

Appendix G2  
LAX SPECIFIC PLAN AMENDMENT STUDY

**Safety**  
**Aviation Accidents, Incidents, and Incursion**  
**Data for LAX**

July 2012

*Prepared for:*

Los Angeles World Airports  
One World Way  
Los Angeles, California 90045

*Prepared by:*

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## Attachments

- Attachment 1 Federal Aviation Administration Aviation Safety Information  
Analysis and Sharing (ASIAS) System  
October 2001 through 2011
- Attachment 2 Los Angeles World Airports LAX Airport Operations  
Runway Incursions and Incidents Data  
2001 through 2011
- Attachment 3 National Transportation Safety Board  
Aviation Accident Database and Synopses  
2001 through 2011

***Table of Contents (continued)***

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## **Attachment 1**

**Federal Aviation Administration Aviation Safety Information  
Analysis and Sharing (ASIAS) System  
October 2001 through 2011**



## Brief Report For Runway Safety Office - Runway Incursions

## QUERY COUNTS

Query Count: 151

Total Event Count: 10676




Brief Display	Event Id	Event Local Date	Event Local Time	Event State	RI Category Rank	Airport Id	Location	Event Lndg/Tkoff Surface	Aircraft 1 Type	Aircraft 2 Type	Aircraft 1 FAR	Aircraft 2 FAR	Weather Condition
<input type="checkbox"/>	10675	05-DEC-11	1037	CA	P	LAX	LOS ANGELES INTL, CA	RWY 25L	C550	E135	91	121	10 SM FEW150 CALM
<input type="checkbox"/>	10633	19-NOV-11	1110	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	CRJ7	A320	121	121	10 SM SCT021 BKN034 25006KT
<input type="checkbox"/>	10493	11-OCT-11	0715	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B763	N/A	121	N/A	2.5 SM BCFG BR FEW001 SCT007 CALM
<input type="checkbox"/>	10435	28-SEP-11	1525	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	WW24	B737	135	121	6 SM HZ SCT011 26008KT
<input type="checkbox"/>	10008	30-JUN-11	2153	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B772	B738	121	121	10 SM FEW010 26003KT
<input type="checkbox"/>	10007	29-JUN-11	2202	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	CL30	B737	91	121	10 SM 24007KT
<input type="checkbox"/>	9938	10-JUN-11	2210	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	A320	B737	121	121	10 SM OVC011 25006KT
<input type="checkbox"/>	9864	14-MAY-11	1310	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	B738	121	121	10 SM FEW022 SCT031 OVC039 17008KT
<input type="checkbox"/>	9856	11-MAY-11	1123	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	MD11	N/A	129	N/A	10 SM FEW032 25009G14KT
<input type="checkbox"/>	9742	09-APR-11	2232	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	CRJ2	N/A	121	N/A	10 SM FEW200 22003KT
<input type="checkbox"/>	9717	02-APR-11	0832	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	E135	129	121	8 SM OVC012 09006KT
<input type="checkbox"/>	9634	05-MAR-11	2211	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	A320	B772	121	129	10 SM FEW050 SCT250 26003KT
<input type="checkbox"/>	9606	24-FEB-11	1414	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	N/A	121	VEH	10 SM SCT032 26010KT
<input type="checkbox"/>	9584	17-FEB-11	1136	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	A321	N/A	121	N/A	10 SM SCT048 27008KT
<input type="checkbox"/>	9551	09-FEB-11	1928	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	B752	135	121	10 SM CLR 10006KT
<input type="checkbox"/>	9522	01-FEB-11	2256	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	N/A	N/A	N/A	VEH	10 SM CLR 11003KT
<input type="checkbox"/>	9484	22-JAN-11	1845	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	A319	N/A	121	VEH	10 SM FEW004 SCT100 25004KT
<input type="checkbox"/>	9431	03-JAN-11	0003	CA	C	LAX	LOS ANGELES INTL, CA	RWY 7R	P180	A320	135	121	10 SM BKN070 VRB05KT
<input type="checkbox"/>	9395	21-DEC-10	2253	CA	C	LAX	LOS ANGELES INTL, CA	RWY 7R	B752	P180	121	135	8 SM -RA FEW004 BKN007 OVC070 02006KT
<input type="checkbox"/>	9392	19-DEC-10	0845	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	P180	A320	135	121	1.75 SM -RA BR OVC004 20013G19KT R24L4500VP6000FT
<input type="checkbox"/>	9379	14-DEC-10	1139	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	F900	N/A	135	N/A	2.5 SM BR OVC010 14006KT
<input type="checkbox"/>	9334	30-NOV-10	2020	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	P180	CRJ7	135	121	10 SM FEW150 29004KT
<input type="checkbox"/>	9063	04-SEP-10	0520	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	B752	N/A	121	VEH	3/4 SM BR FEW002 CALM R25R/P6000FT
<input type="checkbox"/>	8928	31-JUL-10	0921	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	B737	121	121	5 SM HZ OVC012 CALM
<input type="checkbox"/>	8934	31-JUL-10	0120	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	N/A	121	N/A	5 SM BR OVC007 25003KT
<input type="checkbox"/>	8759	18-JUN-10	1311	CA	N/A	LAX	LOS ANGELES INTL, CA	UNK	N/A	N/A	N/A	PED	9 SM FEW025 26011KT
<input type="checkbox"/>	8727	11-JUN-10	1244	CA	N/A	LAX	LOS ANGELES INTL, CA	UNK	N/A	N/A	N/A	PED	10 SM SCT024 26010KT
<input type="checkbox"/>	8512	14-APR-10	1211	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	E145	B763	129	121	10 SM FEW025 SCT160 25009KT
<input type="checkbox"/>	8421	16-MAR-10	0150	CA	C	LAX	LOS ANGELES INTL, CA	RWY 6R	B744	C560	129	135	10 SM CLR CALM

<input type="checkbox"/>	8387	06-MAR-10	1016	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	A319	121	121	6 SM +RA SCT016 BKN020 BKN050 13006KT
<input type="checkbox"/>	8336	16-FEB-10	0927	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	SR22	N/A	91	N/A	10 SM FEW250 VRB04KT
<input type="checkbox"/>	8316	10-FEB-10	2354	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	FA10	B752	91	121	10 SM FEW150 09004KT
<input type="checkbox"/>	8283	29-JAN-10	0015	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B763	N/A	121	N/A	10 SM SCT180 06006KT
<input type="checkbox"/>	8267	24-JAN-10	1205	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	SR22	MD80	91	121	10 SM FEW180 CALM
<input type="checkbox"/>	8160	12-DEC-09	2250	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	P180	N/A	135	N/A	10 SM FEW015 25011KT
<input type="checkbox"/>	8150	08-DEC-09	1028	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	N/A	129	N/A	10 SM FEW050 10006KT
<input type="checkbox"/>	8053	26-OCT-09	1657	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	CL60	N/A	121	N/A	10 SM FEW180 25007KT
<input type="checkbox"/>	8052	25-OCT-09	1452	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	E190	B753	121	121	3 SM HZ CLR 27010KT
<input type="checkbox"/>	7883	02-SEP-09	2024	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	PC12	B744	91	129	10 SM FEW001 SCT005 BKN150 26005KT
<input type="checkbox"/>	7822	17-AUG-09	1458	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	A320	N/A	129	N/A	6 SM HZ FEW015 27010KT
<input type="checkbox"/>	7779	05-AUG-09	2015	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	E135	129	121	10 SM FEW250 25020KT
<input type="checkbox"/>	7422	21-APR-09	2332	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	N/A	N/A	N/A	VEH	10 SM FEW090 27004KT
<input type="checkbox"/>	7295	04-MAR-09	2133	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	B752	129	121	10 SM FEW020 SCT070 29010KT
<input type="checkbox"/>	7255	21-FEB-09	1903	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	DC93	N/A	125	VEH	10 SM OVC110 30005KT
<input type="checkbox"/>	6947	02-NOV-08	1000	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	GLF4	N/A	135	N/A	10 SM FEW009 BKN025 BKN030 VRB04KT
<input type="checkbox"/>	6880	10-OCT-08	1246	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	B350	LJ60	135	91	10 SM FEW025 26013KT
<input type="checkbox"/>	6437	19-JUN-08	1043	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24R	B773	MD80	129	121	N/A
<input type="checkbox"/>	6398	08-JUN-08	0951	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	E120	121	121	N/A
<input type="checkbox"/>	6257	26-APR-08	0625	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	N/A	N/A	N/A	VEH	N/A
<input type="checkbox"/>	6256	26-APR-08	1027	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	A320	MD80	129	121	N/A
<input type="checkbox"/>	6149	22-MAR-08	0635	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	SF34	N/A	121	N/A	N/A
<input type="checkbox"/>	5915	26-DEC-07	2043	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	MD80	A319	121	129	N/A
<input type="checkbox"/>	5886	13-DEC-07	1618	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	CRJ7	B744	121	129	N/A
<input type="checkbox"/>	5871	06-DEC-07	1350	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	MD11	B752	135	121	N/A
<input type="checkbox"/>	5753	02-NOV-07	0824	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B712	N/A	121	N/A	1/2 SM OVC 009
<input type="checkbox"/>	5694	12-OCT-07	1159	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	A319	N/A	129	N/A	N/A
<input type="checkbox"/>	5629	22-SEP-07	1728	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	A319	MD80	129	121	N/A
<input type="checkbox"/>	5605	16-SEP-07	1800	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	CRJ2	121	121	N/A
<input type="checkbox"/>	5589	07-SEP-07	1225	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B712	N/A	121	N/A	N/A
<input type="checkbox"/>	5543	26-AUG-07	2149	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	B738	B738	121	121	N/A
<input type="checkbox"/>	5537	21-AUG-07	1416	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B738	B762	121	121	N/A
<input type="checkbox"/>	5519	16-AUG-07	1257	CA	B	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	A320	121	121	N/A
<input type="checkbox"/>	5481	08-AUG-07	0650	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	MD10	N/A	121	N/A	N/A
<input type="checkbox"/>	5307	19-JUN-07	1635	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B712	A320	121	121	N/A
<input type="checkbox"/>	5282	12-JUN-07	1431	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	CRJ2	B752	121	121	N/A
<input type="checkbox"/>	5267	07-JUN-07	1015	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	E145	N/A	121	N/A	N/A
<input type="checkbox"/>	5264	06-JUN-07	2043	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	H25B	B737	91	121	N/A
<input type="checkbox"/>	5254	04-JUN-07	1406	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	C500	N/A	91	N/A	N/A



<input type="checkbox"/>	5241	29-MAY-07	2011	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R	B763	B72Q	121	135	N/A
<input type="checkbox"/>	5207	18-MAY-07	0658	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	F2TH	N/A	135	N/A	N/A
<input type="checkbox"/>	5166	06-MAY-07	1835	CA	B	LAX	LOS ANGELES INTL, CA	RWY 24R	A340	E120	121	121	N/A
<input type="checkbox"/>	5041	29-MAR-07	0520	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	N/A	N/A	N/A	VEH	N/A
<input type="checkbox"/>	5024	19-MAR-07	1008	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	PA23	N/A	91	N/A	N/A
<input type="checkbox"/>	4960	25-FEB-07	2043	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	P180	E120	91	121	N/A
<input type="checkbox"/>	4954	24-FEB-07	1738	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	SF34	121	121	N/A
<input type="checkbox"/>	4859	17-JAN-07	1652	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	MD80	B738	129	121	N/A
<input type="checkbox"/>	4801	21-DEC-06	1931	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B763	B763	121	121	N/A
<input type="checkbox"/>	4587	30-SEP-06	1802	CA	A	LAX	LOS ANGELES INTL, CA	RWY 25R	GLF5	CRJ7	135	121	N/A
<input type="checkbox"/>	4480	31-AUG-06	1213	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	LJ35	CRJ2	135	121	N/A
<input type="checkbox"/>	4379	26-JUL-06	1601	CA	B	LAX	LOS ANGELES INTL, CA	RWY 25R/L	CRJ2	E120	121	121	N/A
<input type="checkbox"/>	4308	05-JUL-06	2330	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	B737	A321	129	121	N/A
<input type="checkbox"/>	4307	03-JUL-06	2116	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	E145	E120	121	121	N/A
<input type="checkbox"/>	4153	02-MAY-06	1212	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R/L	GLF3	N/A	135	N/A	N/A
<input type="checkbox"/>	4131	27-APR-06	1211	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	B737	MD80	121	121	N/A
<input type="checkbox"/>	3954	17-FEB-06	2322	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	A320	121	129	N/A
<input type="checkbox"/>	3950	17-FEB-06	2322	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	E120	121	121	N/A
<input type="checkbox"/>	3784	29-NOV-05	0930	CA	N/A	LAX	LOS ANGELES INTL, CA	UNK	C525	N/A	91	N/A	N/A
<input type="checkbox"/>	3653	11-OCT-05	2050	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L/R	BE9L	C208	91	135	N/A
<input type="checkbox"/>	3496	16-AUG-05	1423	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24	LJ35	N/A	135	N/A	N/A
<input type="checkbox"/>	3440	28-JUL-05	0726	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	C208	B752	135	121	N/A
<input type="checkbox"/>	3398	15-JUL-05	1006	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R/L	A319	A340	121	129	N/A
<input type="checkbox"/>	3366	01-JUL-05	1705	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	CRJ7	SF34	121	121	N/A
<input type="checkbox"/>	3344	22-JUN-05	1313	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L/R	B737	B737	121	121	N/A
<input type="checkbox"/>	3341	21-JUN-05	1445	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	B735	MD80	121	121	N/A
<input type="checkbox"/>	3338	20-JUN-05	2145	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R/L	E145	CRJ2	121	121	N/A
<input type="checkbox"/>	3326	14-JUN-05	2100	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R/L	B744	N/A	129	N/A	N/A
<input type="checkbox"/>	3272	24-MAY-05	2012	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	SF34	B737	121	121	N/A
<input type="checkbox"/>	3236	10-MAY-05	1730	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	CL60	N/A	91	N/A	N/A
<input type="checkbox"/>	3079	10-MAR-05	0732	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	E120	N/A	121	N/A	N/A
<input type="checkbox"/>	3008	08-FEB-05	0502	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 6R	B762	N/A	121	N/A	N/A
<input type="checkbox"/>	2977	23-JAN-05	1150	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	N/A	N/A	N/A	VEH	2 1/2 SM HZ
<input type="checkbox"/>	2957	11-JAN-05	1059	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L/R	MD80	N/A	121	N/A	N/A
<input type="checkbox"/>	2954	10-JAN-05	1950	CA	N/A	LAX	LOS ANGELES INTL, CA	UNK	N/A	N/A	N/A	VEH	1 SM FG RA- OVC 010
<input type="checkbox"/>	2931	29-DEC-04	1436	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L/R	MD80	N/A	135	N/A	N/A
<input type="checkbox"/>	2907	16-DEC-04	1315	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	C750	N/A	91	N/A	N/A
<input type="checkbox"/>	2832	11-NOV-04	1833	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L/R	H25B	H25B	91	135	N/A
<input type="checkbox"/>	2827	10-NOV-04	1831	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R/L	H25B	CRJ2	91	121	N/A

<input type="checkbox"/>	2826	10-NOV-04	1831	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	H25B	SF34	91	121	N/A
<input type="checkbox"/>	2639	19-AUG-04	1454	CA	B	LAX	LOS ANGELES INTL, CA	RWY 24L	B744	B737	129	121	N/A
<input type="checkbox"/>	2569	25-JUL-04	2130	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L/R	B737	B737	121	121	N/A
<input type="checkbox"/>	2559	21-JUL-04	2004	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25R/L	C210	MD80	91	121	N/A
<input type="checkbox"/>	2369	06-MAY-04	1852	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B737	SF34	129	121	N/A
<input type="checkbox"/>	2349	29-APR-04	0911	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	N/A	N/A	N/A	VEH	7SM CLOUDY
<input type="checkbox"/>	2091	22-DEC-03	1612	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B763	E120	121	121	N/A
<input type="checkbox"/>	2089	08-DEC-03	1929	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	GLF2	GLF2	135	135	N/A
<input type="checkbox"/>	2052	04-DEC-03	1218	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24L	C123	A320	MIL	129	N/A
<input type="checkbox"/>	2013	19-NOV-03	0935	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	N/A	N/A	N/A	VEH	10 SM CLR
<input type="checkbox"/>	2002	16-NOV-03	1610	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	E120	B763	121	121	N/A
<input type="checkbox"/>	1982	07-NOV-03	0834	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	MD80	N/A	121	VEH	N/A
<input type="checkbox"/>	1873	21-SEP-03	1255	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	GLF2	E120	129	121	N/A
<input type="checkbox"/>	1853	12-SEP-03	1312	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	A340	N/A	129	N/A	N/A
<input type="checkbox"/>	1747	02-AUG-03	1615	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	MD11	N/A	129	N/A	N/A
<input type="checkbox"/>	1631	21-JUN-03	1907	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L/R	H25A	N/A	91	N/A	N/A
<input type="checkbox"/>	1630	21-JUN-03	0754	CA	D	LAX	LOS ANGELES INTL, CA	RWY 24R/L	CRJ2	B737	121	121	N/A
<input type="checkbox"/>	1563	25-MAY-03	1545	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25L	C526	B737	91	121	N/A
<input type="checkbox"/>	1488	23-APR-03	0747	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B733	CRJ2	121	121	N/A
<input type="checkbox"/>	1457	06-APR-03	1010	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R/L	B722	MD80	121	121	N/A
<input type="checkbox"/>	1450	01-APR-03	1133	CA	D	LAX	LOS ANGELES INTL, CA	RWY 7L/R	B735	B742	121	121	N/A
<input type="checkbox"/>	1363	21-FEB-03	2130	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	MD11	BE99	129	135	N/A
<input type="checkbox"/>	1224	25-DEC-02	1301	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	N/A	N/A	N/A	VEH	N/A
<input type="checkbox"/>	1212	16-DEC-02	2038	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	A320	E120	121	121	2SM LT RN & DZ 900' BKN 1600 OVC
<input type="checkbox"/>	1165	28-NOV-02	0848	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	E120	N/A	135	VEH	10 SM CLR
<input type="checkbox"/>	1151	23-NOV-02	1227	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	B737	N/A	121	N/A	N/A
<input type="checkbox"/>	1134	18-NOV-02	2317	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	B744	N/A	121	N/A	N/A
<input type="checkbox"/>	1115	09-NOV-02	2230	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	MD11	B762	121	121	1/2 SM 100 OVC
<input type="checkbox"/>	948	06-SEP-02	0804	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	B738	B762	121	121	N/A
<input type="checkbox"/>	936	03-SEP-02	1653	CA	C	LAX	LOS ANGELES INTL, CA	RWY 24L	B762	B744	121	129	N/A
<input type="checkbox"/>	896	22-AUG-02	0230	CA	B	LAX	LOS ANGELES INTL, CA	RWY 25R	B744	N/A	121	VEH	9SM
<input type="checkbox"/>	733	21-JUN-02	1601	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	CRJ2	N/A	121	N/A	N/A
<input type="checkbox"/>	481	05-APR-02	0818	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25L	H25B	N/A	91	N/A	N/A
<input type="checkbox"/>	443	23-MAR-02	1613	CA	B	LAX	LOS ANGELES INTL, CA	RWY 25R	B737	B752	121	121	10 SM SCT 020
<input type="checkbox"/>	413	14-MAR-02	1055	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	LJ31	N/A	91	N/A	N/A
<input type="checkbox"/>	365	22-FEB-02	1703	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	MD11	N/A	135	N/A	N/A
<input type="checkbox"/>	315	01-FEB-02	0704	CA	N/A	LAX	LOS ANGELES INTL, CA	UNK	B737	N/A	121	N/A	N/A
<input type="checkbox"/>	244	26-DEC-01	1134	CA	D	LAX	LOS ANGELES INTL, CA	RWY 25R	MD11	E120	121	121	N/A
<input type="checkbox"/>	225	16-DEC-01	0848	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	CRJ2	N/A	121	N/A	N/A

