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## Landing gear failure, Boeing 727-200, July 9, 1997

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**Micro-summary:** The right main landing gear on this Boeing 727-200 had partially collapsed as the passengers were boarding.

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**Event Date:** 1997-07-09 at 840 EST


**Investigative Body:** National Transportation Safety Board (NTSB), USA

**Investigative Body's Web Site:** <http://www.nts.gov/>

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1. Accident reports can be and sometimes are revised. Be sure to consult the investigative agency for the latest version before basing anything significant on content (e.g., thesis, research, etc).
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		NTSB ID: CHI97IA205		Aircraft Registration Number: N770AT	
		Occurrence Date: 07/09/1997		Most Critical Injury: None	
		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place INDIANAPOLIS		State IN	Zip Code 46241	Local Time 0840	Time Zone EST
Airport Proximity: On Airport		Distance From Landing Facility:		Direction From Airport:	
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series B-727-200		Type of Aircraft Airplane	
Sightseeing Flight: No			Air Medical Transport Flight: No		
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
<p>On July 9, 1997, at 0840 eastern standard time, a Boeing 727-200, N770AT, operated by American Trans Air, was determined to have received minor damage prior to pushback from the gate. During his pre-flight walk around, the Flight Engineer discovered that the aft trunnion on the shock strut of the right main landing gear had failed. The Captain was notified of the discrepancy by the Flight Engineer. The Captain halted the boarding of passengers. The seven crewmembers and four passengers were deplaned by normal means. There were no injuries. The 14 CFR Part 121, Flight 403/402, was scheduled to depart Indianapolis International Airport, Indianapolis, Indiana, with Las Vegas International Airport, Las Vegas, Nevada as the intended destination. Instrument meteorological conditions prevailed and an instrument flight plan had been filed.</p> <p>The aircraft had landed at Indianapolis International Airport the night before and had received routine maintenance. The next morning the aircraft was towed to gate C-4 at the main terminal. The maintenance personnel who serviced the aircraft and towed the airplane to the gate reported that they did not notice anything unusual about the right wing or the right main landing gear of the airplane. The aircraft fueler reported that he noticed that the right wing was lower than the left wing. He notified maintenance personnel of the condition. About the same time, the Flight Engineer discovered and reported the condition of the right main landing gear to the maintenance personnel. It was determined that the outer cylinder trunnion had fractured and the actuator support beam was resting on the fractured stub of the outer cylinder trunnion. The airplane was towed to a hangar for removal and replacement of the shock strut and local repair of the main landing gear support beam.</p> <p>It was determined that the fractured right main landing gear, p/n 65-17650-74, s/n 0171601597, had recently been overhauled and had accumulated 51 cycles and 126 hours since installation 21 days prior to the fracture. The aft trunnion of the right main landing gear and the trunnion bearing components were sent to the Materials Laboratory of the National Transportation Safety Board for examination.</p> <p>The examination revealed that the aft portion of the trunnion was fractured into four pieces with the three largest pieces contained within a cylindrical repair sleeve encircling the trunnion. The repair sleeve, installed during a previous repair of the outer cylinder trunnion journal, was also longitudinally split at the approximate bottom centerline of the trunnion.</p> <p>An etched longitudinal metallographic section was cut through the initiation area of the upper aft lug fracture. The metallographic section uncovered a thin layer of plating on the outer diameter surface of the lug. The plating was determined to be chromium by energy dispersive spectrographic analysis. The plating extended from the fracture location aft through the transition radius and onto the outer diameter of the lug. The plating was thickest on the lug diameter (0.0022 inch), thinned in the radius, and at an intermediate thickness (0.00035) adjacent to the fracture.</p>					
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National Transportation Safety Board

## FACTUAL REPORT

AVIATION

NTSB ID: CHI97IA205

Occurrence Date: 07/09/1997

Occurrence Type: Incident

## Narrative (Continued)


Another section was cut from the lower lug showing a portion of the journal diameter, the trunnion end face and the transition radius from the end face to the lug outer diameter. Chromium plating was apparent on the entire manufactured surface visible in this section. On the journal diameter the plating thickness measured 0.005 inch. The plating extended aft over the corner chamfer onto the end face and throughout the transition radius.


The Boeing Commercial Airplane Overhaul Manual indicated that chromium plating was only to be applied to the trunnion journal outer diameter and a portion of the end face. It also specifically denoted areas for chromium plate runout that bound these areas. Further, the figure had a "No Chrome" notation for the journal surface immediately adjacent to the chamfer. The landing gear overhaul facility's "workorder traveler" for the gear indicated similar chromium plating details. Flag note 13 in figure 406 indicated plating the aft lugs and surrounding areas with either titanium-cadmium or low hydrogen embrittlement (LHE) cadmium. Work order documents supplied by the overhaul facility indicated that LHE cadmium was used.

In addition to the trunnion section of the landing gear, the spherical bearing assembly, locking bolt and anti-rotation washer were received. For normal assembly, the aft trunnion of the gear is inserted into the inner diameter of the wing mounted spherical bearing.

