## Wheel separation, Boeing 737-200, November 18, 1994

Micro-summary: This Boeing 737-200 lost a main wheel on takeoff.

## Event Date: 1994-11-18 at 0706 CST

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

Investigative Body's Web Site: http://www.ntsb.gov/

## Cautions:

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).

2. Readers are advised that each report is a glimpse of events at specific points in time. While broad themes permeate the causal events leading up to crashes, and we can learn from those, the specific regulatory and technological environments can and do change. Your company's flight operations manual is the final authority as to the safe operation of your aircraft!

3. Reports may or may not represent reality. Many many non-scientific factors go into an investigation, including the magnitude of the event, the experience of the investigator, the political climate, relationship with the regulatory authority, technological and recovery capabilities, etc. It is recommended that the reader review all reports analytically. Even a "bad" report can be a very useful launching point for learning.

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National Transportation Safety Board	National Transportation Safety Board NTSB ID: FTW95IA049 Aircraft Registration Number: N988UA								
FACTUAL REPORT	Occurren	ce Date: 11/18	3/1994	Most Critical Injury: None					
<b>AVIATION</b>	Occurren	ce Type: Incide	ent	Investigated By: NTSB					
Location/Time									
Nearest City/Place	State	Zi	p Code	Local Time	Time Zone				
SPRINGFIELD	МО	6	5800	0706	CST				
Airport Proximity: On Airport	Distar	nce From L	anding Facility:		Direction From Airport:				
Aircraft Information Summary									
Aircraft Manufacturer			Model/Series	6			Type of Aircraft		
BOEING			B-737-200				Airplane		
Sightseeing Flight: No		A	Air Medical Tr	ansport Flight: No	)				
Narrative									
All components were forwarded further examination. On January 7, 1995, at San Fra at the company engineering of NTSB investigator. Six recover roller ends were relatively	0706 Sprin gical o Der enclo sligh ir Tr tifie to t missi ident vis gator the d to ancis facil ered free re wa ure y out perso overe " Th	central agfield, condit aver, Co bed Pill at scrap caffic C ed as br e crew r the dest ang. Th cally be closed c (enclo outer s be the U sco, Call ity by rollers e of s as no in event."	standard Missouri ions preva olorado. ot/Operato ontrol Tow cake assemb ceported th ination. e crew was examined statement statement pindle wer Inited Airl dication i the level shad "sevent scuffing di dication i the level beari	. The crew of iled for United r report, the for er (ATCT) that ly components is at all cockpit Upon arrival at cleared for a on November is ), a Federal ent). The axle e damaged and ines facility a he components ngineers, metal rely damaged re amage, which in n or around the ft hand axle of ng failure."	f five and d Airlines information tation from airplane d from a Boei indication t Denver, t landing on 23, 1994, a Aviation e nut retai "appeared t at San Fran (enclosed r llurgists, olling surf ndicated ad e keyway of utboard "en ted that th	52 pass Flight in the runwa ebris ng 737 s were he tow runwa t Denv Admir ning r o be r cisco, eport) a FAA aces; equate "repord d had e axle at the	ssengers were not 1487, scheduled his paragraph was ay 02. A witness was found on the and Springfield e normal and that wer confirmed the ay 35R and taxied ver, Colorado, by histration (FAA) ring and nut were colled outboard." California, for were reexamined inspector, and a however, all the e lubrication and ortable defect or severe resultant e nut lock washer ey were installed		