<input type="checkbox"/>	<b>188</b>	28-NOV-01	1355	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 24L	A320	B737	129	129	N/A
<input type="checkbox"/>	<b>184</b>	27-NOV-01	1647	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	B762	A319	121	121	N/A
<input type="checkbox"/>	<b>98</b>	30-OCT-01	1258	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	E120	N/A	121	PED	10 SM BKN 100
<input type="checkbox"/>	<b>55</b>	19-OCT-01	0851	CA	C	LAX	LOS ANGELES INTL, CA	RWY 25L	B72Q	B752	129	121	N/A
<input type="checkbox"/>	<b>23</b>	08-OCT-01	2004	CA	N/A	LAX	LOS ANGELES INTL, CA	RWY 25R	DC9	N/A	121	N/A	N/A

[Back to form](#)





## **Runway Incursion Database Business Rules**

The FAA Office of Runway Safety is responsible for determining whether an occurrence at an aerodrome is a runway incursion and/or surface incident. Only surface events at airports with an operating Airport Traffic Control Tower are recorded and classified as runway incursions and surface incidents. The FAA Air Traffic Organization does not control aircraft movement where an ATCT is not present. Surface events are reported by the Airport Traffic Control Tower where the event occurred. FAA directives provide the guidance and requirements for reporting these events.

Runway incursions are classified into the following types:

- a. Loss of Standard Separation. A surface event attributed to Air Traffic Control Tower action or inaction (see FAA Order 7210.56, Air Traffic Quality Assurance, for the official definition).
- b. Pilot Deviation. An incursion caused by a pilot or other person operating an aircraft under its own power (see FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation and Reporting for the official definition).
- c. Vehicle/Pedestrian Deviation. An incursion caused by a vehicle driver or pedestrian (see FAA Order 8020.11, Aircraft Accident and Incident Notification, Investigation and Reporting for the official definition).
- d. Other: Incursions which cannot clearly be attributed to a mistake or incorrect action by an air traffic controller, pilot, driver or pedestrian will be classified as "other". These events would include incursions caused by equipment failure or other factors.

The Office of Runway Safety will analyze all surface events when initially reported and make a preliminary determination of whether the event is a runway incursion or surface incident. The surface incident or runway incursion will then be classified as an operational error, pilot deviation, or vehicle pedestrian deviation. The determination and classification of runway incursions will be confirmed and made final by the Director of Runway Safety at the same time the severity ranking is finalized. The preliminary determination and classification of surface incidents will become final after 90 days unless data is received which justifies a second review.

Runway incursions are assessed by the Office of Runway Safety and classified by the severity of the event. In fiscal year 2008, the FAA adopted the ICAO definition for a runway incursion as well as the ICAO severity category definitions.

*Runway Incursion: Any occurrence at an aerodrome involving the incorrect presence of an aircraft, vehicle, or person on the protected area of a surface designated for the landing and take-off of aircraft.*

Runway The Severity Classifications are:

- a. Accident. An incursion that results in a collision. For the purposes of tracking incursion performance, an accident will be treated as a Category A runway incursion.
- b. Category A. A serious incident in which a collision was narrowly avoided.
- c. Category B. An incident in which separation decreases and there is a significant potential for collision, which may result in a time critical corrective/evasive response to avoid a collision.
- d. Category C. An incident characterized by ample time and/or distance to avoid a collision.
- e. Category D. An incident that meets the definition of a runway incursion such as incorrect presence of a single vehicle/person/aircraft on the protected area of a surface designated for the landing and take-off of aircraft of aircraft but with no immediate safety consequences.
- f. Category E. An incident in which insufficient or conflicting evidence of the event precludes assigning another category.

Factors affecting the severity of a runway incursion include: proximity of the aircraft and/or vehicle; Geometry of the encounter; evasive or corrective action; available reaction time; environmental conditions; and factors that affect system performance.

**Attachment 2**  
**Los Angeles World Airports LAX Airport Operations**  
**Runway Incursions and Incidents Data**  
**2001 through 2011**



## Runway Incursions at Los Angeles International Airport 2000-2009

YEAR / TOTAL	DATE OF EVENT/# OF EVENTS	RI (Level)	SI	RWY 25L/7R Incident	RWY 25R/7L Incident	RWY 24L/6R Incident	RWY 24R/6L Incident	Crossing Taxiway	South Complex	North Complex
<b>2000</b>	1/7/2000	X (A)	X		25R			U	X	
	1/27/2000		X		25R			B	X	
	2/2/2000		X		25R			M	X	
	3/5/2000					24L		Z		X
	3/12/2000		X		25R			N	X	
	3/28/2000	X (B)	X	25L				G	X	
	4/2/2000				25R			M	X	
	4/15/2000		X		25R			P	X	
	4/23/2000	X (C)			25R			P	X	
	5/14/2000		X		25R			N	X	
	5/17/2000		X		25R			K	X	
	6/26/2005	X (B)	X	25L				F	X	
	7/1/2000		X		25R			M	X	
	7/11/2000		X	25L				U	X	
	7/17/2000		X		25R			N	X	
	7/21/2000					24L		Z		X
	8/9/2000	X (C)	X	25L				G	X	
	8/21/2000				25R			N	X	
	9/23/2000		X			24L		V		X
	10/10/2000	X (C)	X	25L				F	X	
	10/11/2000				25R			M	X	
	11/1/2000		X		25R			T	X	
	11/8/2000	X (B)	X			24L		Z		X
	11/16/2000					24L		Z		X
	11/17/2000		X		25R			T	X	
	12/9/2000	X (B)			25R			P	X	
<b>2000 TOTAL</b>	<b>26</b>	<b>8</b>	<b>18</b>	<b>5</b>	<b>16</b>	<b>5</b>	<b>0</b>	<b>26</b>	<b>21</b>	<b>5</b>
<b>2001</b>	1/24/2001	X (C)			25R			M	X	
	1/28/2001		X			24L		E-13		X
	2/12/2001		X			24L		V		X
	2/23/2001	X (B)			25R			K	X	
	3/2/2001		X		25R			M	X	
	3/3/2001	X (D)			25R			M	X	
	3/15/2001	X (D)			25R			U	X	
	3/18/2001		X		25R			N	X	
	3/22/2001		X			24L		AA		X
	5/16/2001	X (C)			25R			M	X	
	7/11/2001		X		25R			F	X	
	8/6/2001	X (D)			25R			M	X	
	8/7/2001		X	25L				F	X	
	8/8/2001		X		25R			K	X	
	10/8/2001	X (C)	X		25R			T	X	
	10/19/2001			25L				F	X	
	12/26/2001		X (D)		25R			T	X	
<b>2001 Total</b>	<b>17</b>	<b>8</b>	<b>9</b>	<b>2</b>	<b>12</b>	<b>3</b>	<b>0</b>	<b>17</b>	<b>14</b>	<b>3</b>
<b>2002</b>	2/21/2002	X (B)	X		25R			U	X	
	3/14/2002		X		25R			U	X	
	3/22/2002				25R			M	X	
	4/5/2002		X	25L				F	X	
	6/21/2002		X		25R			M	X	
	8/22/2002	X (B)			25R			M	X	
	9/3/2002		X (C)			24L		AA		X
	9/6/2002		X (D)		25R			M	X	
	11/9/2002	X (C)		25L				P	X	
	11/17/2002		X	25L				F	X	
	11/23/2002		X			24L		E-10		X
	11/28/2002	X (D)	X		25R			U	X	
	12/15/2002				25R			N	X	
	12/25/2002		X		25R			B-1	X	
<b>2002 Total</b>	<b>14</b>	<b>6</b>	<b>8</b>	<b>3</b>	<b>9</b>	<b>2</b>	<b>0</b>	<b>14</b>	<b>12</b>	<b>2</b>
<b>2003</b>	2/20/2003	X (D)			25R			U	X	
	4/1/2003				7L			G	X	
	4/6/2003		X (D)		25R			T	X	
	4/23/2003		X (D)		25R			M	X	
	5/25/2003		X (D)	25L				F	X	
	6/20/2003	X (D)	X		25R			M	X	
	6/21/2003					24L		AA		X
	8/2/2003		X		25R			B-1	X	
	9/12/2003	X (D)	X	25L		24L		V	X	X
	9/21/2003				25R			F	X	
	11/7/2003		X		25R			B-1	X	
	11/15/2003	X (D)			25R			K	X	
	11/19/2003		X			24L		E-16		X

## Runway Incursions at Los Angeles International Airport 2000-2009

YEAR / TOTAL	DATE OF EVENT/# OF EVENTS	RI (Level)	SI	RWY 25L/7R Incident	RWY 25R/7L Incident	RWY 24L/6R Incident	RWY 24R/6L Incident	Crossing Taxiway	South Complex	North Complex
	12/5/2003	X (D)				24L		V		X
	12/7/2003	X (C)		25L				F	X	
	12/21/2003	X (D)			25R			K	X	
<b>2003 Total</b>	<b>16</b>	<b>11</b>	<b>5</b>	<b>3</b>	<b>9</b>	<b>4</b>	<b>0</b>	<b>16</b>	<b>12</b>	<b>4</b>
<b>2004</b>	4/29/2004		X	25L				? (APP Incident)	X	
	5/5/2004		X		25R			B	X	
	7/21/2004	X (C)		25L				U	X	
	7/25/2004	X (D)				24L		AA		X
	8/19/2004	X (B)				24L		V		X
	11/10/2004	X (D)			25R			F	X	
	11/10/2004	X (C)			25R			T	X	
<b>2004 Total</b>	<b>7</b>	<b>5</b>	<b>2</b>	<b>2</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>7</b>	<b>5</b>	<b>2</b>
<b>2005</b>	1/10/2005		X				24R	V		X
	1/11/2005		X		25R			K	X	
	1/23/2005		X		25R			WF	X	
	5/9/2005		X	25L				G	X	
	5/23/2005	X (D)			25R			N	X	
	6/14/2005		X		25R			U	X	
	6/19/2005	X (C)			25R			K	X	
	6/21/2005	X (D)			25R			K	X	
	6/22/2005	X (D)				24L		Z		X
	7/1/2005	X (D)			25R			K	X	
	7/15/2005		X		25R			N	X	
	7/28/2005	X (D)			25R			G	X	
	8/16/2005		X			24L		AA		X
	10/10/2005		X			24L		Z		X
<b>2005 Total</b>	<b>14</b>	<b>6</b>	<b>8</b>	<b>1</b>	<b>9</b>	<b>3</b>	<b>1</b>	<b>14</b>	<b>10</b>	<b>4</b>
<b>2006</b>	2/17/2006	X (D)				24L		V		X
	2/17/2006	X (D)				24L		AA		X
	4/27/2006	X (D)			25R			P	X	
	5/2/2006		X		25R			N	X	
	7/2/2006	X (D)			25R			M	X	
	7/4/2006	X (D)			25R			T	X	
	7/26/2006	X (B)			25R			M	X	
	8/31/2006	X (D)			25R			B	X	
	9/30/2006	X (A)			25R			G	X	
	12/21/2006	X (D)			25R			B	X	
<b>2006 Total</b>	<b>10</b>	<b>9</b>	<b>1</b>	<b>0</b>	<b>8</b>	<b>2</b>	<b>0</b>	<b>10</b>	<b>8</b>	<b>2</b>
<b>2007</b>	1/16/2007		X		25R			B	X	
	2/24/2007	X (C)				24L		Y		X
	2/25/2007	X (D)			25R			B/CC	X	
	3/19/2007		X		25R			U	X	
	3/29/2007		X		25R			U	X	
	5/6/2007	X (B)					24R	Z		X
	5/18/2007		X	25L				F	X	
	5/29/2007	X (C)			25R			M	X	
	6/4/2007		X	25L				APCH	X	
	6/6/2007		X			24L		E-7		X
	6/7/2007		X			24L		Z		X
	6/12/2007		X		25R			M	X	
	6/19/2007	X (D)			25R			M	X	
	8/8/2007		X	25L				F	X	
	8/16/2007	X (B)				24L		Y	X	
	8/21/2007		X		25R			M	X	
	8/25/2007	X (D)				24L		AA		X
	9/7/2007		X		25R			M	X	
	9/16/2007	X (D)				24L		AA		X
	9/22/2007		X		25R			F	X	
	10/12/2007	X (D)		25L				APCH	X	
	11/2/2007	X (D)		25L				APCH	X	
	12/6/2007	X (D)		25L				F	X	
	12/26/2007	X (C)			25R			P	X	
<b>2007 Total</b>	<b>24</b>	<b>12</b>	<b>12</b>	<b>6</b>	<b>11</b>	<b>6</b>	<b>1</b>	<b>24</b>	<b>18</b>	<b>6</b>
<b>2008</b>	3/22/2008	X (D)		25L				G	X	
	4/26/2008	X (D)		25L				N	X	
	4/26/2008	X (D)				24L		W		X
	6/8/2008	X (C)				24L		V		X
	6/19/2008	X (C)					24R	AA		X

YEAR / TOTAL	DATE OF EVENT/ # OF EVENTS	RI (Level)	SI	RWY 25L/7R Incident	RWY 25R/7L Incident	RWY 24L/6R Incident	RWY 24R/6L Incident	Crossing Taxiway	South Complex	North Complex
	10/10/2008	X (D)		25L				G	X	
	11/2/2008	X (D)		25L				F	X	
<b>2008 Total</b>	<b>7</b>	<b>7</b>	<b>0</b>	<b>4</b>	<b>0</b>	<b>2</b>	<b>1</b>	<b>7</b>	<b>4</b>	<b>3</b>
<b>2009</b>	2/21/2009	X (C)		25L				U	X	
	3/4/2009	X (D)		25L				F	X	
	4/21/2009	X (D)				24L		V		X
	8/5/2009	X (C)		25L				F	X	
	8/17/2009	X (D)				24L		V		X
	9/1/2009	X (C)			25R			F	X	
	10/25/2009	X (D)			25R			M	X	
	12/12/2009	X (D)			25R			F	X	
<b>2009 Total</b>	<b>8</b>	<b>8</b>	<b>0</b>	<b>3</b>	<b>3</b>	<b>2</b>	<b>0</b>	<b>8</b>	<b>6</b>	<b>2</b>
<b>2010</b>	1/24/2010	X (C)			25R			T	X	
	2/10/2010	X (C)			25R			F	X	
	2/16/2010	X (D)			25R			N	X	
	3/6/2010	X (C)				24L		AA		X
	3/16/2010	X (C)				06R		E8		X
	4/14/2010	X (C)			25R			T	X	
	7/31/2010	X (C)		25L				G	X	
	7/31/2010	X (D)				24L		V		X
	9/4/2010	X (C)		25L				U	X	
	11/30/2010	X (C)			25R			T	X	
	12/14/2010	X ( D )			25R			B16	X	
	12/19/2010	X ( C )				24L		AA		X
	12/21/2010	X ( C )		7R				A4	X	
<b>2010 Total</b>	<b>13</b>	<b>13</b>	<b>0</b>	<b>3</b>	<b>6</b>	<b>4</b>	<b>0</b>	<b>13</b>	<b>9</b>	<b>4</b>
<b>2011</b>	1/3/2011	X ( C )		7R				G	X	
	1/22/2011	X ( C )			25R			B6	X	
	2/1/2011	X ( D )			25R			B4	X	
	2/9/2011	X ( C )		25L				H9	X	
	2/17/2011	X ( D )				24L		E10		X
	2/24/2011	X ( C )				24L		E16		X
	3/5/2011	X ( C )				24L		E8		X
	4/2/2011	X ( D )		25L				F	X	
	4/8/2011	X ( D )			25R			P	X	
	5/11//2011	X ( C )			25R			U	X	
	5/14//2011	X ( C )				24L		AA		
	6/10/2011	X ( C )				24L		AA		X
	6/29/2011	X ( C )				24L		Z		X
	6/30/2011	X (D)				24L		AA	X	X
	9/28/2011	X ( C )		25L				H9	X	
	10/11/2011	X ( )			25R			B16	X	
	12/5/2011	X ( )		25L				F	X	
<b>2011 Total</b>	<b>17</b>	<b>17</b>		<b>5</b>	<b>5</b>	<b>7</b>	<b>0</b>	<b>17</b>	<b>11</b>	<b>6</b>
<b>TOTALS</b>	<b>171</b>	<b>109</b>	<b>63</b>	<b>51</b>	<b>91</b>	<b>42</b>	<b>3</b>	<b>171</b>	<b>129</b>	<b>42</b>





**Attachment 3**  
**National Transportation Safety Board**  
**Aviation Accident Database and Synopses**  
**2001 through 2011**



34 records meet your search criteria.

