



# National Transportation Safety Board Aviation Accident Final Report

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<b>Location:</b>	CHINO, CA	<b>Accident Number:</b>	LAX95FA338
<b>Date &amp; Time:</b>	09/18/1995, 0624 PDT	<b>Registration:</b>	N693PG
<b>Aircraft:</b>	Swearingen SA-226T	<b>Aircraft Damage:</b>	Destroyed
<b>Defining Event:</b>		<b>Injuries:</b>	1 Minor

**Flight Conducted Under:** Part 91: General Aviation - Executive/Corporate

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## Analysis

During arrival at dawn, the pilot contacted Approach Control about 22 miles from the airport at 8,500 feet and requested an ILS runway 26 approach. The ATIS was reporting 1/8 mile visibility with fog; the minimum published visibility for the ILS landing was 3/4 mile. The controller vectored the aircraft so that it intercepted the ILS localizer at the outer marker at an intercept angle that was 5 degrees greater than the maximum allowable intercept of 30 degrees. The intercept point should have been at least 3 miles further away from the airport. The aircraft was 650 feet above the ILS glideslope at the outer marker (which was outside the ILS glideslope parameter). Instead of making a missed approach, the pilot elected to continue the ILS. As he attempted to intercept the glideslope from above, the airplane entered a high rate of descent and passed through the glideslope. The pilot was arresting the descent, when the airplane collided with level terrain about 1,000 feet short of the runway. After the accident, at 0646 edt, the visibility was 1/16 mile with fog.

## Probable Cause and Findings

The National Transportation Safety Board determines the probable cause(s) of this accident to be: The pilot's improper IFR procedure by not initiating a missed approach at the outer marker, by attempting to intercept the glideslope from above after passing the outer marker, and by allowing the airplane to continue descending after reaching the decision height. Factors relating to the accident were: the adverse weather condition, and the approach controller's improper technique in vectoring the airplane onto the ILS localizer.

## 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. LIGHT CONDITION - DAWN
2. (F) WEATHER CONDITION - FOG
3. WEATHER CONDITION - BELOW APPROACH/LANDING MINIMUMS
4. (F) APPROACH/DEPARTURE CONTROL SERVICE - IMPROPER - ATC PERSONNEL(DEP/APCH)
5. (C) IFR PROCEDURE - IMPROPER - PILOT IN COMMAND
6. (C) PROPER GLIDEPATH - NOT FOLLOWED - PILOT IN COMMAND
7. (C) DECISION HEIGHT - BELOW - PILOT IN COMMAND
8. (C) MISSED APPROACH - NOT PERFORMED - PILOT IN COMMAND

## Factual Information

On September 18, 1995, at 0624 hours Pacific daylight time, a Swearingen SA-226T, N693PG, collided with level terrain about 1,000 feet short of runway 26 at the Chino, California, airport while executing an ILS approach. The airplane was operated by Great Western Hotels Corporation, La Habra, California, as a positioning flight under 14 CFR Part 91 when the accident occurred. The airplane was destroyed by impact forces and a postimpact fire. The certificated commercial pilot, the sole occupant, received minor injuries. The flight originated from Apple Valley, California, about 0600 hours and was destined for Chino. Night instrument meteorological conditions prevailed at the time.

At 0614:23 hours, the pilot contacted Ontario Approach Control (Norton radar sector) and requested an instrument flight rules (IFR) clearance and approach to Chino. The airplane's position was about 22 miles north of Chino at 8,500 feet mean sea level (msl). The Norton radar sector controller radar identified the aircraft at 0615:58 and cleared the pilot direct to the Paradise VOR with instructions to maintain 6,000 feet msl. At 0616:15 hours, the Norton radar sector controller instructed the pilot to contact approach (Pomona Radar Sector) on a different VHF radio frequency.

The pilot contacted the Pomona radar sector controller at 0616:39 hours and reported he was descending out of 8,000 feet for 6,000 feet msl. At 0617:20, the Pomona radar sector controller instructed the pilot to descend and maintain 4,000 feet msl.