National Transportation Safety Board	B ID: FT	W95IA049									
FACTUAL REPORT	urrence Da	ate: 11/18/1994									
AVIATION	Occ <sup>,</sup>	urrence T	ype: Incident		_						
Landing Facility/Approach Information											
Airport Name		Airport ID	D: Airport Eleva	ation R	unway Used	Runwa	y Length	Run	way Width		
SRINGFIELD		SGF	1267 Ft		-	7000		150	)		
Runway Surface Type: Asphalt											
Runway Surface Condition: Dry											
Type Instrument Approach:											
VFR Approach/Landing: None											
Aircraft Information											
Aircraft Manufacturer BOEING			odel/Series 737-200				Serial Num 7372175				
Airworthiness Certificate(s): Transport											
Landing Gear Type: Retractable - Tricycle											
Homebuilt Aircraft? No Number of Seats: 107 Certified Max Gross Wt. 117000 LBS N							Number of	-			
Engine Type: Turbo Jet	Engine P&W	Manufacturer:		Model/Se JT8D-78				ed Power: 000 LBS			
- Aircraft Inspection Information		<del></del>									
Type of Last Inspection			Date of Last Inspection Time Since Last Inspection						otal Time		
Continuous Airworthiness		12/199	<del>)</del> 3	2215 Hours					2144 Hours		
- Emergency Locator Transmitter (ELT) Info				1							
	ELT Operated? ELT Aided in Locating Accident Site?										
Owner/Operator Information											
Registered Aircraft Owner		Stre	Street Address P. O. BOX 66100								
UNITED AIRLINES				CHICAGO IL							
	Stree	CHICAGO IL 60666 Street Address									
Operator of Aircraft	Same as Reg'd Aircraft Owner										
Same as Reg'd Aircraft Owner	City			tate	Zip Code						
Operator Does Business As: Operator Designator Code: UALA											
- Type of U.S. Certificate(s) Held:											
Air Carrier Operating Certificate(s): Flag Ca	arrier/Domestic										
Operating Certificate: Operator Certificate:											
Regulation Flight Conducted Under: Part 121: Air Carrier											
Type of Flight Operation Conducted: Sched	duled; Domestic	; Passen	iger Only								
FACTUAL REPORT - AVIATION Page 2											

National Transportation	Safety Board	1	NTSB ID:	FTW95IA	.049								
FACTUAL	FACTUAL REPORT Occurrence Date: 11/18/1994												
Z	1 2		Occurrence Type: Incident										
ery BOI.													
First Pilot Information													
												Age	
On File					On F	le				On File	On	File	40
Sex: M Seat Occupied: Left Principal Profession: Civilian Pilot Certificate Number: On File													
Certificate(s): Airline Transport; Commercial; Foreign													
Airplane Rating(s): Mult	Airplane Rating(s): Multi-engine Land; Single-engine Land												
Rotorcraft/Glider/LTA: Non	e		-										
Instrument Rating(s): Airp													
Instructor Rating(s): Airplane													
Type Rating/Endorsement for	or Accident/Ir	ncident Aircra	aft? Yes			C	urrent E	Biennial Fli	ght Re	eview?			
Medical Cert.: Class 1	Medica	al Cert. Statu	s: Valid Me	dicalno w	/aivers/	lim.		Date	of La	st Medical	Exam:	09/1994	
- Flight Time Matrix	All A/C	This Make and Model	Airplane Single Engine	Airplane Mult-Engine	Ni	Night Inst Actual		Instrument Sim	ulated	Rotorcraf	t	Glider	Lighter Than Air
Total Time	5338	542								_			
Pilot In Command(PIC)	5338	542											
Instructor										_			
Last 90 Days		96			_								
Last 30 Days		69								_			
Last 24 Hours		2				<b>-</b> ·				<u> </u>			
Seatbelt Used? Yes	Shou	Ider Harness	s Used? Yes	6		IOXICO	blogy Pe	erformed?	No		Second	d Pilot? Ye	S
Flight Plan/Itinerary													
Type of Flight Plan Filed: IF	R					1							
Departure Point								Airport Ide	port Identifier		Departure Time		Time Zone
Same as Accident/Incident Location SGF 0706 CST										CST			
Destination State									irport Identifier				
DENVER CO DEN													
Type of Clearance: IFR													
Type of Airspace: Class D													
Weather Information													
Source of Briefing: Company; Flight Service Station													
Method of Briefing:													
			FACTUAI	L REPORT	- AVI	ATIO	N						Page 3