A docket of supporting materials may exist for factual and probable cause reports. Please contact Records Management Division. Dockets are not available for preliminary reports.

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<u>Current Synopsis</u>	<u>PDF Report(s) (Published)</u>	<u>Event Date</u>	<u>Estimated Release</u>	<u>Location</u>	<u>Make/Model</u>	<u>Regist. Number</u>	<u>NTSB No.</u>	<u>Event Severity</u>	<u>Type of Air Carrier Operation and Carrier Name (Doing Business As)</u>
<a href="#">Preliminary</a>	<a href="#">Preliminary</a> (07/07/2011)	5/31/2011		Los Angeles, CA	BOEING 757-222	N526UA	WPR11LA300	Nonfatal	United Airlines
<a href="#">Preliminary</a>	<a href="#">Preliminary</a> (05/12/2011)	1/3/2011		Los Angeles, CA	BOEING 737		DCA11FA050	Unavailable	American Airlines
<a href="#">Preliminary</a>	<a href="#">Preliminary</a> (11/19/2010)	11/8/2010		Los Angeles, CA	BOMBARDIER INC DHC-8-402	N422QX	WPR11LA042	Nonfatal	HORIZON AIR INDUSTRIES INC
<a href="#">Probable Cause</a>	<a href="#">Factual</a> (11/30/2011)  <a href="#">Probable Cause</a> (12/19/2011)	9/4/2010	12/19/2011	Los Angeles, CA	BELL 222U	N222AM	OPS10IA538B	Incident	
<a href="#">Probable Cause</a>	<a href="#">Factual</a> (11/30/2011)  <a href="#">Probable Cause</a> (12/19/2011)	9/4/2010	12/19/2011	Los Angeles, CA	BOEING 737-7H4	N907WN	OPS10IA538A	Incident	
<a href="#">Preliminary</a>	<a href="#">Preliminary</a> (04/27/2010)	4/9/2010		Los Angeles, CA	BOEING 737-3H4	N624SW	WPR10FA199	Nonfatal	SOUTHWEST AIRLINES CO
<a href="#">Preliminary</a>	<a href="#">Preliminary</a> (02/25/2010)	2/16/2010		Los Angeles, CA	EMBRAER EMB-120ER	N226SW	WPR10IA135	Incident	SKYWEST AIRLINES INC (DBA: United Express)
<a href="#">Probable Cause</a>	<a href="#">Factual</a> (05/06/2010)  <a href="#">Probable Cause</a> (01/07/2011)	9/8/2009	1/7/2011	Los Angeles, CA	BOEING 737	N670SW	ENG09IA014	Incident	Southwest Airlines, Co.
<a href="#">Probable Cause</a>	<a href="#">Factual</a> (01/21/2011)  <a href="#">Probable Cause</a> (08/01/2011)	5/21/2009	4/28/2011	Los Angeles, CA	EMBRAER EMB-135	N843AE	WPR09LA255	Nonfatal	American Eagle Airlines Inc

<u>Probable Cause</u>	<u>Factual</u> (07/21/2009)  <u>Probable Cause</u> (09/10/2009)	4/16/2009	9/10/2009	Los Angeles, CA	MAULE M-5-235C	N9219E	WPR09LA204	Nonfatal	
<u>Preliminary</u>	<u>Preliminary</u> (02/03/2009)	12/26/2008		Los Angeles Intl Airport, CA	MCDONNELL DOUGLAS DC-9-83(MD	N9617R	DCA09FA022	Nonfatal	AMERICAN AIRLINES INC
<u>Probable Cause</u>	<u>Factual</u> (09/11/2009)  <u>Probable Cause</u> (11/09/2009)	11/11/2008	11/9/2009	Los Angeles, CA	CESSNA 680	N320QS	WPR09LA036	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (01/20/2009)  <u>Probable Cause</u> (02/25/2009)	1/25/2008	2/25/2009	Los Angeles, CA	ROBINSON HELICOPTER R22 BETA	N705JJ	LAX08FA052	Fatal(1)	
<u>Probable Cause</u>	<u>Factual</u> (11/21/2007)  <u>Probable Cause</u> (11/30/2007)	8/16/2007	11/30/2007	Los Angeles, CA	Boeing 737-700	C-FUWS	OPS07IA009A	Incident	
<u>Probable Cause</u>	<u>Factual</u> (11/21/2007)  <u>Probable Cause</u> (11/30/2007)	8/16/2007	11/30/2007	Los Angeles, CA	Airbus Industrie A320	N348NW	OPS07IA009B	Incident	NORTHWEST AIRLINES INC
<u>Probable Cause</u>	<u>Factual</u> (08/13/2008)  <u>Probable Cause</u> (08/28/2008)	6/29/2007	8/28/2008	Los Angeles, CA	Boeing 747-400	B-2470	LAX07IA198	Incident	
<u>Probable Cause</u>	<u>Factual</u> (05/14/2007)  <u>Probable Cause</u> (06/27/2007)	4/19/2007	6/27/2007	Los Angeles, CA	Cessna 172B	N7546X	SEA07CA107	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (11/30/2007)  <u>Probable Cause</u> (12/20/2007)	4/12/2007	12/20/2007	Los Angeles, CA	Boeing 757-200	N525UA	LAX07LA127	Nonfatal	UNITED AIRLINES
	<u>Factual</u> (05/15/2007)								

<u>Probable Cause</u>	<u>Probable Cause</u> (06/27/2007)	4/2/2007	6/27/2007	Los Angeles, CA	Carpenter Lancair 320	N320	LAX07CA120	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (02/27/2008) <u>Probable Cause</u> (03/31/2008)	10/19/2006	3/31/2008	Los Angeles, CA	Boeing 737-790	N614AS	LAX07IA014	Incident	
<u>Probable Cause</u>	<u>Factual</u> (01/11/2008) <u>Probable Cause</u> (01/31/2008)	6/2/2006	1/31/2008	Los Angeles, CA	Boeing 767-223(ER)	N330AA	ENG06IA018	Incident	
<u>Probable Cause</u>	<u>Factual</u> (01/30/2007) <u>Probable Cause</u> (03/26/2007)	12/19/2005	3/26/2007	Los Angeles, CA	Boeing 747-400	VT-AIM	LAX06FA063	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (01/20/2006) <u>Probable Cause</u> (04/25/2006)	12/10/2005	4/25/2006	Los Angeles, CA	Ryan Navion	N4403K	LAX06CA062	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (10/29/2008) <u>Probable Cause</u> (11/25/2008)	9/21/2005	11/25/2008	Los Angeles, CA	Airbus Industrie A320	N536JB	LAX05IA312	Incident	Jet Blue Airways, Inc.
<u>Probable Cause</u>	<u>Factual</u> (09/26/2006) <u>Probable Cause</u> (11/29/2006)	6/12/2005	11/29/2006	Los Angeles, CA	Bombardier Aerospace, Inc. CL-600-2B19	N960SW	LAX05FA202	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (05/26/2006) <u>Probable Cause</u> (07/31/2006)	2/11/2005	7/31/2006	Los Angeles, CA	SAAB-SCANIA SAAB 340B	N394AE	LAX05LA105	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (12/07/2005) <u>Probable Cause</u> (02/28/2006)	12/11/2004	2/28/2006	Los Angeles, CA	Robinson R22B	N145RJ	LAX05LA049	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (10/21/2005)			Los	Boeing 737-				

<u>Cause</u>	<u>Probable Cause</u> (01/31/2006)	9/13/2004	1/31/2006	Angeles, CA	3H4	N601WN	LAX04LA318	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (10/18/2005) <u>Probable Cause</u> (01/31/2006)	8/19/2004	1/31/2006	Los Angeles, CA	Boeing 737-7H4	N461WN	LAX04IA302	Incident	
<u>Probable Cause</u>	<u>Factual</u> (02/07/2006) <u>Probable Cause</u> (04/25/2006)	3/16/2004	4/25/2006	Los Angeles, CA	Mooney M20K	N1148V	LAX04FA162	Fatal(2)	
<u>Probable Cause</u>	<u>Factual</u> (01/07/2005) <u>Probable Cause</u> (02/24/2005)	10/28/2003	2/24/2005	LOS ANGELES, CA	Cessna 310C	N6674B	LAX04LA030	Nonfatal	
<u>Probable Cause</u>	<u>Factual</u> (04/08/2004) <u>Probable Cause</u> (04/16/2004)	6/6/2003	4/16/2004	Los Angeles, CA	Beech A36TC	N1856P	LAX03FA182	Fatal(5)	
<u>Probable Cause</u>	<u>Factual</u> (11/21/2003) <u>Probable Cause</u> (02/05/2004)	7/25/2001	2/5/2004	Los Angeles, CA	MDHI 520N	N953SD	LAX01IA262	Incident	
<u>Probable Cause</u>	<u>Factual</u> (05/09/2002) <u>Probable Cause</u> (02/02/2009)	7/21/2001	10/24/2002	Los Angeles, CA	Sikorsky S-76A	N769BB	LAX01FA252	Nonfatal	

**NOTES:**


- On Jan. 8, 2001, dynamic access to the accident data repository was implemented. Static files are no longer available.
- On Oct. 2, 2001, minor cases which do not fall under the definition of "accident" or "incident" were removed from the database; these entries were previously identified with "SA" in the accident number.
- On Sept. 18, 2002, data from 1962-1982 were added to the aviation accident information. The format and type of data contained in the earlier briefs may differ from later reports.


\*\* - Do not use these fields as selection parameters if your date range includes pre-1982 dates, as they did not exist prior to 1982 and their use may falsely limit the data returned.

[Aviation Page](#) | [Switch to Monthly Lists](#)

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX01A262 Occurrence Date: 07/25/2001 Occurrence Type: Incident	
Narrative (Continued)			
<p>pilot stated that this was an annoying problem that regularly occurred with all the 520N's in their fleet, and that the maintenance department typically cleared it up by cleaning a Teflon coated sliding tube in the NOTAR fan assembly. According to the pilot, her understanding was that dirt and oil would get on this sliding tube and cause it to bind in the housing, and the mechanics would simply clean this tube to resolve the problem.</p> <p>After their lunch break, the pilot and observer resumed patrol. The preflight, start, and run-up were again normal. After takeoff from the Long Beach base, they flew about 1 1/2 hour and landed at the LAX West Helipads, then conducted a liaison visit with the LAX Air Traffic Control Tower. Following the tower cab visit, the pilot and observer returned to the helicopter to resume the patrol mission. Again, the preflight, start, and run-up were normal. The pilot lifted off and was climbing eastbound from the pads passing through 60 knots at 300 feet agl, when a loud squeal suddenly started in the rear of the helicopter. The onset of the squeal was sudden with no precursor indications of a problem. The high-pitched, piercing squeal was accompanied by a high frequency vibration through the antitorque pedals and through the airframe. The pilot made a 180-degree turn and landed on the West Helipads. The noise and vibration continued throughout the descent and landing, and, through the power reduction to ground idle and the coast down of the rotor system following engine shutdown. The pilot noted that the noise would get louder with left pedal application during the landing flare. Post flight inspection by maintenance personnel revealed damage to several NOTAR fan drive and control tube components. The parts were removed and replaced with airworthy parts.</p> <p>Summary of Maintenance Personnel Interviews</p> <p>Mechanics in the LASD maintenance department were interviewed concerning their actions in response to pilot discrepancies noting sticking antitorque pedals. The mechanics noted that this problem typically involved foreign material on the aft tubes Teflon coated pitch slider. The discrepancies could be resolved by removing the aft tube and lightly sanding with fine sand paper the Teflon coating.</p> <p>DESCRIPTION OF THE 520N HELICOPTER AND THE NOTAR SYSTEM</p> <p>General</p> <p>The MDHI 520N helicopter is a single piloted, five place, turboprop powered, skid configured, rotary-wing aircraft constructed primarily of aluminum alloy while the tailboom and thrust are primarily constructed of graphite composite. The main rotor is a fully articulated, five-bladed system, with antitorque and directional control provided by the NOTAR system. The NOTAR system is a design in which helicopter antitorque and directional control is markedly different than conventionally designed tail rotor configured helicopters.</p> <p>The NOTAR system comprises the following subsystems: a NOTAR fan assembly, a circulation control tailboom, a direct-jet variable thrust assembly at the end of the tailboom, and two vertical stabilizers affixed to a horizontal stabilizer in an H-tail configuration.</p> <p>Power from the Allison Model 250-G20R/2 turbine engine is transmitted through the main drive shaft to the main rotor transmission, through an intermediate drive shaft to the NOTAR fan transmission, and through a NOTAR fan drive shaft to the NOTAR fan assembly. The NOTAR fan drive system also includes the fan support shaft and the fan support bearing. The NOTAR fan transmission increases the input shaft speed to a constant operating speed of 5,388 revolutions per minute (rpm) to drive the NOTAR fan assembly.</p> <p>The NOTAR fan assembly provides for an air circulation control system within the tail boom that is designed to function as an antitorque device. The high volume, high pressure air is directed tangentially downward through two rows of four horizontal slots along the right side of the tail</p>			

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX01A262 Occurrence Date: 07/25/2001 Occurrence Type: Incident	
Aircraft Registration Number: N953SD Most Critical Injury: None Investigated By: NTSB			
Location/Time			
Nearest City/Floors Los Angeles	State CA	Zip Code 90045	Local Time 0250 Time Zone PDT
Airport Proximity: On Airport/Airship Distance From Landing Facility: 0			
Aircraft Information Summary			
Aircraft Manufacturer MDHI		Model/Serial 520N	
Revenue Sightseeing Flight No		Air Medical Transport Flight No	
Narrative			
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>HISTORY OF FLIGHT</p> <p>On July 25, 2001, at 0250 Pacific daylight time, a McDonnell Douglas Helicopters Incorporated (MDHI) 520N, N953SD, experienced an antitorque control system component malfunction during the takeoff initial climb from the West Helipads at the Los Angeles International Airport (LAX), Los Angeles, California. The helicopter was climbing eastbound after lift-off, and was passing 300 feet agl, when the crew heard a loud squeal and felt a high frequency vibration in the airframe and in the antitorque control pedals. The pilot executed a 180-degree turn and landed back at the West Helipads. The helicopter was owned and operated by the Los Angeles County Sheriff's Department (LASD) under 14 CFR Part 91 of the Federal Aviation Regulations. The helicopter sustained minor damage confined to the affected antitorque control system components. Neither the commercial pilot nor the observer were injured. Night visual meteorological conditions prevailed for the law enforcement patrol flight, which was originating as the continuation of a series of patrol flights that night.</p> <p>The NOTAR fan drive system was disassembled for examination. The Aft Tube Assembly (P/N 300N7113-11) transmits antitorque pedal inputs to the NOTAR fan blade pitch change mechanism and moves fore and aft through the hollow rotating fan drive shaft. The tube does not rotate. Three distinct areas of circumferential scoring were noted on the tube; one in the center at roughly the middle of the drive shaft, and one at each end of the tube corresponding to locations just within the fan drive gear box on the forward end and just inside of the fan assembly. A light radial scratch was noted on the tube in an area consistent with the forward edge of the pitch change slider assembly.</p> <p>An Engineering Group was formed and met in Long Beach, California, during the period of July 30 to August 4, 2001, and in Mesa, Arizona, during the period of October 16 to 18, 2001. The NOTAR fan drive system and control system components were retained for further examinations. The examinations were conducted at both the manufacturer's facility and at the headquarters facility of the National Transportation Safety Board. A complete report of the examinations is contained in the Engineering Group factual report, which is contained in the docket for this accident.</p> <p>LASD PERSONNEL STATEMENTS</p> <p>Pilot's Statement</p> <p>The pilot reported that N953SD was assigned to them at the beginning of their shift and there were no open maintenance items. The initial preflight, start and run-up were normal. During the first part of the shift, a 2.3-hour patrol mission was flown, followed by a return and landing at the LASD base in Long Beach. The only discrepancy the pilot noted during this first flight was that the antitorque pedals seemed to stick or slightly bind with 2 inches of right pedal displacement. The</p>			