The Pomona radar sector controller transmitted missed approach instructions to the pilot at 0617:43 hours. The instructions transmitted were, "November three papa gulf in the event of missed approach at chino fly heading two six zero climb and maintain three thousand departure frequency will be one two five point five." At 0617:59 hours, the pilot requested that the Pomona radar sector controller repeat the instructions. The Pomona radar sector controller repeated the instructions and the pilot acknowledged with a partial read back as follows; "ok..two six zero three thousand and one two five point five."

At 0618:19 hours, the Pomona radar sector controller instructed the pilot to descend and maintain 3,200 feet msl and turn left heading 160 degrees for radar vectors for final. At 0619:14 hours, the Pomona radar sector controller told the pilot to expect vectors across the final approach course for descent. At 0619:51 hours, the Pomona radar sector controller instructed the pilot to descend and maintain 2,500 feet msl. Four seconds later the pilot read back the clearance to the newly assigned altitude of 2,500 feet.

At 0620:03 hours, the Pomona radar sector controller cleared the pilot for the instrument landing system (ILS) runway 26 instrument approach procedure. The sector controller stated, " November three papa gulf your six miles from the final approach fix turn right heading two niner zero maintain two thousand five hundred until established on final cleared for the ils runway 26 approach." At 0620:13 hours, the pilot read back his approach clearance. According to the air traffic control transcript of the communications, the pilot stated, "ok do two nine zero and ah maintain two three two thousand five hundred until established and cleared thanks."

At 0620:56, the Pomona radar sector controller amended the pilot's clearance and stated, "November three papa golf your var...your uh...I didnt expect such a wide turn fly heading three two zero maintain two thousand for vector to final." At 0621:04 hours, the pilot

acknowledged his amended clearance.

At 0621:33 hours, the Pomona radar sector controller told the pilot his position was 2 miles (east) from the final approach fix and instructed him to fly 290 degrees and maintain 2,500 feet msl until established on the final approach course and he was cleared for the approach. At 0621:44 hours, the pilot acknowledged the radar heading and the approach clearance.

At 0623:16 hours, the Pomona radar sector controller told the pilot his position was 1 mile inside (west) the final approach fix and to switch to the Chino Airport Advisory frequency, but return to Pomona radar frequency to cancel his IFR flight plan.

The pilot was vectored through the ILS final approach course about 5 miles east of the outer marker to permit the airplane to descend to a lower altitude. The airplane was then vectored toward the outer marker. Radar data depicted the aircraft intercepting the final approach course at the outer marker about 600 feet above the glide slope. The airplane's descent profile from the radar data indicates a loss of 1,600 feet in less than 3 miles. The airplane collided with the ground about 1,000 feet beyond the missed approach point at the middle marker.

The pilot indicated he armed the localizer capture function of the autopilot as the localizer needle began to move. According to the pilot the airplane was slowing to 140 knots. The pilot stated the localizer needle was centered as the airplane crossed the middle marker and the glide slope needle indicator was above glide slope. The pilot then reported pressing the autopilot's track mode and glide slope buttons. The pilot indicated the "airplane seemed to respond normally by intercepting the localizer and pitching down to the glide slope approximately 1,200 feet per minute."

#### Pilot Information

The pilot held a commercial pilot certificate with ratings for multiengine aircraft issued on March 17, 1984. The most recent second-class medical certificate was issued to the pilot on February 27, 1995, and contained no limitations.

The pilot reported his total aeronautical experience consists of about 3,282 hours, of which 346 hours were accrued in the accident airplane make and model. In the preceding 90 days before the accident, he lists a total of 67 hours flown. He also listed a total of 264 hours of actual instrument experience; 11 hours were accrued in the 90 days before the accident.

#### Airplane Information

The airplane was maintained under a manufacturer's continuous airworthiness inspection program. According to the pilot, the most recent inspection was accomplished on September 15, 1995, about 7 flight hours prior to the accident.

The aircraft maintenance records were reported to be in the airplane and were destroyed by the postimpact fire. An aircraft sales brochure for the accident airplane indicated a Bendix M4C autopilot was installed. The pilot indicated during two independent interviews, one with the FAA and another with the Safety Board that a Century III autopilot had been installed prior to the accident. The pilot later indicated in his accident report, the Bendix M4C autopilot was installed. According to the manufacturers of both autopilot systems, neither system will intercept the glide slope signal from above without the pilot first making a pitch change command.