The spherical bearing that contacts the trunnion journal had an inner diameter which measured approximately 3.50 inches. The aft trunnion journal of the failed landing gear had an outer diameter that measured approximately 3.25 inches. During landing gear replacement, the maintenance procedures require that the proper sized spherical bearings, either 3.50 inch or the 3.25 inch inner diameter, be matched with the appropriate outer cylinder aft trunnion outside diameter. (See Metallurgist's Factual Report)

Boeing had issued Service Bulletins in 1980 and 1991 which detailed the requirements to ensure that the correct trunnions and spherical bearings were matched during landing gear replacement.

 <b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: CHI97IA205			
		Occurrence Date: 07/09/1997			
		Occurrence Type: Incident			
<b>Landing Facility/Approach Information</b>					
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width
INDIANAPOLIS INTL	IND	Ft. MSL	0		
Runway Surface Type:					
Runway Surface Condition:					
Type Instrument Approach:					
VFR Approach/Landing:					
<b>Aircraft Information</b>					
Aircraft Manufacturer		Model/Series		Serial Number	
Boeing		B-727-200		21953	
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle					
Homebuilt Aircraft? No	Number of Seats: 176	Certified Max Gross Wt.	197700 LBS	Number of Engines: 3	
Engine Type:	Engine Manufacturer:	Model/Series:	Rated Power:		
Turbo Jet	P&W	JT8D-17	16000 LBS		
- Aircraft Inspection Information					
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time		
Continuous Airworthiness	06/1997	162 Hours	52509 Hours		
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Yes	ELT Operated? No	ELT Aided in Locating Accident Site?			
<b>Owner/Operator Information</b>					
Registered Aircraft Owner		Street Address			
AMERICAN TRANS AIR		7337 WEST WASHINGTON ST.			
		City	State	Zip Code	
		INDIANAPOLIS	IN	46251	
Operator of Aircraft		Street Address			
Same as Reg'd Aircraft Owner		Same as Reg'd Aircraft Owner			
		City	State	Zip Code	
Operator Does Business As:			Operator Designator Code:		
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
Operating Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Non-scheduled; Domestic; Passenger Only					
FACTUAL REPORT - AVIATION					

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: CHI97IA205
	Occurrence Date: 07/09/1997
	Occurrence Type: Incident

**First Pilot Information**

Name On File	City On File	State On File	Date of Birth On File	Age 51
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Sex: M	Seat Occupied: Left	Principal Profession: Civilian Pilot	Certificate Number: On File
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Certificate(s): Airline Transport

Airplane Rating(s): Multi-engine Land; Single-engine Land

Rotorcraft/Glider/LTA: None

Instrument Rating(s): Airplane

Instructor Rating(s): None

Type Rating/Endorsement for Accident/Incident Aircraft? Yes	Current Biennial Flight Review?
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Medical Cert.: Class 1	Medical Cert. Status: Valid Medical--no waivers/lim.	Date of Last Medical Exam: 02/1997
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- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Multi-Engine	Night	Instrument		Rotorcraft	Glider	Lighter Than Air
						Actual	Simulated			
Total Time	6500									
Pilot In Command(PIC)										
Instructor										
Last 90 Days	160									
Last 30 Days										
Last 24 Hours										

Seatbelt Used? No	Shoulder Harness Used? No	Toxicology Performed? No	Second Pilot? No
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**Flight Plan/Itinerary**

Type of Flight Plan Filed: IFR

Departure Point Same as Accident/Incident Location	State	Airport Identifier IND	Departure Time 1825	Time Zone EDT
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Destination LAS VEGAS	State NV	Airport Identifier LAS	
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Type of Clearance: None

Type of Airspace:

**Weather Information**

Source of Briefing:

Method of Briefing:

 <p><b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b></p>	NTSB ID: CHI97IA205
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<b>Weather Information</b>					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
	0000		0 Ft. MSL	0 NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Unknown			0 Ft. AGL	Condition of Light: Day	
Lowest Ceiling: Overcast		300 Ft. AGL		Visibility: 1 SM	Altimeter: 30.00 "Hg
Temperature: 17 °C	Dew Point: 16 °C	Wind Direction: 360		Density Altitude: Ft.	
Wind Speed: 11	Gusts:	Weather Conditions at Accident Site: Instrument Conditions			
Visibility (RVR): 0 Ft.	Visibility (RVV) 0 SM	Intensity of Precipitation: Unknown			
Restrictions to Visibility: None					
Type of Precipitation: Drizzle					

<b>Accident Information</b>		
Aircraft Damage: Minor	Aircraft Fire: None	Aircraft Explosion: None

Classification: U.S. Registered/U.S. Soil					
- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer				1	1
Cabin Attendants				4	4
Other Crew					
Passengers				4	4
- TOTAL ABOARD -				11	11
Other Ground	0	0	0		0
- GRAND TOTAL -	0	0	0	11	11

National Transportation Safety Board

**FACTUAL REPORT**

**AVIATION**



NTSB ID: CHI97IA205

Occurrence Date: 07/09/1997

Occurrence Type: Incident

Administrative Information

Investigator-In-Charge (IIC)

JIM SILLIMAN

Additional Persons Participating in This Accident/Incident Investigation:

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