 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: LAX01A282
	Occurrence Date: 07/25/2001
	Occurrence Type: Incident
<b>Narrative (Continued)</b>	
<p>an area consistent with the edge of the pitch slider when the tube is installed.</p> <p>Three distinct areas of circumferential scoring were noted along the tube length. In the center scored area of the tube, approximately 1 5/8 inches of green paint had been worn off, and smooth, silver colored, bare metal was exposed. An area of heavier scoring in the middle of the scored area was 5/8-inch long, and exhibited four distinct gray bands.</p> <p>The circumferentially scored area closest to the aft tube end exhibited the heaviest scoring. The scored area was approximately 3/4 inch long with brown colored circumferential tinting at the forward margin of the heavily scored center area. A Safety Board metallurgist stated that the brown color was indicative of heated paint. Two outer bands, just inside the painted margins, were smooth and exhibited blue tinting. The metallurgist said that the blue tinting indicated high heating of the metal, but he could not determine temperature with certainty. A center band of scoring was gray colored with a rough, granular surface.</p> <p>The circumferentially scored area closest to the forward tube end exhibited moderately heavy scoring. The scored area was approximately 3/4 inch long with irregular, green-to-silver colored, circumferential tinting at the margins of the scored center area. Two distinct, smooth, gray bands of scoring were inside the margins with a center band of gray colored slightly granular scoring.</p> <p>The metallurgist stated that the differences in the characteristics of the forward and aft scored areas was likely due to differences in the hardness of the materials that caused the scoring on the tube as well as differences in application force between the two surfaces. The metallurgist stated that it was likely that the scoring of the three areas had occurred during one event. The minimum outer diameters of the scored areas were found to be:</p> <p>Smooth, Unscored Tube 0.506 Forward Scored Area 0.491 Center Scored Area 0.501 Aft Scored Area 0.498</p> <p>NOTAR Fan Assembly</p> <p>No anomalies were noted upon examination of the fan housing, the 13 fan blades, and the pitch plate.</p> <p>NOTAR Fan Drive System Bearings</p> <p>The pitch plate bearing and the fan shaft support bearing were sent to the manufacturer, Timken Aerospace, for engineering assessments. Visual inspection and roundness and noise spectrum testing of the bearings at operational rotation speed did not reveal any anomalies.</p> <p>NOTAR Fan Support Shaft</p> <p>A visual inspection of the NOTAR fan support shaft with the support shaft coupling attached was conducted on-site and at the Safety Board laboratory. Circumferential scoring was noted on the first 1/4 inch of the forward end of the fan support shaft ID. This scoring location corresponds to the location of the aft scored area of the aft tube assembly.</p> <p>Pitch Slider</p> <p>The pitch slider was inspected on-site and at the Safety Board laboratory. Laboratory measurements were made with a video measuring microscope system.</p> <p>The pitch slider consists of a bearing housing (the large end) and the slider shaft. The inner surface of the slider shaft, viewed without magnification, exhibited circumferential manufacturing</p>	
FACTUAL REPORT - AVIATION	
Page 1c	

 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: LAX01A282
	Occurrence Date: 07/25/2001
	Occurrence Type: Incident
<b>Narrative (Continued)</b>	
<p>boom and mixes with main rotor downwash, accelerating the resulting attached boundary layer flow over the curved concave of the tailboom (referred to as the Canada effect). The accelerated flow creates a low pressure region that results in lift, lateral lift to provide some antitorque moment, the remainder of which is provided by the direct-jet variable thruster.</p> <p>The direct-jet variable thruster assembly and the vertical stabilizers provide additional antitorque moment, and directional control of the helicopter. The direct-jet variable thruster uses NOTAR fan pressurized air, exiting through nozzles on either side of the tail boom, to provide directional control. The direct-jet thruster provides all of the required directional control for hover and low speed flight. The fully moving, left vertical stabilizer provides directional control of the helicopter in forward flight where the control surface can produce lateral lift, unloading the requirement for directional control from the direct-jet variable thruster. The fully moving, right vertical stabilizer is controlled by the Yaw Stability Augmentation System (YSAS), which is designed to enhance the flying qualities of the helicopter in forward flight. The aircraft is capable of controlled flight with the YSAS disabled.</p> <p>Mechanical Control of the NOTAR System</p> <p>Conventional directional control pedals at the pilot and copilot stations work through a bellcrank splitter assembly to simultaneously control the collective blade angles of the NOTAR fan assembly, the direct-jet variable thruster, and the left vertical stabilizer. Push-pull tubes transmit directional pedal displacement from the splitter assembly to the NOTAR fan blade pitch change mechanism. The pitch change mechanism ensures all of the thirteen NOTAR fan blades collectively change by the same amount of commanded pitch.</p> <p>The longest push-pull tube, the aft tube assembly, is installed through the center of the rotating NOTAR fan drive system. The aft tube assembly does not rotate, and it is restrained at both ends. The forward end of the aft tube assembly is fitted with a 2.0 inch spined shaft that is free to slide axially through a splined tube support installed on the front housing of the NOTAR fan transmission assembly. To connect the aft tube assembly to the directional control system aft of the splitter assembly, a clevis end is screwed into the forward end of the tube once it is installed. The aft end of the aft tube assembly is fitted with a 2.5 inch threaded shaft that is fixed to the NOTAR fan blade pitch change mechanism with a retaining nut. A pitch slider and a pitch plate bearing, installed as part of the NOTAR fan drive system and connecting the NOTAR fan blade pitch change mechanism, is designed to rotationally isolate the aft tube assembly from the NOTAR fan drive system.</p> <p>Airflow into the tailboom is increased as the directional control pedals are displaced right or left from the neutral position, or minimum commanded airflow. This increased tailboom airflow exits from the direct-jet variable thruster assembly. The splitter assembly also transmits the directional pedal control inputs to the direct-jet variable thruster and the left vertical stabilizer by a three-part cable.</p> <p>INVESTIGATION OF NOTAR FAN CONTROL SYSTEM AND DRIVE SYSTEM COMPONENTS</p> <p>Aft Tube Assembly</p> <p>A visual inspection of the aft tube assembly, Part Number 500W7113-11 Rev. A, was conducted on-site and at the National Transportation Safety Board laboratory in Washington, DC. No Serial Number was assigned to the part.</p> <p>The tube was covered with green paint with the exception of the two ends. The tube was fitted with a spined rod end and a threaded rod end at the forward and aft ends, respectively. The forward splines were cleaned with soap and the examination did not reveal any unusual teeth wear. The aft threads did not indicate any unusual wear. A light longitudinal scratch was noted on the tube in</p>	
FACTUAL REPORT - AVIATION	
Page 1b	



National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX01A262
	Occurrence Date: 07/25/2001 Occurrence Type: Incident
<b>Narrative (Continued)</b> <p>center ridge in the ID of the shaft. The shaft ID was gun drilled from each end of the shaft to the center, and slight misalignment of the honing arm can leave a center ridge in the shaft ID.</p> <p>The fan drive shaft was sent to the manufacturer, Kamatic Corporation, for an engineering assessment, which included a driveshaft balance check, an overall length measurement, an examination of the torque stripes on the bolts of the end fitting fasteners of the flex frame fittings, breakaway torque measurements for the end fitting fastener bolts, and partial disassembly of the flex frame fittings to examine for fail safe contact. No anomalies were found.</p> <p><b>NOTAR Fan Transmission</b></p> <p>A visual inspection of the NOTAR fan transmission was conducted on-site. The mounting flanges on the transmission housing were intact and the mounting holes were round, with no elongation. Circumferential scoring was exhibited within the first 1/4 inch of the NOTAR output shaft ID consistent with the as-installed location of the forward scored area of the aft tube assembly. A teardown inspection of the NOTAR fan transmission was conducted at MDHI facilities in accordance with the MDHI Component Overhaul Manual. No anomalies were found.</p> <p><b>TESTS PERFORMED DURING INVESTIGATION</b></p> <p><b>NOTAR Fan Transmission Mount and Fan Assembly Mount Alignment</b></p> <p>The alignment of the fuselage mounts for the NOTAR fan transmission and the NOTAR fan assembly was checked on-site in accordance with the MDHI 53-30-30 maintenance manual procedures, using tool kits 500S000-1, 500S000-2-ATP, and 500S000-3-ATP. The alignment of the mounts was within the required tolerance ranges specified in the manual.</p> <p><b>NOTAR Fan Balance</b></p> <p>The NOTAR fan assembly had been balanced by the LASD through normal maintenance practices. NOTAR fan assembly balancing was performed using a Chadwick-Helmuth Model 8500C+ Balancer/Analyzer and a Chadwick-Helmuth Model 8520C Signal Detector. A satisfactory calibration check of the entire system was performed during the on-site visit.</p> <p><b>Aft Tube Assembly Frequency Response</b></p> <p>Testing was conducted at MDHI facilities to determine the bending mode natural frequencies of the aft tube assembly, 500S7113. Dynamic Labs, of Phoenix, Arizona, was contracted by MDHI to supply the response measurement equipment and perform the impulse hammer tests.</p> <p>All tests were conducted on a static, mechanically representative, maintenance training 520N fuselage. The drive system was not rotating. Acceleration spectral data of the aft tube assembly response to impulse hammer inputs were collected for different NOTAR fan drive and control component assembly configurations (i.e.: new pitch slider replaced with a worn pitch slider, etc.). Thirty-four configurations were tested. Dynamic Labs conducted the reduction and analysis of the spectral data. As reported by Dynamic Labs, the three lowest bending modes measured during the tests were 65, 220, and 450 Hz, with minor variations in the second and third modal frequencies with assembly configuration changes. It was also reported that the first mode of 65 Hz was not sensitive to assembly configuration changes. The scope of the testing was not sufficient to obtain torsional mode natural frequency data.</p> <p>Dynamic Labs noted that the impulse hammer did not always excite the three bending modes for each assembly configuration tested. The 65 Hz mode was excited in 10 configurations (29 percent of the 34 tested configurations). The 220 Hz mode was excited in 25 configurations (74 percent of the 34 tested configurations). The 450 Hz mode was excited in 10 configurations (29 percent of the 34 tested configurations).</p>	
National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	
Occurrence Date: 07/25/2001 Occurrence Type: Incident	
<b>Narrative (Continued)</b> <p>NTSB ID: LAX01A262</p>	
National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX01A262																																																																												
	Occurrence Date: 07/25/2001 Occurrence Type: Incident																																																																												
<b>Narrative (Continued)</b> <p>boring marks. The outer surface of the slider shaft was covered with a dry, permanently bonded sleeve of black Teflon material (identified as Karon Grade B liner in accordance with MDHI Drawing No. 500N5367). The outer diameter of the outer surface was measured to be 3.797 inches. Most of the liner surface was flat black and nonreflective, with two, slightly glossy, more reflective areas exhibited at two axial locations (1.0 inch and 3.25 inches from the inner liner edge closest to the bearing housing). These reflective areas were over approximately the same 90-degree circumference of the liner. Numerous, very fine, axial scratches were apparent on the slider shaft liner surface.</p> <p>According to MDHI Drawing No. 500N5367, the outer diameter (OD) of the liner is required to be 0.818 inch (+ 0.001 inch). The measured OD of the liner at 0.25 inch increments from the bearing housing end, along orthogonal axes is presented in the following table.</p> <table border="1"> <thead> <tr> <th>Measured Length</th> <th>Outer Diameter of Pitch Slider</th> <th>Outer Diameter of Pitch Slider Measured at Reference Point</th> <th>Measured at 90 Degrees From the Reference Point</th> </tr> </thead> <tbody> <tr> <td>Along Karon Liner</td> <td></td> <td></td> <td></td> </tr> <tr> <td>0.0000</td> <td>0.8131</td> <td></td> <td>0.8133</td> </tr> <tr> <td>0.2500</td> <td>0.8134</td> <td></td> <td>0.8142</td> </tr> <tr> <td>0.5000</td> <td>0.8119</td> <td></td> <td>0.8124</td> </tr> <tr> <td>0.7500</td> <td></td> <td>0.8089</td> <td>0.8097</td> </tr> <tr> <td>1.0000</td> <td>0.8057</td> <td></td> <td>0.8060</td> </tr> <tr> <td>1.2500</td> <td>0.8041</td> <td></td> <td>0.8044</td> </tr> <tr> <td>1.5000</td> <td>0.8040</td> <td></td> <td>0.8040</td> </tr> <tr> <td>1.7500</td> <td>0.8047</td> <td></td> <td>0.8049</td> </tr> <tr> <td>2.0000</td> <td>0.8045</td> <td></td> <td>0.8052</td> </tr> <tr> <td>2.2500</td> <td>0.8060</td> <td></td> <td>0.8063</td> </tr> <tr> <td>2.5000</td> <td>0.8057</td> <td></td> <td>0.8077</td> </tr> <tr> <td>2.7500</td> <td>0.8090</td> <td></td> <td>0.8092</td> </tr> <tr> <td>3.0000</td> <td>0.8104</td> <td></td> <td>0.8106</td> </tr> <tr> <td>3.2500</td> <td>0.8112</td> <td></td> <td>0.8113</td> </tr> <tr> <td>3.5000</td> <td>0.8112</td> <td></td> <td>0.8116</td> </tr> <tr> <td>3.7500</td> <td>0.8049</td> <td></td> <td>0.8047</td> </tr> <tr> <td>3.7950</td> <td>0.7814</td> <td></td> <td>0.7838</td> </tr> </tbody> </table> <p><b>NOTAR Fan Drive Shaft</b></p> <p>A visual inspection of the NOTAR fan drive shaft was conducted on-site and at the Safety Board laboratory. The fan assembly drive shaft was covered with light green paint. There was a handwritten label "AFT" printed on the outside of the shaft, opposite the data plate. KAYJAX flex frame fittings on each end of the shaft exhibited no visual anomalies.</p> <p>The inside of the shaft was viewed with a boroscope and numerous axial scratches were seen inside the shaft. The unscratched surface of the shaft had a silver-colored finish. A shiny, 0.042 inch wide circumferentially marked band was exhibited at the center of the shaft. The margins of the area were distinctly defined by the termination of the silver-colored finish. A 0.110 inch wide interrupted, circumferential surface mark was exhibited 1.33 inch aft of the center band. The mark was not shiny. A 0.200 inch wide circumferentially marked band was located 1.16 inch forward of the center band.</p> <p>The shiny center band was seen as a raised protuberance from the ID surface of the shaft. Kamatic Corporation engineers stated that the protuberance was due to the final surface polishing procedure when the one-piece shaft was manufactured. Slight misalignment of the polishing arm can leave a</p>		Measured Length	Outer Diameter of Pitch Slider	Outer Diameter of Pitch Slider Measured at Reference Point	Measured at 90 Degrees From the Reference Point	Along Karon Liner				0.0000	0.8131		0.8133	0.2500	0.8134		0.8142	0.5000	0.8119		0.8124	0.7500		0.8089	0.8097	1.0000	0.8057		0.8060	1.2500	0.8041		0.8044	1.5000	0.8040		0.8040	1.7500	0.8047		0.8049	2.0000	0.8045		0.8052	2.2500	0.8060		0.8063	2.5000	0.8057		0.8077	2.7500	0.8090		0.8092	3.0000	0.8104		0.8106	3.2500	0.8112		0.8113	3.5000	0.8112		0.8116	3.7500	0.8049		0.8047	3.7950	0.7814		0.7838
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION																																																																													

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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX011A262 Occurrence Date: 07/25/2001 Occurrence Type: Incident	
Landing Facility/Approach Information			
Airport Name Los Angeles International	Airport ID: LAX	Runway Used FL MSL	Runway Length Runway Width
Runway Surface Type: Concrete			
Runway Surface Condition: Dry			
Approach/Arrival Flow: NONE			
VFR Approach/Landing: Traffic Pattern			
Aircraft Information			
Aircraft Manufacturer MDHI	Model/Serial 520N	Serial Number LN070	
Airworthiness Certificate(s): Normal			
Landing Gear Type: Skid			
Amateur Built Act? No	Number of Seats: 4	Certified Max Gross Wt. 3350 LBS	Number of Engines: 1
Engine Type: Turbo Shaft	Engine Manufacturer: Allison	Model/Serial: 250-C20R	Rated Power: 425
Aircraft Inspection Information			
Type of Last Inspection 100 Hour	Date of Last Inspection 07/2001	Time Since Last Inspection 65 Hours	Airframe Total Time 5852 Hours
Emergency Locator Transmitter (ELT) Information			
ELT installed?/Type No	ELT Operated? No	ELT Aided in Locating Accident Site? No	
Owner/Operator Information			
Registered Aircraft Owner Los Angeles County Sheriff's Department	Street Address 4700 W. Ramona	City Monterey Park	State CA
Operator of Aircraft Los Angeles County Sheriff's Department	Street Address 4700 W. Ramona	City Monterey Park	State CA
Operator Does Business As:	Operator Designator Code:		
Type of U.S. Certificate(s) Held: None			
Air Carrier Operating Certificate(s):			
Operating Certificate:			
Regulation Flight Conducted Under: Part 91: General Aviation			
Type of Flight Operation Conducted: Public Use			
FACTUAL REPORT - AVIATION			


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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX011A262 Occurrence Date: 07/25/2001 Occurrence Type: Incident	
Narrative (Continued)			
<p>tested configurations). An analysis of the natural frequency of the aft tube assembly was conducted by MDHI prior to the testing. MDHI reported that the natural frequency of the rod, when analysed as a fixed-pinned rod, was estimated to be 94 Hz in bending and 1140 Hz in torsion.</p> <p>FLUET-WIDE RESEARCH</p> <p>The FAA and MDHI Service Difficulty Report (SDR) databases were reviewed. There were no reported incidents of high vibrations experienced in the NOTAR fan drive and control systems. In addition, there were no reported incidents of anomalous marks, or scoring noted on the aft control tube during routine maintenance on the NOTAR fan drive and control systems.</p> <p>Safety Board investigators conducted interviews and submitted questionnaires to selected MD 520N operators. Neither the Orange County Police Department in California, nor the Prince Georges County Police Helicopter Unit in Maryland had experienced any:</p> <p>a. Vibratory incidents with origins traced to the NOTAR fan drive and control systems;</p> <p>b. Directional control pedals binding;</p> <p>c. Incidents of anomalous marks or scoring noted on the aft control tube during routine maintenance on the NOTAR fan drive and control systems.</p>			
FACTUAL REPORT - AVIATION			

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX01A282 Occurrence Date: 07/25/2001 Occurrence Type: Incident			
Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
LAX	0250	PST	56 Ft. MSL	0 NM	Deg. Mag.
Sky/Lowest Cloud Condition:				FL AGL	Condition of Light: Night
Lowest Ceiling: Overcast				1400 Ft. AGL	7 SM
Temperature: 17 °C				Dew Point: 15 °C	Altitude: 29.89
Wind Direction: 270				Wind Speed: 3	Visual Conditions
Visibility (RVR):				SM	Wind Gusts:
Precip and/or Obscuration:					
Accident Information					
Aircraft Damage: Minor			Aircraft Fire: None		
Aircraft Explosion: None					
- Injury Summary Matrix					
Fatal	Serious	Minor	None	TOTAL	
1	1	1	1	1	
First Pilot					
Second Pilot					
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants					
Other Crew					
Passengers					
- TOTAL ABGARD -					
2	2	2	2	2	
Other Ground					
- GRAND TOTAL -					
2	2	2	2	2	
FACTUAL REPORT - AVIATION					
Page 4					