For the Century III autopilot system, the glide slope deviation indicator must be deflected

upward for at least 20 seconds before the logic circuit of the glide slope coupler is armed. According to the manufacturer, this assurance provides that the glide path will be intercepted from below in the normal manner and prevent inadvertent coupling from above.

In the Bendix M4C system, the autopilot will only automatically capture the localizer signal. The pilot must manually select the glide slope mode when the glide slope pointer is in the center position to couple the glide slope to the autopilot. This action disengages the altitude mode of the autopilot. Also, any movement of the pitch control knob will automatically release the autopilot system from the glide slope or altitude mode.

#### Meteorological Information

The pilot received an automated telephonic weather briefing about 0530 hours. The Chino Air Traffic Control Tower (ATCT) was closed at the time and was not scheduled to open until 0700 hours. The pilot obtained the Ontario International Airport terminal weather, which was reporting visibility 3/4 mile in fog. The pilot updated the weather while en route by monitoring the Ontario Automatic Terminal Information Service (ATIS). According to the pilot, the ATIS was reporting visibility of 1/8 mile in fog.

An air traffic controller assigned to the Chino ATCT, who reported for work before the tower officially opened, took a weather observation upon hearing of the accident. At 0646 hours, the ground visibility at the Chino airport was reported to be 1/16 mile in fog.

#### Aids to Navigation

At the time of the accident there were no notices to airman (NOTAM) issued for the Chino airport instrument landing system (ILS).

A flight inspection was performed of the navigational aids associated with the ILS to runway 26 at the Chino airport on September 18, 1995, at 1635 hours. There were no discrepancies found with the ILS localizer, locator outer marker, glide slope, or marker beacons. The flight inspection report indicated the facility operation was found satisfactory.

#### Wreckage and Impact Information

The wreckage path extended about 603 feet on an arcing magnetic heading from 283 degrees to 292 degrees. The airplane initially contacted a level alfalfa field with a crop height of about 2 feet. Three tracks were found in the alfalfa that corresponded to the geometry of the airplane's landing gear. The crop was cut in a parallel path to the landing gear tracks at an angle corresponding to a right wing low bank angle. Portions of the right wing tip fairing were found at the outer northern edge of the cut crop.

A ground scar was found about 30 feet from the initial contact point with the crop. The ground scar was on the northern track found in the alfalfa, and had two distinct gouges that corresponded to the shape and size of the tires on the main landing gear. Propeller slashes found further along the track started about 36 feet from the initial contact point with the crop, and were to the right (north) of the nose gear track. The propeller slashes were about 50 feet long and stopped in the vicinity of where another main landing gear started, about 10 feet to the left (south).

Fifty-one propeller slashes were found about 1 foot to the right of the second main landing gear track at a point where the wreckage path began to arc to the right (north) about 170 feet from the initial contact point with the alfalfa. About 230 feet from the initial contact point the ground

tracks in the alfalfa faded. The airplane then struck the top of a 6-foot-high dirt berm which parallels an east/west dirt road on the south. Three gouges on top of the berm were noted. The shape of, and distance between, the three gouges corresponded the geometry of the airplane's fuselage and engine nacelles striking the berm at the angle between the heading of the wreckage path and the road. The nose gear and the right main landing gear were found on the south side of the berm in the wreckage path, but were moved to the berm prior to the arrival of Safety Board investigators.

The airplane touched down again on the north side of the road and slid about 165 feet to a stop. The longitudinal axis of the airplane's fuselage came to rest pointed south. The left main landing gear was found in the wreckage path north of the road.

The airplane came to rest at 33 58.572 degrees north latitude and 117 37.516 degrees west longitude. The wreckage was destroyed by fire. There were no readable instruments or switch positions. Both propellers exhibited evidence of forward blade bending and twisting.