Part Part Part Part Part Part Part Part	Nationa	TRANSP al Transportation Safety	NTSB ID:	FTW95	5IA049								
Occurrece Type: Incident     Weather Information     WOF ID   Observation Time   Time Zone   WOF Elevation   WOF Distance From Accident Site   Direction From Accident Site     Styl Lowest Cloud Condition: UNITY   CST   1267 Ft. MSL   ONN   O Deg. Mag.     SkylLowest Cloud Condition: UNITY   U   Direction From Accident Site   Damini Condition: ULITY   O Deg. Mag.     SkylLowest Cloud Condition: UNITY   U   1267 Ft. MSL   Visibility:   1   SM   Attimeter:   30.00   "Hg     Temperature:   9 °C   Gusts:   Wort   Visibility:   1   SM   Attimeter:   30.00   "Hg     Wind Speed: 7   Gusts:   Wort   Visibility:   1   SM   Attimeter:   30.00   "Hg     Visibility (RVR):   0   Ft.   St.   Y   More   None   None   None   None     Classification:   Visibility:   None   ToTAL   Attimeter:   None   ToTAL     Injury Summary Matrix   Fat   Serious		O NO TO	Occurren	Occurrence Date: 11/18/1994									
Weather Information   WOF ID   Observation Time   Time Zone   WOF Elevation   WOF Distance From Accident Site   Direction From Accident Site     SGF   0650   CST   1267 FL MSL   0 NM   0 Deg. Mag.     Sky/Lowest Cloud Condition: Unknown   0 FL AGL   Visibility:   1   SM   Altimeter:   30.00   "Hg     Lowest Ceiling: Obscured   9 °C   Dew Point:   8 °C   Wind Direction: 260   Density Altitude:   FL     Wind Speed: 7   Gusts:   Wather Conditions at Accident Site:   Instrument Conditions   Provide:   FL     Visibility (RVR):   0   FL   Visibility (RVV)   0   SM   Intensity of Precipitation:: Unknown     Restrictions to Visibility: F0g   FL   Visibility (RVV)   0   SM   Intensity of Precipitation:: Unknown     Arcraft Explosion None   Arcraft Fire: None   Arcraft Explosion None   Classification: U.S. Registered/U.S. Soil   Intensity of Proteipitation:   Intensity of Proteipitation:     - Injury Summary Matrix   Fatal   Serious   Minor   None   ToTAL   Fifte Instructor   Intens		1 100 AN 100 -		Occurren									
WOF ID   Observation Time   Time Zone   WOF Elevation   WOF Distance From Accident Site   Direction From Accident Site     SGF   0650   CST   1267 Fi. MSL   0 NM   0 Deg, Mag.     SkyLowest Cloud Condition: Unkowst   Uncertain Site   0 Fi. AGL   Condition: Upit: Dawn     Lowest Cloud Condition: Obscured   100 Fi. AGL   Visibility: 1   SM   Altimeter: 30.00   'Hg     Temperature:   9 "C   Gusts:   0 Gusts:   Wind Direction: 260   Density Altitude:   Fi.     Wind Speed:   7   Gusts:   Weatter Conditions at Accident Site: Instrument Conditions   Density Altitude:   Fi.     Visibility (RVR):   0   Fi.   Visibility: No   SM   Intensity of Precipitation: Unknown   Intensity of Precipitation: Unknown     Accident Information   Aircraft Fire: None   Aircraft Explosion None   Intensity of Precipitation: US, Registered/US, Soil   Intensity of Precipitation: US, Registered/US, Soil   Intensity of Precipitation: US, Firet Fire	Weather												
SkyLowest Cloud Condition: Unknown   0 FL AGL   Condition of Light: Dawn     Lowest Ceiling: Obscured   100 FL AGL   Visibility:   1   SM   Attimeter:   30.00   "Hg     Temperature:   9 °C   Dew Point:   8 °C   Wind Direction: 260   Density Altitude:   FL     Wind Speed:   7   Gusts:   Weather Conditions at Accident Site: Instrument Conditions   Person     Visibility (RVR):   0   FL   Visibility (RVV)   0   SM   Intensity of Precipitation: Unknown     Restrictions to Visibility:   Fog   Free Precipitation:   None   Aircraft Explosion None     Classification:   U.S. Registered/U.S. Soit												e	