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX01A282 Occurrence Date: 07/25/2001 Occurrence Type: Incident			
First Pilot Information					
Name	City	State	Date of Birth	Age	
On File	On File	On File	On File	40	
Sex: F	Seat Occupied: Right	Occupational Pilot? Police	Certificate Number: On File		
Certificate(s): Commercial					
Airplane Rating(s): None					
Rotorcraft/Glider/LTA: Helicopter					
Instrument Rating(s): Helicopter					
Instructor Rating(s): None					
Current Biennial Flight Review? 03/2001					
Medical Cert. Class 1			Medical Cert. Status: Valid Medical--no waivers/lim.		
Date of Last Medical Exam: 05/2001					
- Flight Time Matrix					
Total Time	AT A/C	Time in Command	Engine Time	Engine Time	Engine Time
2700	2700	1000	2700	2700	2700
Pilot in Command (PIC)					
Instructor					
Instruction Received					
Last 90 Days					
240	240	240	240	240	240
Last 30 Days					
75	75	75	75	75	75
Last 24 Hours					
4	4	4	4	4	4
Seatbelt Used? Yes			Shoulder Harness Used? Yes		
Toxicology Performed? No			Second Pilot? No		
Flight Plan/Literary					
Type of Flight Plan Filed: None					
Departure Point	State	Airport Identifier	Departure Time	Time Zone	
Same as Accident/Incident Location	KLAX	0248	PDT		
Destination	State	Airport Identifier			
Long Beach	CA	KLGB			
Type of Clearance: VFR					
Type of Airspace: Class D					
Weather Information					
Source of WX Information:					
Company					
FACTUAL REPORT - AVIATION					
Page 3					

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 <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX01A262	Occurrence Date: 07/25/2001 Occurrence Type: Incident	
	Administrative Information Investigator-in-Charge (IC): JEFF RICH		
	Additional Persons Participating in This Accident/Incident Investigation: Nicholas Eull Federal Aviation Administration Long Beach, CA John Hobby MD Helicopters, Inc. Mesa, AZ Mark Utley Los Angeles County Sheriff Long Beach, CA		

Page 5

FACTUAL REPORT - AVIATION

**National Transportation Safety Board**  
 Washington, DC 20594

Printed on : 1/10/2012 7:53:41 PM

**Brief of Incident**

**Adopted 02/05/2004**

LAX01A262 File No. 14787	07/25/2001	Los Angeles, CA	Aircraft Reg No. N953SD	Time (Local): 02:50 PDT
Make/Model: Mdhi / 520N Engine Make/Model: Allison / 250-C20R Aircraft Damage: Minor Number of Engines: 1 Operating Certificate(s): None Type of Flight Operation: Public Use Reg. Flight Conducted Under: Part 91: General Aviation	Fatal 0 Serious 0 Minor/None 2 0	Crew 0 Pass 0	Condition of Light: Night Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: 1400 Ft. AGL, Overcast Visibility: 7.00 SM Wind Dir/Speed: 270 / 003 Kts Temperature (°C): 17 Precip/Obscuration:	Last Depart. Point: Same as Accident/Incident Location Destination: Long Beach, CA Airport Proximity: On Airport/Airstrip Airport Name: Los Angeles International Runway Identification: Unk/Nr Runway Length/Width (Ft): Unk/Nr Runway Surface: Concrete Runway Surface Condition: Dry
Pilot-in-Command Certificate(s)/Rating(s) Commercial; Helicopter Instrument Ratings Helicopter	Age: 40	Flight Time (Hours) Total All Aircraft: 2700 Last 90 Days: 240 Total Make/Model: 1000 Total Instrument Time: Unk/Nr		

The helicopter was climbing eastbound after liftoff and was passing 300 feet agl when the crew heard a loud squeal and felt a high frequency vibration in the airframe and in the antitorque control pedals. The pilot executed a 180-degree turn and landed back at the helipad. The NOTAR fan drive system was disassembled for examination. The Aft Tube Assembly transmits antitorque pedal inputs to the NOTAR fan blade pitch change mechanism and moves fore and aft through the hollow rotating fan drive shaft. The tube does not rotate. Three distinct areas of circumferential scoring were noted on the tube; one in the center at roughly the middle of the drive shaft, and one at each end of the tube corresponding to locations just within the fan drive gear box on the forward end and just inside of the fan assembly. The pilot reported that during an earlier flight in the accident helicopter, the antitorque pedals seemed to stick or slightly bind with 2 inches of right pedal displacement. The pilot stated that this was an annoying problem that regularly occurred with all the 520N's in their fleet, and that the maintenance department typically cleared it up by cleaning (lightly sanding) a Teflon coated sliding tube in the NOTAR fan assembly. According to the pilot, dirt and oil would get on this sliding tube and cause it to bind in the housing, and the mechanics would simply clean this tube to resolve the problem. Maintenance department mechanics confirmed that the pedal-sticking problem typically involved foreign material on the aft tubes' Teflon coated pitch slider, and that they routinely resolved the discrepancies by removing the aft tube and lightly sanding the Teflon coating with fine sand paper. With the exception of the aft tube and it's associated pitch slider shaft, extensive examinations and tests of the NOTAR system components revealed no anomalies that could be related to the vibratory event. Examination of the pitch slider shaft found numerous, very fine, axial scratches on the surface, and measurements found that the outer diameter had been reduced by up to 0.014 inch from the manufacturer's specified constant 0.818 inch (+0.001 inch). The hand sanding of the liner resulted in axial surface scratches and a variable shaft outer diameter that was

LAX01IA262  
File No. 14787

07/25/2001

Los Angeles, CA

Aircraft Reg No. N953SD

Time (Local): 02:50 PDT

smaller than that required by the MDHI specification. The decreased and variable liner OD degraded the ability to isolate the aft tube assembly from drive system vibrations. The bending mode natural frequencies of the aft tube assembly were assessed to be 65, 220, and 450 Hz. Initial MDHI estimates stated that the first bending mode natural frequency of the aft tube assembly was 94 Hz. The operational rotor speed of the MDHI 520N helicopter is 7.95 Hz, and the operational NOTAR fan and drive system rotational speed is 89.4 Hz. While in comparison, the measured first bending mode natural frequency of the aft tube assembly of 65 Hz offers a margin of 24.4 Hz under the 89.4 Hz operating speed of the NOTAR fan drive system, the actual natural frequency may be higher and result in a smaller margin. The investigation determined that a maintenance practice of sanding the Teflon coated pitch slider tube in the NOTAR assembly resulted in excessive clearance between the antitorque system components. This excessive clearance allowed a vibration to occur in those components resulting in the noise and airframe vibrations noted by the pilots.

## Brief of Incident (Continued)

LAX01IA262  
File No. 14787

07/25/2001

Los Angeles, CA

Aircraft Reg No. N953SD

Time (Local): 02:50 PDT

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: TAKEOFF - INITIAL CLIMB

## Findings

1. (C) ROTORCRAFT FLIGHT CONTROL SYSTEM, NOTAR - VIBRATION
2. (C) MAINTENANCE - IMPROPER - COMPANY MAINTENANCE PERSONNEL

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
the excitation of the first bending mode natural frequency of the aft tube assembly that is installed through the rotating NOTAR fan drive system. Contributing factors to the incident included the operator's maintenance practice of hand-sanding the pitch slider component of the NOTAR fan system.



This report is for internal use only.

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04IA302		Aircraft Registration Number: N461WN	
Occurrence Date: 08/19/2004		Occurrence Date: 08/19/2004		Most Critical Injury: None	
Occurrence Type: Incident		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code 90248	Local Time 1455	Time Zone PDT	
Airport Proximity: On Airport/Altnship Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Serial 737-7H4		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No Air Medical Transport Flight: No					
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
<p>1.1 HISTORY OF FLIGHT</p> <p>On August 19, 2004, about 1455 Pacific daylight time, an Asiana Airlines Boeing 747-400, HT7415, overflew a Southwest Airlines Boeing 737-7H4, N461WN, while the Southwest airplane was in position on the active runway 24L, at Los Angeles International Airport, Los Angeles, California. Southwest Airlines operated the Boeing 737 under the provisions of 14 CFR Part 121, and Asiana Airlines operated the Boeing 747 under the provisions of 14 CFR Part 129. There was no damage to either airplane nor injuries to the combined total of 417 passengers and 29 crewmembers. Visual meteorological conditions prevailed and an instrument flight plan had been filed.</p> <p>On August 24th Southwest Airlines safety personnel reported to the National Transportation Safety Board investigator that the captain of Southwest flight 440 (SWA440) reported that an Asiana Boeing 747 (AAR204) came within 300 feet of his airplane while it was executing a go-around on runway 24L. Southwest flight 440 had been cleared for takeoff on runway 24L. The captain stated that he became concerned when the Asiana airplane did not come in to his view, as it should have, when landing on the parallel runway 24R. He began to move his airplane off the runway when the Asiana airplane overflew his, coming within 200 feet. The captain of AAR204 stated that he and his copilot identified the runway conflict while they were on the short final approach for landing and executed a go-around about 400 feet above ground level (agl).</p> <p>At 2151:21, the LAX local 2 (LC2) tower controller cleared AAR204 to land on runway 24L, and the flight crew acknowledged the landing clearance. AAR204 was conducting an ILS runway 24L approach and radar data indicated the aircraft was 9.3 miles east of the airport. About this time, the LAX operations supervisor on duty asked the local assist 1 (LAI) controller (hereafter referred to as the "LC2 relief controller") to relieve the LC2 controller, who needed a break.</p> <p>At 2153:08, the LC2 controller began a position relief briefing for the LC2 relief controller. He stated, "Alright uh both runways available. Let's see you got the board you said. Got a lot of flow up there, a lot of flow. Better study up on that." The LC2 relief controller stated, "uh huh, I do I came from assist one." The LC2 controller continued, "Alright. They're on the board, the inboards I should say, both runways available, FIREPS none, you can visual out. Uh, rolling out on the right is Southwest, cleared to land is Asiana on the left. Southwest on the pad is a LAXX I haven't tried to coordinate. You got a King Air, I'm sorry, he just left, so right now you're back to relieved. These two have been approved, but not run down or released." The LC2 controller continued, "this one is awaiting approval," then stated, "and that's all I can think of." At 2153:43, the LC2 relief controller advised, "Alright well I've got it." The LC2 controller responded by saying, "Uh helicopters I'm sorry you have one more." The LC2 relief controller asked, "Oh and who is it?" As the LC2 controller began to say the helicopter's call sign, "Coast Guard six five..." he was interrupted by a transmission from a Southwest Airlines flight crew who had just landed runway 24R and requested permission to exit the runway at a</p>					

FACTUAL REPORT - AVIATION

Page 1

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04IA302		Aircraft Registration Number: N461WN	
Occurrence Date: 08/19/2004		Occurrence Date: 08/19/2004		Most Critical Injury: None	
Occurrence Type: Incident		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code 90248	Local Time 1455	Time Zone PDT	
Airport Proximity: On Airport/Altnship Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Serial 737-7H4		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No Air Medical Transport Flight: No					
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
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FACTUAL REPORT - AVIATION

Page 1a

National Transportation Safety Board <b>FACTUAL REPORT</b> <small>AVIATION</small>	NTSB ID: LAX04HA302
	Occurrence Date: 08/19/2004 Occurrence Type: Incident
<b>Narrative</b> (Continued)	
<p>usually went to bed about 2200 and woke up between 0800 and 0900. He said he treated his weekends as recovery time, attempting to get at least 9 hours of sleep per night. The LC2 relief controller's normal weekly work schedule included afternoon shifts on Wednesday and Thursday, early morning shifts on Friday and Saturday, and either a midnight or early morning shift on Sunday.</p> <p>The LC2 relief controller had modified his schedule for the day of the incursion, working a shift that began in the early morning rather than in the afternoon. He did this for personal reasons. This change afforded him a rest period of 8 hours on Wednesday night. The controller referred to this rest period as a "quick turnaround." A review of tower watch schedules indicated that the 8-hour rest period the LC2 relief controller received the night before the incursion was his shortest in the previous 30 days. His next shortest rest periods were 9 hours long.</p> <p>The LC2 Relief Controller's 72-Hour History</p> <p>On Monday, August 16, 2004, the relief controller had a scheduled day off. He engaged in routine activities and went to sleep about 2200.</p> <p>On Tuesday, August 17th, the relief controller had another scheduled day off. He woke about 0800, engaged in routine activities, and went to sleep about 2200.</p> <p>On Wednesday, August 18th, the relief controller woke about 0800, and engaged in routine activities at his home. He said he felt fully rested when he began his shift at 1530. He finished his shift at 2330, drove home, and slept for "five or six hours."</p> <p>On Thursday, August 19th, the relief controller woke about 0600, got ready for work, drove to the tower, and began his shift at 0730. He described his shift leading up to the incursion as a "hard day." He felt tired because he had not received enough sleep the night before and worked several busy positions during the shift.</p> <p>Tower position logs for August 19, 2004, showed the relief controller spent 5 hours 36 minutes on position, out of a total of 7 hours 25 minutes on duty before the incursion.</p> <p><b>1.9 COMMUNICATIONS</b></p> <p>The Los Angeles Air Traffic Control Tower is a Level II ATC facility. The tower is centrally located on the airport between the north and south complexes. The tower can accommodate up to 13 positions; 2 local control (LC1/LC2), 2 local assistant (LA1/LA2), 3 ground control (GC1/GC2/GC3), 2 clearance delivery (CD1/CD2), 1 helicopter position (HC), 1 traffic management coordinator (TM), and 2 supervisors (AS1/AS2).</p> <p>On the day of the incursion, LAX was in a west configuration, the north complex was landing and departing runway 24R/24L, and the south complex was landing and departing runway 25R/25L.</p> <p><b>1.9.1 Equipment</b></p> <p>The LAX tower is equipped with 7 DBRTR (Digital Bright Radar Indicator Terminal Equipment) systems, which are located at the LC1/2, GC1/2/3, helicopter, and traffic management positions. The system displays primary and secondary radar returns of aircraft and alphanumeric target symbols generated by the LAX ARTS IIIIE system. The data is derived from the Los Angeles ASR-9 radar located on the airport. The DBRTR displays aircraft target symbols each with a corresponding (Automated Terminal Radar System) ARTS data block. The data block provides aircraft information to the controller. Line 1 of the data block indicates the aircraft call sign, line 2 contains current altitude (in hundreds of feet) and ground speed (in tens of knots). These two items of line 2 data are time shared with two other items, which are referred to as "scratch pad" information. At LAX the scratch pad items are: current runway assignment or type approach (e.g.,</p>	
<b>FACTUAL REPORT - AVIATION</b>	
Page 1c	

National Transportation Safety Board <b>FACTUAL REPORT</b> <small>AVIATION</small>	NTSB ID: LAX04HA302
	Occurrence Date: 08/19/2004 Occurrence Type: Incident
<b>Narrative</b> (Continued)	
<p>crew responded by saying, "ok yeah the runways are so close together we looked at it and it was so big we thought he was on the right side as well." In response, the LC2 relief controller said, "yep, I did the exact same thing."</p> <p>Upon hearing the AMASS alert, the operations supervisor who was located on the south side of the tower cab began walking to the north side of the tower cab, and saw AAR204 in a nose-high attitude, 200 to 300 feet above the runway. The aircraft appeared to be executing a go-around. The supervisor continued to the LC2 position, and began monitoring the actions of the LC2 relief controller. The operations supervisor looked at the DBRTR display and saw information indicating that AAR204 was assigned to land on runway 24L. He asked the LC2 relief controller if he knew AAR204 was landing on runway 24L. The controller responded, "I did not know he was on the left." The LC2 controller, who was leaving the tower cab, also heard the AMASS alert. He also began walking toward the LC2 position, observed AAR204 climbing in a go-around attitude, and saw SWA440 turning onto the runway below AAR204. The operations supervisor asked the LC2 controller if he had told the LC2 relief controller AAR204 was landing on the left side. The LC2 controller advised that he had done so, and that SWA440 had been awaiting a takeoff clearance on the concrete pad adjacent to the approach end of the runway. The LC2 controller asked if he should relieve the LC2 relief controller. The supervisor advised him to do so.</p> <p><b>1.5 PERSONNEL INFORMATION</b></p> <p><b>1.5.1 The LC2 Tower-Controller</b></p> <p>The LC2 controller held an air traffic control tower operator certificate and a current medical certificate. He entered on duty with the Federal Aviation Administration (FAA) on November 2, 1983. He was assigned to LAX in 2000, and received facility certification in 2002. Before his assignment to LAX, he previously worked at Kansas City Air Route Traffic Control Center (ARTCC), Los Angeles ARTCC, Los Angeles TRACON, and Southern California TRACON (SCT). On the day of the incursion, he had been working the LC2 position for about 1 1/2 hours before the relief LC2 controller relieved him.</p> <p><b>1.5.2 The LC2 Relief Tower-Controller</b></p> <p>The FAA hired the LC2 relief controller as an air traffic controller in 1987. After completing his initial training at the FAA academy, the relief LC2 controller was assigned to Palleson Tower (FNU) until 1990. In 1990, he was assigned to Orange County Tower (SNA) and remained there until he was assigned to LAX in 2000, where he received facility certification in 2001.</p> <p>The LC2 relief controller had no history of operational errors or disciplinary action in the FAA. His supervisor described him as "the best controller on his crew," adding that he was a "conscientious controller" who "gave 100 percent." The LC2 relief controller's coworkers also spoke favorably about his performance. The LC2 controller said he had "a lot of confidence" in the LC2 relief controller. He said if someone else had relieved him, he might have remained at the LC2 position longer after the position relief briefing was completed.</p> <p>The LC2 relief controller's most recent second-class medical certificate, dated May 28, 2004, included a limitation stating "must have glasses for near vision in his/her immediate possession while performing ATC duties." He reported having glasses with him at the time of the incursion, but stated that he was not wearing them and did not need them for the tasks he was performing. He stated that he did not take prescription medications, and said he took no medications of any kind in the 72 hours before the incursion. He said he did not smoke and reported only occasional light use of alcohol. He reported no significant recent changes in his finances or personal life.</p> <p>The LC2 relief controller's residence was a 45-minute drive from LAX. Mondays and Tuesdays were his regular days off. He rarely slept or took naps during the day. On his days off, he said he</p>	
<b>FACTUAL REPORT - AVIATION</b>	
Page 1c	

