None	Latitude, Longitude:	37.616944, -122.383333

Administrative Information

Investigator In Charge (IIC):	Scott J Dunham	Adopted Date:	11/30/2007
Additional Participating Persons:			
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/ .		

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.