SkyLowest Cloud Condition: Unknown   0 FL AGL   Condition of Light: Dawn     Lowest Ceiling: Obscured   100 FL AGL   Visibility:   1   SM   Attimeter:   30.00   "Hg     Temperature:   9 °C   Dew Point:   8 °C   Wind Direction: 260   Density Altitude:   FL     Wind Speed:   7   Gusts:   Weather Conditions at Accident Site: Instrument Conditions   Person     Visibility (RVR):   0   FL   Visibility (RVV)   0   SM   Intensity of Precipitation: Unknown     Restrictions to Visibility:   Fog   Free Precipitation:   None   Aircraft Explosion None     Classification:   U.S. Registered/U.S. Soit													
Lowest Ceiling: Obsoured 100 FL ×LL Visibility: 1 SM Altimeter: 30.00 "Hg   Temperature: 9 °C □ = Point: 8 °C Wind Direction: 260 Density Altitude: FL   Wind Speed: 7 Gusts: Gusts: Weat+Conditions at Accident Site: Instrument Conditions FL   Visibility (RVR): 0 FL Visibility (RVV) 0 SM Intensity of Precipitation: Unknown   Restrictions to Visibility: FOg FG Aircraft Fire: None Aircraft Site: Instrument Conditions   Accident Information Aircraft Fire: None Aircraft Fire: None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil Fatal Serious Minor ToTAL   First Pion Fatal Serious Minor ToTAL   First Pion Fatal Serious Minor ToTAL   Second Pilot I I 1 1   Second Pilot I I 1 1   Second Pilot I I 1 1   Second Pilot I I I 1 1													
Temperature:   9 °C   Dew Point:   8 °C   Wind Direction: 260   Density Altitude:   Ft.     Wind Speed:   7   Gusts:   Weather Conditions at Accident Site: Instrument Conditions     Visibility (RVR):   0   Ft   Visibility (RVV)   0   SM   Intensity of Precipitation: Unknown     Restrictions to Visibility:   Fog   Intensity of Precipitation: Unknown   Intensity of Precipitation: Unknown     Accident Information   Aircraft Fire: None   Aircraft Explosion None     Classification:   U.S. Registered/U.S. Soil   Intensity of ToTAL     - Injury Summary Matrix   Fatal   Serious   Minor   ToTAL     First Nick   Intensity   Intensity of Intensity of Precipitation: Unknown   Intensity of In	Sky/Lowes												
Wind Speed: 7 Gusts: Weather Conditions at Accident Site: Instrument Conditions   Visibility (RVR): 0 Ft Visibility (RVV) 0 SM Intensity of Precipitation: Unknown   Restrictions to Visibility: Fog        Type of Precipitation: None         Accident Information Aircraft Fire: None Aircraft Explosion None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil  1 1    First Plot  1 1 1  <	Lowest Ce	Lowest Ceiling: Obscured 100 Ft. AGL Visibility: 1 SM Altimeter: 30.00 "H										"Hg	
Visibility (RVR): 0 Ft. Visibility (RVV) 0 SM Intensity of Precipitation: Unknown   Restrictions to Visibility: Fog <td>Temperatu</td> <td>ire: 9 °C</td> <td>Dew Point:</td> <td>8 °C</td> <td>Wind</td> <td>Direction:</td> <td>260</td> <td></td> <td></td> <td>Dei</td> <td>nsity Altitude:</td> <td></td> <td>Ft.</td>	Temperatu	ire: 9 °C	Dew Point:	8 °C	Wind	Direction:	260			Dei	nsity Altitude:		Ft.