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION 7/1/04	NTSB ID: LAX04A302
	Occurrence Date: 08/19/2004
	Occurrence Type: Incident
<b>Narrative (Continued)</b> <p>At the time of the incursion, five certified professional controllers and one operations supervisor were working in the tower cab. Both local (LC1/LC2) and ground control (GCL/GC3) positions and the clearance delivery position were open. An operations supervisor was on duty and assigned to oversee the operation. The local assist positions were not opened. The LC1 and LC2 controllers were both working the local assist functions in conjunction with their local control duties. In addition, the LC2 controller was also responsible for the helicopter position. One controller assigned to work as the traffic management coordinator was on a break. According to facility personnel, there would normally be 10 people assigned to the shift. However, 3 controllers who were assigned to the shift were absent, due to injuries, 2 were on sick leave, and the other worked an earlier shift to accommodate a doctor's appointment.</p> <p>The operations supervisor stated during the interview that he was a little short on personnel at the time of the incursion, and had been carefully monitoring controller assignments to ensure that key positions were continuously manned and that no controller exceeded a maximum of 2 hours continuous time on position.</p> <p>The basic watch schedule is defined as the days of the week, hours of the day, rotation of shifts, and change in regular days off. Procedures for employee bidding and assignment to the basic watch schedule are negotiated in accordance with the collective bargaining agreement and the FAA at the local facility level. FAA Order 7110.3, "Facility Operation and Administration," paragraph 2-6-7, Basic Watch Schedule, states in part that facility watch schedules shall take into account normal traffic flow, thereby permitting the posting of a continuing schedule for an indefinite period. Facility management is responsible for ensuring watch schedules are in accordance with collective bargaining agreements. Air traffic control specialists whose primary duties are those directly related to the control and separation of aircraft must meet the following criteria: (1) do not work more than 10 operational hours in a shift; (2) have at least an 8-hour break from the time work ends to the start of any subsequent shift and; (3) do not work more than six shifts without taking a regular day off.</p> <p>1.17.2 Tower Training and Procedures</p> <p>1.17.2.1 Air Traffic Control Guidelines</p> <p>FAA Order 7110.65, "Air Traffic Control", paragraph 3-10-3, Same Runway Separation states in part:</p> <p>a. Separate an arriving aircraft from another aircraft using the same runway by ensuring that the arriving aircraft does not cross the landing threshold until one of the following conditions exists or unless authorized in paragraph 3-10-10, Altitude Restricted Low Approach.</p> <p>2. The other aircraft has departed and crossed the runway end. If you can determine distances by reference to suitable landmarks and the other aircraft is airborne, it need not have crossed the runway end if the following minimum distance from the landing threshold exists:</p> <p>(a) Category I aircraft landing behind Category I or II- 3,000 feet.</p> <p>(b) Category II aircraft landing behind Category I or II- 4,500 feet.</p> <p>(c) When either is a category III aircraft- 6,000 feet. (See FIG 3-10-5.)</p> <p>1.17.2.2 Training</p> <p>All controllers at LAX completed a computer-based training module on "listening and remembering" during the month of August 2004, before the runway incursion. The training module, which was developed by the FAA and was customized for LAX, addressed specific visual and auditory cues that could be used to enhance controller memory.</p> <p>Position Relief Briefing</p>	
Page 1a FACTUAL REPORT - AVIATION	

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION 7/1/04	NTSB ID: LAX04A302
	Occurrence Date: 08/19/2004
	Occurrence Type: Incident
<b>Narrative (Continued)</b> <p>ILS runway 24L approach is displayed as "J14L" and aircraft type (e.g. Boeing 747-400 is displayed as "B744"). Information displayed in the scratch pad area alternates between altitude/ground speed and assigned runway/aircraft type. A review of the radar playback of the LC2 BPRIS display indicated that at the time of the incursion AAR204's altitude and ground speed were displayed for 15 second intervals, alternating with displays of assigned runway and aircraft type, which lasted 5 seconds.</p> <p>The LAX tower's AMASS is a computer software enhancement to the airport surface detection equipment. The system provides logic predicting the path of aircraft landing and/or departing, and aircraft and/or vehicle movements on runways. Visual and auditory alerts are activated when logic projects a potential collision. AMASS alerts controllers to a potential collision when an aircraft or vehicle is occupying a runway and when arriving or departing aircraft cross a certain threshold or attain a certain speed. The system works by processing surveillance data from ground radar, and then predicting possible conflicts based on the position, velocity, and acceleration of arriving and departing aircraft and vehicles.</p> <p>Both the DBRITE and AMASS systems augment visual observations by tower personnel of arriving and departing aircraft.</p> <p>During the field investigation, the ATC group toured the tower cab and from the LC2 position, the local controller appears to have a good view of traffic approaching the airport from the east. However, tower personnel reported that it could be difficult to visually determine whether an aircraft is approaching runway 24L or runway 24R because of the location of the tower relative to the runway thresholds. This was reported to be most difficult with large aircraft.</p> <p>1.10 AERODROME INFORMATION</p> <p>The Los Angeles International Airport is located in the northwest suburbs of Los Angeles, adjacent to the Pacific coastline. The terrain is largely flat to coastal with large expanses of urban areas.</p> <p>The airport has dual parallel runways. Runways 6L/24R and 6R/24L are referred to as the north complex and runways 7L/25R and 7R/25L comprise the south complex. Runway 24L is 10,285 feet long and 150 feet wide with no displaced threshold. True runway heading is 263 degrees.</p> <p>The airport lies within Class D airspace whose dimensions extend 5 miles from the airport and from the surface, up to but not including 2,500 feet agl. Los Angeles Class B airspace overlays the LAX Class D airspace.</p> <p>The Southern California Terminal Radar Approach Control (SCT) provides approach control services to LAX.</p> <p>1.11 FLIGHT RECORDERS</p> <p>Southwest Airlines downloaded the FDR from the Boeing 737 and sent the raw binary data file to the National Transportation Safety Board's Vehicle Recorder Laboratory. The FDR data from AAR204 was overwritten before it could be downloaded.</p> <p>The Flight Data Recorder Specialist's Factual Report is located in the official docket of this investigation.</p> <p>1.17 ORGANIZATIONAL AND MANAGEMENT INFORMATION</p> <p>1.17.1 Tower Staffing</p>	
Page 1a FACTUAL REPORT - AVIATION	



National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX04IA302 Occurrence Date: 08/19/2004 Occurrence Type: Incident
<p><b>Narrative</b> (Continued)</p> <p>b. During position operation, each item of status information, which is or may be an operational factor for the relieving specialist, should be recorded as soon as it is operationally feasible so that it will not be forgotten or incorrectly recorded.</p> <p>c. Extra care should be taken when more than one specialist relieves or is being relieved from a position at the same time; e.g., combining or decombining positions. Such simultaneous reliefs should be approached with caution.</p> <p>5. RESPONSIBILITIES</p> <p>a. The specialist being relieved shall be responsible for ensuring that any pertinent status information of which he/she is aware is relayed to the relieving specialist and is either:</p> <ol style="list-style-type: none"> <li>1. Accurately displayed in the Status Information Area/s for which he/she has responsibility, or</li> <li>2. relayed to the position having responsibility for accurately displaying the status information.</li> </ol> <p>b. The relieving specialist shall be responsible for ensuring that, before accepting responsibility for the position, any unresolved questions pertaining to the operation of the position are resolved.</p> <p>c. The relieving specialist and the specialist being relieved shall share equal responsibility for the completeness and accuracy of the position relief briefing.</p> <p>d. The specialists engaged in a position relief shall conduct the relief process at the position being relieved unless other procedures have been established and authorized by the facility air traffic manager.</p> <p><b>NOTE-</b></p> <p>The "sharing" of this responsibility means that the specialist being relieved is obligated to provide a complete, accurate briefing and the relieving specialist is obligated to ensure that a briefing takes place and is to his/her total satisfaction.</p> <p>The transfer of position responsibility is accomplished in accordance with appropriate FAA and facility directives each time operational responsibility for a position is transferred from one controller to another. To the maximum extent practicable, the position relief briefing is recorded. Generally, the position relief briefing begins with a self-briefing phase. The relieving controller obtains needed status information by reading from the Status Information Area/s to begin the relief process. Next, information related to the control of aircraft or vehicular movements is verbally exchanged between controllers. In the final part of the relief process, the controller being relieved monitors and reviews the position to ensure that nothing has been overlooked or incorrectly displayed and that the transfer of position responsibility occurred with a complete briefing. The extent of content, method, and practices used for position relief briefings vary depending upon the operational circumstances at the time of the briefing.</p> <p>1.17.3 Tower Notification of Event</p> <p>On August 24, 2004, the Safety Board became aware of this event by a telephone report from Southwest Airlines, which was 5 days after it had occurred. LAX management personnel did not report the event to the FAA's Regional Operations Center because they believed it did not fall within the parameters that required notification. Immediately following the event, LAX management personnel conducted an investigation and determined notification was not necessary because the flight crew of 342204 initiated a go-around before reaching the runway 24L landing threshold. Instead, the incident was logged in the facility's daily record of operation, dated August 10, 2004, and annotated as a QAR (quality assurance report). Once the Safety Board began to</p>	
Page 10	

FACTUAL REPORT - AVIATION

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX04IA302 Occurrence Date: 08/19/2004 Occurrence Type: Incident
<p><b>Narrative</b> (Continued)</p> <p>FAA Order 7110.65, Appendix D, "Standard Operating Practice for the Transfer of Position Responsibility" outlines the method for conducting a position relief briefing and the FAA provided the Safety Board with a "Local Control / Local Assist Briefing Checklist" used to guide position relief briefings at LAX.</p> <p>FAA Order 7110.65, Appendix D, Standard Operating Practice (SOP) for the Transfer of Position Responsibility states in part:</p> <p>1. PURPOSE</p> <p>This appendix prescribes the method and systematic process for conducting a position relief briefing and transferring position responsibility from one specialist to another.</p> <p>2. DISCUSSION</p> <p>a. In all operational facilities, the increase in traffic density and the need for the expeditious movement of traffic without compromising safety have emphasized the importance of the position relief process.</p> <p>b. The contents, methods, and practices used for position relief and briefings vary among personnel, and pertinent information is often forgotten or incompletely covered. Major problems occur whenever there is a heavy reliance upon memory, unsupported by routines or systematic reminders. This SOP addresses the complete task of transferring position responsibility and the associated relief briefing.</p> <p>c. Position relief unavoidably provides workload for specialists at the time of relief. The intent of this SOP is to make the transfer of position responsibility take place smoothly and to ensure a complete transfer of information with a minimum amount of workload. The method takes advantage of a self-briefing concept in which the relieving specialist obtains needed status information by reading from the Status Information Area/s to begin the relief process. Current information related to the control of aircraft or vehicular movements requires verbal exchanges between specialists during the relief process. The method also specifies the moment when the transfer of position responsibility occurs.</p> <p>d. In the final part of the relief process, the specialist being relieved monitors and reviews the position to ensure that nothing has been overlooked or incorrectly displayed and that the transfer of position responsibility occurred with a complete briefing.</p> <p>3. TERMS</p> <p>The following terms are important for a complete understanding of this SOP:</p> <ol style="list-style-type: none"> <li>a. Status Information Area (SIA). Manual or automatic displays of the current status of position related equipment and operational conditions or procedures.</li> <li>b. Written Notes. Manually recorded items of information kept at designated locations on the position of operation. They may be an element of the Status Information Area/s.</li> <li>c. Checklist. An ordered listing of items to be covered during a position relief.</li> <li>d. PRECAUTIONS</li> </ol> <ol style="list-style-type: none"> <li>a. Specialists involved in the position relief process should not rush or be influenced to rush.</li> </ol>	
Page 11	

FACTUAL REPORT - AVIATION

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX04/A302 Occurrence Date: 08/19/2004 Occurrence Type: Incident	<p><b>Narrative (Continued)</b></p> <p>checklist for the LC2 position revealed that it was designed in accordance with PAA directives. Currently, there is no requirement for a relieving controller to remain at the position once transfer of position responsibility has been completed. In 1996, the PAA implemented a policy mandating a 5-minute overlap period when transferring position responsibility from one specialist to another. The policy required the relieving controller to remain at the position for 5 minutes after transferring position responsibility to the relief controller. The intent of the policy was to ensure continuity during transfer of control responsibility and ensure nothing had been overlooked or incorrectly explained during the briefing. The policy lasted a few months and was replaced with a systemic method of conducting briefings, which is highlighted in PAA Order 7110-65, Appendix D.</p> <p><b>1.18.1.3 Visual Information</b></p> <p>The relief controller stated that he saw AAR204's radar target on the DBRITS display during the position relief briefing, but that he did not specifically recall seeing AAR204's data block. A review of the radar replay indicated AAR204's data block displayed two sets of aircraft information: runway assignment and aircraft type were presented for 5 seconds; followed by a 15-second presentation of altitude and ground speed data.</p> <p>Visual sampling is performed by a combination of rapid saccadic eye movements and fixations. Although visual fixations can vary in duration, fixation durations for skilled readers have been measured at between 200 and 250 milliseconds. If the controller had gazed at AAR204 on the DBRITS for 1 second, he would have had only a 25 percent probability of seeing AAR204's alphanumeric runway assignment. The probability of seeing the runway assignment would have increased if a longer fixation or additional short fixations were made. It is impossible to know how many times, or for how long, the relief controller gazed at the DBRITS display.</p> <p><b>1.18.1.4 Fatigue</b></p> <p>Research on sleep and human performance points to an optimal sleep length of between 8 and 9 hours per night for most people. Studies conducted under controlled laboratory conditions have found that restricting sleep to 4-6 hours for one night causes moderate increases in subjective sleepiness and slight decreases in cognitive performance on tasks involving working memory and reaction time.</p> <p>The complete ATC and Human Factors Specialist's Factual Report is contained in the official docket of this investigation.</p>
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Page 11

FACTUAL REPORT - AVIATION

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX04/A302 Occurrence Date: 08/19/2004 Occurrence Type: Incident	<p><b>Narrative (Continued)</b></p> <p>Investigate, LAX management personnel conducted a further review of the events, and in discussions with PAA Headquarters' quality assurance personnel, reclassified the event from a QAR to an operational error on September 15, 2004.</p> <p><b>1.18 ADDITIONAL INFORMATION</b></p> <p><b>1.18.1 Human Performance</b></p> <p>The Safety Board examined factors that could have affected the relief controller's performance. These factors included memory limitations, visual factors, display characteristics, and fatigue.</p> <p><b>1.18.1.1 Memory Limitations</b></p> <p>Human memory is critical to the performance of tactical air traffic control tasks. The human memory system is subdivided into two major components, long term memory and working memory. Long term memory has no known capacity, is fairly permanent, and supports information retrieval with little conscious effort. Working memory is capacity limited, and requires conscious attention for the maintenance and retrieval of information. On average, people can maintain a maximum of seven plus or minus two units of information in short term memory. Without conscious attention, however, this information is forgotten in about 15 seconds.</p> <p>Verbal information like that conveyed during a position relief briefing is first stored in working memory in terms of phonetic codes. The information remains in this form until it is converted into meaningful semantic codes through a process known as elaborative rehearsal. Through elaborate rehearsal, information held in working memory is related to information contained in long-term memory, activating information in long term memory, which can be used to guide task performance. This is necessary for the creation of a meaningful mental "picture" of the traffic situation. Moreover, research has shown that the information that is rehearsed more is remembered longer.</p> <p>Research with air traffic controllers has shown that controllers are better than novices at processing information about multiple aircraft, and that the maximum number of items of traffic information that can be remembered increases with controller experience. Experienced controllers also appear to be good at efficiently prioritizing and focusing on key information so that critical attributes are better remembered. However, even experienced controllers experience memory errors. In a 1992 study sponsored by the FAA, 93 percent of air traffic controllers reported having experienced a "memory lapse" on the job, and 55 percent reported experiencing a memory lapse resulting in a system error.</p> <p>Studies have shown that controller recall accuracy decreases as the number of aircraft increases. Accuracy also declines quite rapidly if additional cognitive activities are required between the time information is presented and the time it is recalled. Limitations such as these have long been identified as a weakness for human information processing, and as a reason for some kinds of controller errors.</p> <p><b>1.18.1.2 Position Relief Brief</b></p> <p>During a position relief briefing, it is the responsibility of the relieving controller to ensure all information specific to the operation and position is accurately relayed to the relief controller. The relief controller is responsible for ensuring that, before accepting responsibility for the position, he/she has a full understanding of the operation.</p> <p>Controllers are required to use a checklist when conducting position relief briefings. PAA Order 7210.3, "Facility Operation and Administration," paragraph 2-3-4, specifies items to be addressed in the checklist, which include, but are not limited to, equipment and operational conditions that are likely to be a factor at a specific position. A review of the LAX position relief briefing</p>
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Page 10