## Research

### Air Traffic Control (ATC)

The Federal Aviation Administration's Air Traffic Control Handbook, 7110.65, prescribes air traffic control procedures and phraseology for use by personnel providing air traffic control services. Controllers are required to be familiar with the provisions of the handbook. The handbook contains a Pilot Controller Glossary. The glossary defines the "Approach Gate" as, "An imaginary point used within ATC as a basis for vectoring aircraft to the final approach. The gate will be established along the final approach course 1 mile from the outer marker on the side away from the airport for precision approaches." The ATC handbook also specifies the approach gate will be no closer than 5 miles from the landing threshold.

Controllers are required to assign headings that will permit final approach course interception on a track that does not exceed interception angles specified in the ATC handbook. The ATC handbook states that the controller should vector an arriving aircraft to intercept the final approach course at least 2 miles outside the approach gate, using a maximum intercept angle of 30 degrees. The ATC handbook also limits the interception angle to 20 degrees when the distance from the interception point to the approach gate is less than 2 miles.

The ATC handbook also publishes procedures for interception of the glide slope on precision approaches. The ATC handbook indicates the arriving aircraft should be vectored to a point not above the glide slope or below the minimum glide slope interception altitude.

At 0621:33 hours, the Pomona radar sector controller issued a vector instructing the pilot to fly 290 degrees and maintain 2,500 feet msl, and informed the pilot he was 2 miles from the final approach fix. Further review of the ATC transcripts revealed the pilot was not issued an altimeter setting by either the Pomona radar sector controller or the Norton radar sector controller. The ATC handbook states that the en route controller should issue an altimeter setting to the aircraft while operating in that controller's area of jurisdiction, and for the destination airport when 50 miles from the airport if the destination does not have an approach control. The ATC handbook also instructs terminal controllers to issue the altimeter setting to arriving aircraft on initial contact or soon as possible thereafter.

### Instrument Landing System (ILS) Runway 26 Instrument Approach Procedure (IAP)

The pilot was being vectored on a unpublished route to intercept the final approach course of

the ILS runway 26 IAP at the Chino Airport. The ILS runway 26 approach is published in chart form by the U.S. Department of Commerce. The Chino ILS runway 26 chart depicts a final approach course of 255 degrees. The chart places the outer marker 3.9 nautical miles from the landing threshold. The chart also specifies a glide slope angle of 3 degrees and the glide slope altitude at the outer marker of 1,948 feet msl. The chart depicts a glide slope intercept altitude of 2,100 feet msl. The intercept altitude is positioned on the localizer final approach course about 1 nautical mile from the outer marker. The descent table found in the back cover of the U.S. Department of Commerce IAP publication indicated a rate of descent of 715 feet for a ground speed of 135 knots and a rate of descent of 795 feet for a ground speed of 150 knots with a 3-degree angle of descent.

#### Airman's Information Manual (AIM)

The AIM is published by the FAA and is designed to provide basic information to airmen to operate aircraft in the National Airspace System. The AIM states in part; "A pilot adhering to the altitudes, flight paths, and weather minimums depicted on the IAP chart or vectors and altitudes issued by the radar controller, is assured of terrain and obstruction clearance and runway or airport alignment during approach for landing. IAPs are designed to provide an IFR descent from the en route environment to a point where a safe landing can be made." The AIM further states the pilot is responsible when being radar vectored or on an unpublished route to maintain the last assigned altitude until established on a segment of a published route or IAP, at which time published altitudes apply. The AIM also states controllers are responsible to issue "an IFR approach clearance only after the aircraft is established on a segment of a published route or IAP, or assigns an appropriate altitude for the aircraft to maintain until so established."

#### Radar Data

Radar data was supplied by the FAA to the Safety Board in two formats; a floppy disk containing the data in an electronic form, and a plotted format on paper. The floppy disk was found contaminated with a computer virus, "FORM VIRUS," and the electronic data was found unreadable after the disk was inoculated. A second disk was requested and also found contaminated and rendered unreadable data. By the time a third request for data was submitted, 15 days had past. The FAA told the Safety Board the computer tape containing the data was returned to service and the radar data was no longer available.