Restrictions to Visibility: Fog   Type of Precipitation: None   Aircraft Explosion None   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 1 1 1   Second Pilot 1 1 1 1 1   Student Pilot 1 1 1 1 1 1   First Pilot 1 <t< td=""><td>Wind Spee</td><td>ed: 7</td><td>Gusts:</td><td></td><td>Weath</td><td>ner Condt</td><td>ions at Accid</td><td>lent Si</td><td>ite: Instrum</td><td>ent C</td><td>Conditions</td><td></td><td></td></t<>	Wind Spee	ed: 7	Gusts:		Weath	ner Condt	ions at Accid	lent Si	ite: Instrum	ent C	Conditions		
Type of Precipitation: None   Aicraft Information Aicraft Fire: None Aicraft Explosion None   Classification: U.S. Registered/U.S. Soil Aicraft Explosion None   - Injury Summary Matrix Fatal Serious Minor None TOTAL   First Pilot Columnation Image: Minor None TOTAL   First Pilot Columnation Image: Minor None TOTAL   Second Pilot Columnation Image: Minor Image: Minor None   Student Pilot Columnation Image: Minor Image: Minor Image: Minor   Flight Instructor Columnation Image: Minor Image: Minor Image: Minor   Check Pilot Columnation Image: Minor Image: Minor Image: Minor   Cabin Attendants Image: Minor Image: Minor Image: Minor Image: Minor   Passengers Image: Minor Image: Minor Image: Minor Image: Minor Image: Minor   Other Ground Minor Image: Minor Image: Minor Image: Minor Image: Minor   Other Ground Minor Image: Minor Image: Minor <td>Visibility (R</td> <td>RVR): 0 Ft.</td> <td>Visibility</td> <td>(RVV) 0</td> <td>SM</td> <td>Intensity</td> <td>of Precipita</td> <td>ation: I</td> <td>Unknown</td> <td></td> <td></td> <td></td> <td></td>	Visibility (R	RVR): 0 Ft.	Visibility	(RVV) 0	SM	Intensity	of Precipita	ation: I	Unknown				
Accident Information   Aircraft Fire: None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil   Injury Summary Matrix Fatal Serious Minor TOTAL   First Pilot 1 1   Second Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   Filot Image: Minor TOTAL   Second Pilot Image: Minor Ima	Restriction	s to Visibility: Fog	I										
Accident Information   Aircraft Fire: None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil   Injury Summary Matrix Fatal Serious Minor TOTAL   First Pilot 1 1   Second Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   First Pilot Image: Minor None TOTAL   Filot Image: Minor TOTAL   Second Pilot Image: Minor Ima													
Accident Information   Aircraft Damage: Minor Aircraft Fire: None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil  Aircraft Explosion None   - Injury Summary Matrix Fatal Serious Minor None TOTAL   First Pilot C I 1 1   Second Pilot C I 1 1   Student Pilot C I 1 1   Flight Instructor C I I I   Flight Engineer C I I I   Cabin Attendants C I I I   Passengers C I I I   Other Ground 0 0 0 0 I	Type of Pre	ecipitation: None											
Aircraft Damage: Minor Aircraft Fire: None Aircraft Explosion None   Classification: U.S. Registered/U.S. Soil   None TOTAL   - Injury Summary Matrix Fatal Serious Minor None TOTAL   First Pilot   1 1   Second Pilot   1 1   Student Pilot    1 1   Flight Instructor         Check Pilot          Flight Engineer     3 3    Other Crew     52 <t< td=""><td>21</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td></td></t<>	21												
Classification: U.S. Registered/U.S. Soil- Injury Summary MatrixFatalSeriousMinorNoneTOTALFirst Pilot111Second Pilot111Student Pilot111Flight Instructor111Check Pilot111Flight Engineer113Other Crew111Passengers15252-TOTAL ABOARD-000	Accident Information												
- Injury Summary MatrixFatalSeriousMinorNoneTOTALFirst Pilot1111Second Pilot111Student Pilot111Flight Instructor111Check Pilot111Flight Engineer133Other Crew15252- TOTAL ABOARD -000	Aircraft Dar												