FACTUAL REPORT - AVIATION

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04IA302		Occurrence Date: 08/19/2004		Occurrence Type: Incident																																																																									
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04IA302		Occurrence Date: 08/19/2004		Occurrence Type: Incident	
Landing Facility/Approach Information							
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width		
Los Angeles, CA	LAX	126 Ft. MSL	24L	10285	150		
Runway Surface Type: Concrete							
Runway Surface Condition: Dry							
Approach/Arrival Flow: NONE							
VFR Approach/Landing: None							
Aircraft Information							
Aircraft Manufacturer	Model/Serial	Serial Number					
Boeing	737-7H4	32465					
Airworthiness Certificate(s): Transport							
Landing Gear Type: Retractable - Tricycle							
Amateur Built Act? No	Number of Seats: 146	Certified Max Gross Wt.	154500 LBS	Number of Engines: 2			
Engine Type: Turbo Fan	Engine Manufacturer: General Electric	Model/Serial: CFM-56	Rated Power: 24000 LBS				
- Aircraft Inspection Information							
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time				
Continuous Airworthiness	07/2004	460 Hours	1080 Hours				
- Emergency Locator Transmitter (ELT) Information							
ELT Installed?/Type: Yes /	ELT Operated? No	ELT Aided in Locating Accident Site? No					
Owner/Operator Information							
Registered Aircraft Owner	Sheet Address	City	State	Zip Code			
SOUTHWEST AIRLINES CO	2833 Shorecrest Dr	Dallas	TX				
Operator of Aircraft	Street Address	City	State	Zip Code			
SOUTHWEST AIRLINES CO	2833 Shorecrest Dr	Dallas	TX				
Operator Does Business As:							
- 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: Scheduled; Domestic; Passenger Only							
FACTUAL REPORT - AVIATION							

The space for drawing

<div><div><div>NTSB ID: LAX04IA302</div><div>Occurrence Date: 08/19/2004</div><div>Occurrence Type: Incident</div></div><div><div>National Transportation Safety Board</div><div>FACTUAL REPORT</div><div>AVIATION</div></div></div>			
Administrative Information			
Investigator-In-Charge (IIC) Van S. McKenny			
Additional Persons Participating in This Accident/Incident Investigation:  Daniel P. Diggins Federal Aviation Administration Washington, DC  Jack Brine National Air Traffic Controllers Association Los Angeles, CA  Tim Logan Southwest Airlines Dallas, TX  Jeff Hehner Southwest Airlines Pilots Association Dallas, TX			
FACTUAL REPORT - AVIATION			
Page 5			

The space for drawing

<div><div><div>NTSB ID: LAX04IA302</div><div>Occurrence Date: 08/19/2004</div><div>Occurrence Type: Incident</div></div><div><div>National Transportation Safety Board</div><div>FACTUAL REPORT</div><div>AVIATION</div></div></div>					
Weather Information					
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site
KLAX	1350	PDT	126 Ft. MSL	NM	0 Deg. Mag.
Sky/Lowest Cloud Condition: Few				10000 Ft. AGL	Condition of Light Day
Lowest Ceiling: None		Ft. AGL	Visibility	10 SM	Altimeter: 29.97 "Hg
Temperature: 22 °C		Dew Point: 15 °C	Weather Conditions at Accident Site: Visual Conditions		
Wind Direction: 250		Wind Speed: 11	Wind Gusts:		
Visibility (RVR):		Ft.	SM		
Precip and/or Obscuration: No Obscuration; No Precipitation					
Accident Information					
Aircraft Damage: None			Aircraft Fire: None		
Aircraft Explosion: None					
- Injury Summary Matrix					
First Pilot	Fatal	Serious	Minor	None	TOTAL
Second Pilot				1	1
Student Pilot				1	1
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				3	3
Other Crew					
Passengers				137	137
- TOTAL ABOARD -				142	142
Other Ground					
- GRAND TOTAL -				142	142
FACTUAL REPORT - AVIATION					
Page 4					

Brief of Incident

Adopted 01/31/2006

LAX04IA302 File No. 19003	08/19/2004	Los Angeles, CA	Aircraft Reg No. N461WN	Time (Local): 14:55 PDT
Make/Model: Boeing / 737-7H4			Fatal	Serious
Engine Make/Model: General Electric / CFM-56			0	0
Aircraft Damage: None			0	0
Number of Engines: 2				137
Operating Certificate(s): Flag Carrier/Domestic				
Name of Carrier: SOUTHWEST AIRLINES CO				
Type of Flight Operation: Scheduled; Domestic; Passenger Only				
Reg. Flight Conducted Under: Part 121: Air Carrier				
Last Depart. Point: Los Angeles, CA			Condition of Light: Day	
Destination: Albuquerque, NM			Weather Info Src: Weather Observation Facility	
Airport Proximity: On Airport/Airstrip			Basic Weather: Visual Conditions	
Airport Name: Los Angeles, CA			Lowest Ceiling: None	
Runway Identification: 24L			Visibility: 10.00 SM	
Runway Length/Width (Ft): 10285 / 150			Wind Dir/Speed: 250 / 011 Kts	
Runway Surface: Concrete			Temperature (°C): 22	
Runway Surface Condition: Dry			Precip/Obscuration: No Obscuration; No Precipitation	
Pilot-in-Command	Age: 41		Flight Time (Hours)	
Certificate(s)/Rating(s)			Total All Aircraft: 13000	
Airline Transport: Multi-engine Land			Last 90 Days: 240	
Instrument Ratings			Total Make/Model: 9000	
Airplane			Total Instrument Time: Unk/Nr	

NOTE: The narrative associated with this case is too large for this PDF file. Please return to the query results page and select the report under the Current Synopsis heading.

Brief of Incident (Continued)

LAX04IA302 File No. 19003	08/19/2004	Los Angeles, CA	Aircraft Reg No. N461WN	Time (Local): 14:55 PDT
Occurrence #1: NEAR COLLISION BETWEEN AIRCRAFT				
Phase of Operation: STANDING - ENGINE(S) OPERATING				
Findings				
1. (F) RADAR,BRITE - INADEQUATE				
2. (C) ATC CLEARANCE - IMPROPER - ATC PERSONNEL(LCL/GND/CLNC)				
3. (F) FATIGUE(LACK OF SLEEP) - ATC PERSONNEL(LCL/GND/CLNC)				
4. (C) COMMUNICATIONS - INADEQUATE - ATC PERSONNEL(LCL/GND/CLNC)				
5. (F) IMPROPER DECISION - ATC PERSONNEL(SUPERVISOR)				
6. (F) IDENTIFICATION OF AIRCRAFT ON RADAR - NOT RECOGNIZED - ATC PERSONNEL(LCL/GND/CLNC)				
7. (F) IDENTIFICATION OF AIRCRAFT VISUALLY - NOT RECOGNIZED - ATC PERSONNEL(LCL/GND/CLNC)				
8. (C) UNSAFE/HAZARDOUS CONDITION - DELAYED - ATC PERSONNEL(LCL/GND/CLNC)				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
a loss of separation between Southwest flight 440 and Ariana flight 204 due to the LC2 relief controller's failure to appropriately monitor the operation and recognize a developing traffic conflict. Contributing factors included the FAA's position relief briefing procedures, the formatting of the DBRITE radar displays in the LAX tower, controller fatigue, and the tower supervisor's staffing decisions on the day of the incident.



This space is pending.


National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSS ID: LAX04LA318 Occurrence Date: 09/13/2004 Occurrence Type: Accident	
<b>Narrative (Continued)</b> <p>produced by heavy aircraft. Flying slowly, in a clean configuration (i.e., flaps and landing gear retracted). For example, a large or heavy aircraft that must reduce its speed to 250 knots below 10,000 feet and is flying in a clean configuration while descending, produces a very strong wake. Extra caution is needed when flying below and behind such aircraft. The FMA recommends the following to avoid wake turbulence when following another aircraft: "Stay either on or above the preceding aircraft's flight path, upwind, or at least 1,000 feet below."</p>			
Page 1a			

This space is pending.

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSS ID: LAX04LA318 Occurrence Date: 09/13/2004 Occurrence Type: Accident		Aircraft Registration Number: N601WN Most Critical Injury: Serious Investigated By: NTSB	
<b>Location/Time</b> Nearest City/Place: Los Angeles State: CA Zip Code: 90045 Local Time: 2003 Time Zone: PDT Airport Proximity: Off Airport/Airstrip Distance From Landing Facility: 8					
<b>Aircraft Information Summary</b> Aircraft Manufacturer: Boeing Model/Serial: 737-3H4 Type of Aircraft: Airplane					
Revenue Sightseeing Flight: No Air Medical Transport Flight: No					
<b>Narrative</b> <p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On September 13, 2004, at 2003 Pacific daylight time, a Boeing 737-3H4 transport category airplane, N601WN, operated by Southwest Airlines as flight 1437, landed uneventfully after encountering wake turbulence while on approach to the Los Angeles International Airport (LAX), Los Angeles, California. Two flight crew, 2 cabin attendants, and 42 passengers were uninjured, while 1 flight attendant sustained serious injuries. The airplane was not damaged. Southwest Airlines was operating the airplane, registered to a trustee and leased to Southwest, under the provisions of 14 CFR Part 121 as a scheduled domestic passenger flight. The flight originated from Salt Lake City, Utah, and was destined for LAX. Visual meteorological conditions prevailed, and an instrument flight rules flight plan had been filed.</p> <p>According to a written statement provided by Southwest Airlines safety department, the airplane was on the SADD 6 arrival into LAX, and was following a Boeing 747 located approximately 5 miles ahead at 10,000 feet. The accident flight was about a mile west of the Santa Monica (SMO) very-high frequency omni-directional radio range navigation aid and at 10,000 feet and 250 knots, when the flight crew experienced a "quick and violent roll of about 35 degrees to the left due to wake turbulence from the preceding [Boeing] 747." The captain righted the airplane and the first officer informed air traffic control that they had encountered wake turbulence and were going to offset to the north of the 747's course to avoid any additional wake turbulence. The remaining portion of the flight was uneventful.</p> <p>According to air traffic control records from the Southern California Terminal Radar Control, controllers cautioned Southwest flight 1437 of wake turbulence from the preceding heavy Boeing 747. The flight crew responded and indicated that they had the Boeing 747 in sight.</p> <p>According to Southwest Airlines written statement, the fasten seat belt sign was illuminated and none of the passengers were out of their seats. However, the flight attendants had not been seated yet (usual time for flight attendants to be seated is during descent out of 10,000 feet). A flight attendant, who was standing in the aft galley at the time of the turbulence encounter, was injured in the cabin area. Southwest Airlines learned the extent of the flight attendant's injuries (broken ribs) 2 days following the event and then notified the National Transportation Safety Board Southwest Regional Office.</p> <p>The Safety Board authorized Southwest Airlines to download the data from the flight data recorder (FDR) for review. The information gleaned from the FDR revealed that the airplane experienced between +0.734 and +1.547 g's in vertical acceleration, -0.028 and +0.104 g's in longitudinal acceleration, and -0.181 and +0.271 g's in lateral acceleration.</p> <p>According to the Federal Aviation Administration's (FAA) safety product brochure titled "CAUTION Wake Turbulence" (<a href="http://www.asf.faa.gov/safety_products/wake.htm">www.asf.faa.gov/safety_products/wake.htm</a>), the intensity or strength of the vortex is primarily a function of aircraft weight and configuration. The strongest vortices are</p>					
Page 1 FACTUAL REPORT - AVIATION					

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04LA318		Occurrence Date: 09/13/2004		Occurrence Type: Accident																																																																																																	
First Pilot Information																																																																																																							
Name On File	City On File	State On File	Date of Birth On File	Age 47																																																																																																			
Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File																																																																																																				
Certificate(s):		Airline Transport																																																																																																					
Airplane Rating(s):		Multi-engine Land																																																																																																					
Rotorcraft/Glider/TA: None																																																																																																							
Instrument Rating(s): Airplane																																																																																																							
Instructor Rating(s): None																																																																																																							
Current Biennial Flight Review? 08/2004																																																																																																							
Medical Cert: Class 1		Medical Cert. Status: Valid Medical--no waivers/lim.		Date of Last Medical Exam: 07/2004																																																																																																			
<table border="1"> <tr> <th>Flight Time Matrix</th> <th>ATC</th> <th>Time</th> <th>Engine</th> <th>Single Engine</th> <th>Multi-Engine</th> <th>Night</th> <th>Instrument</th> <th>Simulator</th> <th>Recurrent</th> <th>Other</th> <th>Other</th> </tr> <tr> <td>Total Time</td> <td>9300</td> <td>4760</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Pilot in Command (PIC)</td> <td>3000</td> <td>175</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instruction Received</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 90 Days</td> <td>195</td> <td>195</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 30 Days</td> <td>64</td> <td>64</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 24 Hours</td> <td>5</td> <td>5</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								Flight Time Matrix	ATC	Time	Engine	Single Engine	Multi-Engine	Night	Instrument	Simulator	Recurrent	Other	Other	Total Time	9300	4760										Pilot in Command (PIC)	3000	175										Instructor												Instruction Received												Last 90 Days	195	195										Last 30 Days	64	64										Last 24 Hours	5	5									
Flight Time Matrix	ATC	Time	Engine	Single Engine	Multi-Engine	Night	Instrument	Simulator	Recurrent	Other	Other																																																																																												
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Last 90 Days	195	195																																																																																																					
Last 30 Days	64	64																																																																																																					
Last 24 Hours	5	5																																																																																																					
Seabuilt Used? Yes		Shoulder Harness Used? Yes		Toxicology Performed? No		Second Pilot? Yes																																																																																																	
Flight Plan/Itinerary																																																																																																							
Type of Flight Plan Filed: IFR																																																																																																							
Departure Point	State		UT	SLC	SLC	Departure Time	1915																																																																																																
Salt Lake City	State		UT	LAX	LAX	Time Zone	PDT																																																																																																
Destination	State		UT	LAX	LAX																																																																																																		
Same as Accident/Incident Location																																																																																																							
Type of Clearance: IFR; VFR																																																																																																							
Type of Airspace: Class B																																																																																																							
Weather Information																																																																																																							
Source of WX Information:																																																																																																							
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FACTUAL REPORT - AVIATION																																																																																																							
Page 3																																																																																																							

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04LA318		Occurrence Date: 09/13/2004		Occurrence Type: Accident	
Landing Facility/Approach Information							
Airport Name	Los Angeles International	Airport ID:	LAX	Airport Elevation	126 Ft. MSL	Runway Used	24R
Runway Length	8925	Runway Width	150				
Runway Surface Type:	Concrete						
Runway Surface Condition:	Dry						
Approach/Arrival Flow:	Visual						
VFR Approach/Landing:	Full Stop						
Aircraft Information							
Aircraft Manufacturer	Boeing	Model/Serial	737-314	Serial Number	27695		
Airworthiness Certificate(s):	Transport						
Landing Gear Type: Retractable - Tricycle							
Amateur Built Airt? No	Number of Seats: 145	Certified Max Gross Wt.	139000 LBS	Number of Engines: 2			
Engine Type: Turbo Fan	Engine Manufacturer: General Electric	Model/Serial: CFM-56	Rated Power: 20000 LBS				
Aircraft Inspection Information							
Type of Last Inspection	Continuous Airworthiness	Date of Last Inspection	07/2004	Time Since Last Inspection	792 Hours	Airframe Total Time	32767 Hours
Emergency Locator Transmitter (ELT) Information							
ELT Installed? Type No	ELT Operated?	ELT Aided in Locating Accident Site?					
Owner/Operator Information							
Registered Aircraft Owner	Southwest Airlines Co	Street Address	2833 Shorecrest Drive	City	Dallas	State	TX
Operator of Aircraft	Southwest Airlines Co	Street Address	2833 Shorecrest Drive	City	Dallas	State	TX
Operator Does Business As: Southwest Airlines	Operator Designator Code: SWAA						
Type of U.S. Certificate(s) Held:							
Air Carrier Operating Certificate(s): Flag Carrier/Domestic							
Operating Certificate:							
Regulation Flight Conducted Under: Part 121; Air Carrier							
Type of Flight Operation Conducted: Scheduled; Passenger Only							
FACTUAL REPORT - AVIATION							
Page 2							

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION ACTIVITY SECTION	NTSB ID: LAX04LA318
	Occurrence Date: 09/13/2004
	Occurrence Type: Accident
<b>Administrative Information</b>	
Investigator-In-Charge (IIC) Nicole L. Chamon	
Additional Persons Participating in This Accident/Incident Investigation:  Fred Griffin Federal Aviation Administration El Segundo, CA	

Page 5

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX04LA318	
		Occurrence Date: 09/13/2004	
		Occurrence Type: Accident	

Weather Information			
WOF ID	Observation Time	Time Zone	WOF Distance From Accident Site
LAX	2003	PDT	126 FL MSL
Sky/lowest Cloud Condition: Few		FL AGL	8 NM
Lowest Ceiling: None		Visibility	Condition of Light: Day
Temperature: 22 °C		1300 FL AGL	29.79 °Hg
Dew Point: 18 °C		10 SM	
Wind Direction:		Weather Conditions at Accident Site: Visual Conditions	
Wind Speed: Calm		Wind Gusts:	
Visibility (RVR):	FL	SM	
Precip and/or Obscuration: No Obscuration; No Precipitation			

Accident Information	
Aircraft Damage: None	Aircraft Fire: None
Aircraft Explosion: None	

- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL
First Pilot				1	1
Second Pilot				1	1
Student Pilot					
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants		1		2	3
Other Crew					
Passengers				42	42
- TOTAL ABOARD -		1		46	47
Offie Ground					
- GRAND TOTAL -		1		46	47

FACTUAL REPORT - AVIATION	
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Brief of Accident

Adopted 01/31/2006

LAX04LA318 File No. 19011	09/13/2004	Los Angeles, CA	Aircraft Reg No. N601WN	Time (Local): 20:03 PDT
Make/Model: Boeing / 737-3H4	Engine Make/Model: General Electric / CFM-56	Aircraft Damage: None	Crew Fatal: 0	Serious: 1
Number of Engines: 2	Operating Certificate(s): Flag Carrier/Domestic	Name of Carrier: Southwest Airlines Co	Pass: 0	Minor/None: 4
Type of Flight Operation: Scheduled; Domestic; Passenger Only	Reg. Flight Conducted Under: Part 121: Air Carrier			42
Last Depart. Point: Salt Lake City, UT	Destination: Same as Accident/Incident Location	Condition of Light: Day		
Airport Proximity: Off Airport/Airstrip		Weather Info Src: Weather Observation Facility		
		Basic Weather: Visual Conditions		
		Lowest Ceiling: None		
		Visibility: 10.00 SM		
		Wind Dir/Speed: Calm		
		Temperature (°C): 22		
		Precip/Obscuration: No Obscuration; No Precipitation		
Pilot-in-Command	Age: 47	Flight Time (Hours)		
Certificate(s)/Rating(s)	Airline Transport, Multi-engine Land	Total All Aircraft: 9300		
		Last 90 Days: 195		
Instrument Ratings		Total Make/Model: 4700		
Airplane		Total Instrument Time: Unk/Nr		

A flight attendant sustained serious injuries when the Boeing 737 transport category airplane encountered wake turbulence while following behind a Boeing 747 on approach. The injured flight attendant was standing in the aft galley at the time of the event. Air traffic controllers issued a wake turbulence caution to the 737, which was level at 10,000 feet and trailing behind a 747 that was also level at 10,000 feet. According to the accident flight crew, they trailed behind the 747 by 5 miles; however, they still experienced a sudden and violent roll to the left of about 35 degrees. The flight crew righted the airplane and offset their flight path to the north of the 747's flight path. The airplane then landed uneventfully. Review of the aircraft's flight data recorder information revealed the fasten seat belt sign was illuminated and the passengers were all seated at the time of the event. However, the cabin attendants were not yet seated for landing. The Federal Aviation Administration's recommended procedures for avoiding wake turbulence while following another airplane (stay either on or above the preceding aircraft's flight path, upwind, or at least 1,000 feet below) was being followed at the time of the upset.