Review of the plotted data supplied by the FAA illustrated that the airplane intercepted the published localizer course inside the approach gate at the outer marker and was at an altitude of 2,600 feet msl, above the glide slope intercept altitude of 1,948 feet.

#### Additional Information

##### Wreckage Release

The wreckage was released to the representatives of the owner on September 22, 1995.

## Pilot Information

<b>Certificate:</b>	Commercial	<b>Age:</b>	37, 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>	No
<b>Instructor Rating(s):</b>	Airplane Single-engine	<b>Toxicology Performed:</b>	Yes
<b>Medical Certification:</b>	Class 2 Valid Medical--no waivers/lim.	<b>Last FAA Medical Exam:</b>	02/27/1995
<b>Occupational Pilot:</b>	<b>Last Flight Review or Equivalent:</b>		
<b>Flight Time:</b>	3282 hours (Total, all aircraft), 346 hours (Total, this make and model), 2852 hours (Pilot In Command, all aircraft), 67 hours (Last 90 days, all aircraft), 27 hours (Last 30 days, all aircraft), 1 hours (Last 24 hours, all aircraft)		

## Aircraft and Owner/Operator Information

<b>Aircraft Make:</b>	Swearingen	<b>Registration:</b>	N693PG
<b>Model/Series:</b>	SA-226T SA-226T	<b>Aircraft Category:</b>	Airplane
<b>Year of Manufacture:</b>		<b>Amateur Built:</b>	No
<b>Airworthiness Certificate:</b>	Normal	<b>Serial Number:</b>	T207
<b>Landing Gear Type:</b>	Retractable - Tricycle	<b>Seats:</b>	7
<b>Date/Type of Last Inspection:</b>	09/15/1995, Continuous Airworthiness	<b>Certified Max Gross Wt.:</b>	12500 lbs
<b>Time Since Last Inspection:</b>	7 Hours	<b>Engines:</b>	2 Turbo Prop
<b>Airframe Total Time:</b>	5218 Hours	<b>Engine Manufacturer:</b>	Garrett
<b>ELT:</b>	Installed	<b>Engine Model/Series:</b>	TPE 331
<b>Registered Owner:</b>	GREAT WESTERN HOTELS CORP	<b>Rated Power:</b>	840 hp
<b>Operator:</b>	GREAT WESTERN HOTELS CORP	<b>Operating Certificate(s) Held:</b>	None



## Meteorological Information and Flight Plan

Conditions at Accident Site:	Instrument Conditions	Condition of Light:	Dawn
Observation Facility, Elevation:	CNO, 650 ft msl	Distance from Accident Site:	1 Nautical Miles
Observation Time:	0646 PDT	Direction from Accident Site:	270°
Lowest Cloud Condition:	Unknown / 0 ft agl	Visibility	0.06 Miles
Lowest Ceiling:	Obscured / 0 ft agl	Visibility (RVR):	0 ft
Wind Speed/Gusts:	Calm /	Turbulence Type Forecast/Actual:	/
Wind Direction:		Turbulence Severity Forecast/Actual:	/
Altimeter Setting:	29 inches Hg	Temperature/Dew Point:	
Precipitation and Obscuration:			
Departure Point:	APPLE VALLEY, CA (APV)	Type of Flight Plan Filed:	None
Destination:	(CNO)	Type of Clearance:	IFR
Departure Time:	0600 PDT	Type of Airspace:	Class D

## Airport Information

Airport:	CHINO (CNO)	Runway Surface Type:	Concrete
Airport Elevation:	650 ft	Runway Surface Condition:	Dry
Runway Used:	26	IFR Approach:	ILS
Runway Length/Width:	4856 ft / 150 ft	VFR Approach/Landing:	None

## Wreckage and Impact Information

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

## Administrative Information

Investigator In Charge (IIC):	THOMAS H WILCOX	Report Date:	03/25/1997
Additional Participating Persons:	CARL A CHRISTOPHER; RIVERSIDE, CA ALAN LUEBS; PHOENIX, AZ CHARLES MOTE; SAN DIEGO, 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 <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> .		

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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. A factual report that may be admissible under 49 U.S.C. § 1154(b) is available [here](#).