- Injury Summary MatrixFatalSeriousMinorNoneTOTALFirst Pilot1111Second Pilot111Student Pilot111Flight Instructor111Check Pilot111Flight Engineer133Other Crew15252- TOTAL ABOARD -000			J.S. Soil	I									
First PilotImage: state of the s				Serious Min	or	None	TOTAL						
Student PilotImage: Student PilotImage: Student PilotImage: Student PilotFlight InstructorImage: Student PilotImage: Student PilotImage: Student PilotCheck PilotImage: Student PilotImage: Student PilotImage: Student PilotFlight EngineerImage: Student PilotImage: Student PilotImage: Student PilotCabin AttendantsImage: Student PilotImage: Student PilotImage: Student PilotOther CrewImage: Student PilotImage: Student PilotImage: Student PilotPassengersImage: Student PilotImage: Student PilotImage: Student PilotOther GroundImage: Student PilotImage: Student PilotImage: Student PilotOther GroundImage: Student PilotImage:					-								
Flight InstructorImage: Check PilotImage: Check PilotImage: Check PilotImage: Check PilotFlight EngineerImage: Check PilotImage: Check PilotImage: Check PilotCabin AttendantsImage: Check PilotImage: Check PilotImage: Check PilotCabin AttendantsImage: Check PilotImage: Check PilotImage: Check PilotOther CrewImage: Check PilotImage: Check PilotImage: Check PilotPassengersImage: Check PilotImage: Check PilotImage: Check PilotOther GroundImage: Check PilotImage: Check PilotImage: Check PilotOther GroundImage: Check PilotImage: Check Pilot	Second	d Pilot					1						
Check PilotImage: Check PilotImage: Check PilotImage: Check PilotFlight EngineerImage: Check PilotImage: Check PilotImage: Check PilotCabin AttendantsImage: Check PilotImage: Check PilotImage: Check PilotCabin AttendantsImage: Check PilotImage: Check PilotImage: Check PilotOther CrewImage: Check PilotImage: Check PilotImage: Check PilotPassengersImage: Check PilotImage: Check PilotImage: Check PilotOther GroundImage: Check PilotImage: Check Pilot	Studen	t Pilot											
Flight EngineerImage: Constraint of the second	Flight li	nstructor											
Cabin AttendantsImage: Cabin AttendantsImage: Cabin AttendantsOther CrewImage: Cabin AttendantsImage: Cabin AttendantsPassengersImage: Cabin AttendantsImage: Cabin Attendants- TOTAL ABOARD -Image: Cabin AttendantsImage: Cabin AttendantsOther GroundImage: Other GroundImage: Cabin AttendantsImage: Cabin AttendantsImage: Cabin AttendantsImage: Cabin AttendantsOther GroundImage: Cabin AttendantsImage: Cabin Attendants	Check	Pilot											
Other Crew   Image: Constraint of the sector of	Flight E	ingineer											
Passengers   Image: Constraint of the symbol   Image: Consthe symbol	Cabin A	Attendants				3	3						
- TOTAL ABOARD -   Image: Constraint of the second seco	Other C	Crew											
Other Ground 0 0 0 0 0 0	Passen	igers				52	52						
	- TOTAL A	ABOARD -				57	57						
- GRAND TOTAL - 0 0 0 57 57				0	0								
	- GRANE	) TOTAL -	0	0	0	57	57						
				FACTUAI	L REPO	RT - AV	IATION					F	Page 4

National Transportation Safety Board FACTUAL REPORT	NTSB ID: FTW95IA049	
FACTUAL REPORT	Occurrence Date: 11/18/1994	
AVIATION	Occurrence Type: Incident	
Administrative Information		
Investigator-In-Charge (IIC)		
JOYCE M. SMITH,		
Additional Persons Participating in This Accident/Incide	ent Investigation:	
JOHN MARTIN FAA FSDO DENVER, CO 80201		