Brief of Accident (Continued)

LAX04LA318 File No. 19011	09/13/2004	Los Angeles, CA	Aircraft Reg No. N601WN	Time (Local): 20:03 PDT
Occurrence #1: VORTEX TURBULENCE ENCOUNTERED				
Phase of Operation: APPROACH				
Findings				
1. (C) WAKE TURBULENCE - ENCOUNTERED - FLIGHTCREW				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.  
the flight's encounter with the wake turbulence from a preceding heavy airplane while on approach.

This report is pending

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX05LA105 Aircraft Registration Number: N394AE	
Occurrence Date: 02/11/2005 Occurrence Type: Accident		Most Critical Injury: Serious Investigated By: NTSB	
Location/Time			
Nearest City/Place Los Angeles	State CA	Zip Code 90245	Local Time 1645 Time Zone PST
Airport Proximity: Off Airport/Airstrip Distance From Landing Facility:			
Aircraft Information Summary			
Aircraft Manufacturer SAAB-SCANIA		Model/Serial SAAB 340B	
Type of Aircraft Airplane			
Revenue Sightseeing Flight No		Air Medical Transport Flight No	
Narrative Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident. <b>HISTORY OF THE FLIGHT</b> <p>On February 11, 2005, at 1645 Pacific standard time, a Saab 340B, N394AP, encountered turbulence during an approach to landing at Los Angeles International Airport, Los Angeles, California. During the turbulence encounter, the flight attendant was knocked unconscious. American Eagle (AE) was operating the airplane as flight 3030 under the provisions of 14 CFR Part 121 as a domestic scheduled passenger flight. The airline transport pilot, commercial copilot, and 28 passengers were not injured; the sole flight attendant sustained serious injuries. The flight departed from Monterey, California, at 1528, and was destined for Los Angeles. Visual meteorological conditions prevailed, and the flight was operating on an instrument flight plan.</p> <p>According to the airline's safety officer, the airplane passed over the Ventura (VTU) vhf omni-directional range (VOR) (VTU) at 5,000 feet mean sea level, and about 4 minutes later, the flight crew encountered turbulence. The airplane was about 7 minutes from landing. The flight attendant was completing his before landing checklist when turbulence was encountered. The flight attendant impacted the ceiling of the cabin, lost consciousness, regained consciousness a few seconds later, and positioned himself in an empty passenger seat. A deadheading flight attendant assumed the injured flight attendant's duties. About 2 minutes prior to landing, the injured flight attendant resumed his responsibilities for the remainder of the flight.</p> <p>In the captain's statement supplied by AE, he reported that the flight encountered wake turbulence from a preceding Boeing 747. He stated that additional turbulence was not noted during the flight, nor was any forecast.</p> <p><b>RADAR INFORMATION</b></p> <p>A National Transportation Safety Board air traffic control specialist reviewed recorded radar data for the accident flight. The data indicated that a Boeing 747 preceded AE flight 3030 during its approach into Los Angeles. Federal Aviation Administration (FAA) regulations state that these airplanes must maintain separation of at least 6 miles when landing on the same runway. Review of the radar data showed that the spacing was at least 6 miles during the approach into Los Angeles International Airport.</p> <p><b>METEOROLOGICAL INFORMATION</b></p> <p>A Safety Board meteorologist reviewed the weather data surrounding the flight. Weather reports indicated that airman's meteorological information (AIRMET) Update 6 was issued for turbulence. The AIRMET indicated occasional moderate turbulence below 12,000 feet. The flight release for AE flight 3030 was obtained and reviewed. Investigators noted that AIRMET Update 2 was listed on the release; however, AIRMET Update 6 (valid for the accident flight) was not listed. The full release, however, AIRMET Update 6 (valid for the accident flight) was not listed. The full release, however, AIRMET Update 6 (valid for the accident flight) was not listed.</p>			
FACTUAL REPORT - AVIATION			

Page 1

This report is pending

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX05LA105 Occurrence Date: 02/11/2005 Occurrence Type: Accident	
Narrative (Continued)			
meteorological factual report is located in the official docket for this accident. <p>At the time of the accident, AE's weather provider was WNI. Information contained on the release issued by WNI indicated to the crew that no significant turbulence was present. According to information (SIGMET) or significant meteorological conditions (SIGMETs) was present. According to AE personnel, WNI procedures called for staff meteorologists to evaluate the weather and determine the current and forecast conditions. In the case of the accident flight, SIGMET Yankee was canceled at 1630 because the current pilot reports (PIREPS) indicated that conditions had diminished. Although an AIRMET was in effect at the time of the accident for moderate or greater turbulence, there were no other supporting indicators to the staff meteorologist that moderate or greater turbulence was present along the route of flight. The meteorologist then made a judgment call based upon the information available. In this particular case, due to the cancellation of the SIGMET and the lack of additional supporting information for moderate or greater turbulence, the meteorologist did not issue a SIGMET. Therefore, the turbulence information was not on the release.</p> <p><b>ADDITIONAL INFORMATION</b></p> <p>The National Weather Service (NWS) issues SIGMET and AIRMET information. A SIGMET is an internal product specific to American Airlines (and AE) for the issuance of significant meteorological conditions based on information obtained from the NWS. AE's weather provider was changed to WSI a few weeks following the accident. WSI policy states that moderate or greater turbulence is considered SIGMET criteria. This information is displayed through the issuance of a SIGMET on the flight release as well as graphically on a chart.</p> <p>In Aviation Weather Services (AC 00-45E) it states that the maximum forecast period for an AIRMET is 6 hours. AIRMETs "...are considered 'widespread' because they must be either affecting or be forecasted to affect an area of at least 3,000 square miles at any one time. However, if the total area to be affected during the forecast period is very large, it could be that in actuality only a small portion of this total area would be affected at any one time."</p> <p>Federal Aviation Regulations (FAR) 121.101, Weather reporting facilities, and 121.601, Aircraft dispatcher information to pilot in command: Domestic and flag operations, outline air carrier weather procedures. FAR 121.101 states, in part, "that each certificate holder that uses forecasts to control flight movements shall use forecasts prepared from weather reports specified by the United States National Weather Service, or a source approved by the United States National Weather Service, or by a source approved by the administrator. Furthermore, each certificate holder shall adopt and use an approved system for obtaining forecasts and reports of adverse weather phenomena." FAR 121.601 states, in part, "that before beginning a flight, the aircraft dispatcher shall provide the pilot in command with all available weather reports and forecasts of weather phenomena that may affect the safety of flight, including adverse weather phenomena."</p>			
FACTUAL REPORT - AVIATION			

Page 1a


National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX05LA105		Occurrence Date: 02/11/2005		Occurrence Type: Accident																																																																																	
First Pilot Information																																																																																							
Name	City	State	Date of Birth	Age																																																																																			
On File	On File	On File	On File	28																																																																																			
Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File																																																																																				
Certificate(s): Airline Transport; Flight Instructor; Commercial																																																																																							
Airplane Rating(s): Multi-engine Land; Single-engine Land																																																																																							
Rotorcraft/Glider/TA: None																																																																																							
Instrument Rating(s): Airplane																																																																																							
Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine; Instrument Airplane																																																																																							
Current Biennial Flight Review? 12/2004																																																																																							
Medical Cert. Class 1				Date of Last Medical Exam: 01/2005																																																																																			
Medical Cert. Status: With Waivers/Limitations																																																																																							
<table border="1"> <tr> <th>Flight Time Matrix</th> <th>Air AC</th> <th>Time Made and Used</th> <th>Acrobat Single Engine</th> <th>Acrobat Multi Engine</th> <th>Light</th> <th>Instrument</th> <th>Endorsement</th> <th>Other</th> <th>License</th> </tr> <tr> <td>Total Time</td> <td>5531</td> <td>3398</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Pilot in Command (PIC)</td> <td>1408</td> <td>1408</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Instruction Received</td> <td>128</td> <td>128</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 90 Days</td> <td>62</td> <td>62</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 30 Days</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Last 24 Hours</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> </table>								Flight Time Matrix	Air AC	Time Made and Used	Acrobat Single Engine	Acrobat Multi Engine	Light	Instrument	Endorsement	Other	License	Total Time	5531	3398								Pilot in Command (PIC)	1408	1408								Instructor										Instruction Received	128	128								Last 90 Days	62	62								Last 30 Days										Last 24 Hours									
Flight Time Matrix	Air AC	Time Made and Used	Acrobat Single Engine	Acrobat Multi Engine	Light	Instrument	Endorsement	Other	License																																																																														
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Seabed Used? Yes		Shoulder Harness Used? Yes		Toxicology Performed?		Second Pilot? Yes																																																																																	
Flight Plan/Itinerary																																																																																							
Type of Flight Plan Filed: IFR																																																																																							
Departure Point		State	Airport Identifier	Departure Time	Time Zone																																																																																		
Montreux		CA	MRY	1528	PST																																																																																		
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FACTUAL REPORT - AVIATION																																																																																							
Page 3																																																																																							

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX05LA105		Occurrence Date: 02/11/2005		Occurrence Type: Accident	
Landing Facility/Approach Information							
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width		
		Fl. MSL	NA				
Runway Surface Type: Unknown							
Runway Surface Condition: Unknown							
Approach/Arrival Flown: ILS							
VFR Approach/Landing: None							
Aircraft Information							
Aircraft Manufacturer	Model/Serial	Serial Number					
SAAB-SCANIA	SAAB 340B	340B-394					
Airworthiness Certificate(s): Normal							
Landing Gear Type: Retractable - Tricycle							
Amateur Built Act? No	Number of Seats: 37	Certified Max Gross Wt.	29300 LBS	Number of Engines: 2			
Engine Type:	Engine Manufacturer:	Model/Serial	Rated Power:				
Turbo Prop	OE	C179B					
- Aircraft Inspection Information							
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time				
Continuous Airworthiness	11/2004	478 Hours	14432 Hours				
- Emergency Locator Transmitter (ELT) Information							
ELT Installed? Type No	ELT Operated? No	ELT Aided in Locating Accident Site? No					
Owner/Operator Information							
Registered Aircraft Owner	Street Address	City	State	Zip Code			
AMERICAN EAGLE AIRLINES	1700 West 20th St., MD 1200	Fort Worth	TX	75261			
Operator of Aircraft	Street Address	City	State	Zip Code			
AMERICAN EAGLE AIRLINES	1700 West 20th St., MD 1200	Fort Worth	TX	75261			
Operator Does Business As:	Operator Designator Code: AEEA						
- 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: Scheduled; Domestic; Passenger Only							
FACTUAL REPORT - AVIATION							
Page 2							

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX05LA105	
	Occurrence Date: 02/11/2005	
	Occurrence Type: Accident	
<b>Administrative Information</b> Investigator-in-Charge (IIC) Kristi Dunks  Additional Persons Participating in This Accident/Incident Investigation: Evan Wood Federal Aviation Administration Los Angeles, CA		

Page 5

FACTUAL REPORT - AVIATION

<div> <div>  <div> National Transportation Safety Board  <b>FACTUAL REPORT</b>  AVIATION </div> </div> <div> NTSB ID: LAX05LA105  Occurrence Date: 02/11/2005  Occurrence Type: Accident </div> </div>			
Weather Information			
WOF ID	Observation Time	Time Zone	WOF Elevation
LAX	1650	PST	1650 Ft. MSL
Sky/Lowest Cloud Condition: Scattered		1300 Ft. AGL	32 NM
Lowest Ceiling: Broken		2100 Ft. AGL	Condition of Light: Day
Temperature:	14 °C	Dew Point:	14 °C
Wind Direction:	100	Wind Speed:	11
Visibility (RVR):	FL	Visibility (RVR):	SM
Precip and/or Obscuration: No Obscuration; No Precipitation			
Accident Information			
Aircraft Damage: None		Aircraft Fire: None	
Aircraft Explosion: None			
- Injury Summary Matrix			
First Pilot	Fatal	Serious	Minor
Second Pilot			
Student Pilot			
Flight Instructor			
Check Pilot			
Flight Engineer			
Cabin Attendants			
Crew Crew			
Passengers			
- TOTAL ABOARD -			
Other Ground			
- GRAND TOTAL -			

## Brief of Accident

Adopted 07/31/2006

LAX05LA105 File No. 20108	02/11/2005	Los Angeles, CA	Aircraft Reg No. N394AE	Time (Local): 16:45 PST
Make/Model: Saab-scania / SAAB 340B	Engine Make/Model: Gs / CT79B	Aircraft Damage: None	Number of Engines: 2	Operating Certificate(s): Flag Carrier/Domestic
Name of Carrier: AMERICAN EAGLE AIRLINES	Type of Flight Operation: Scheduled; Domestic; Passenger Only	Reg. Flight Conducted Under: Part 121: Air Carrier	Fatal: 0	Serious: 1
			Crew Pass: 0	Minor/None: 2
				28
Last Depart. Point: Monterey, CA	Destination: Los Angeles, CA	Airport Proximity: Off Airport/Airstrip	Condition of Light: Day	Weather Info Src: Weather Observation Facility
				Basic Weather: Visual Conditions
				Lowest Ceiling: 2100 Ft. AGL, Broken
				Visibility: 7.00 SM
				Wind Dir/Speed: 100 / 011 Kts
				Temperature (°C): 14
				Precip/Obscuration: No Obscuration; No Precipitation
Pilot-in-Command	Age: 28		Flight Time (Hours)	
Certificate(s)/Rating(s)	Airline Transport; Flight Instructor; Commercial; Multi-engine Land; Single-engine Land		Total All Aircraft: 5531	
			Last 90 Days: 128	
			Total Make/Model: 3398	
Instrument Ratings			Total Instrument Time: Unk/Nr	
Airplane				

The airplane encountered turbulence at 5,000 feet mean sea level (msl) during an approach to landing and the sole flight attendant was knocked unconscious and sustained serious injuries. The airplane was about 7 minutes from landing, and the flight attendant was completing his before landing checklist when turbulence was encountered. After regaining consciousness a few seconds later, he was able to get to an empty passenger seat. A deadheading flight attendant assumed the incapacitated flight attendant's duties. Review and analysis of available weather data and forecast products showed that airman's meteorological information (AIRMET) Update 6 was issued by the National Weather Service (NWS) and in effect for the flight for occasional moderate turbulence below 12,000 feet. A review of the meteorological data showed that the airplane was operating in conditions that would have supported at least moderate turbulence below 10,000 feet msl. The weather packet included in the flight release provided to the flight crew by the airline's dispatch prior to the flight contained information for AIRMET Update 3; however, AIRMET Update 6 (valid for the accident flight) was not listed. Information contained on the release indicated to the crew that no moderate or greater turbulence was present along the route of flight. At the time of the accident, the airline's contract weather provider evaluated current meteorological data and staff meteorologists used their judgment of the weather to issue a SIGMET (significant meteorological conditions, a company issued advisory) based on the current weather conditions. NWS-issued SIGMET Yankee was canceled at 1630 because the current pilot reports (PIREPS) indicated that previously forecasted turbulent conditions had diminished. Although an AIRMET was in effect at the time of the accident for moderate or greater turbulence, there were no other supporting indicators to the airline staff meteorologist that moderate or greater turbulence was present along the route of flight. Due to the cancellation of the SIGMET and the lack of additional supporting information for moderate or greater turbulence, the meteorologist did not issue a SIGMET. Therefore, the turbulence information was not on the flight release

## Brief of Accident (Continued)

LAX05LA105 File No. 20108	02/11/2005	Los Angeles, CA	Aircraft Reg No. N394AE	Time (Local): 16:45 PST
provided to the flight crew.				

LAX05LA105  
File No. 20108

02/11/2005

Los Angeles, CA

Aircraft Reg No. N394AE

Time (Local): 16:45 PST

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER  
Phase of Operation: DESCENT - NORMAL

## Findings

1. (C) WEATHER CONDITION - TURBULENCE

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows:  
the in-flight encounter with turbulence.

(This space is blank)

<b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: LAX05FA202		Aircraft Registration Number: N960SW	
		Occurrence Date: 08/12/2005		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
<b>Location/Time</b> Nearest City/Place: Los Angeles State: CA Zip Code: 90009 Local Time: 2226 Time Zone: PDT					
Airport Proximity: On Airport/Airstrip Distance From Landing Facility:					
<b>Aircraft Information Summary</b> Aircraft Manufacturer: Bombardier Aerospace, Inc. Model/Serial: CL-600-2B19 Type of Aircraft: Airplane					
Revenue Sightseeing Flight: No Air Medical Transport Flight: No					
<b>Narrative</b> Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: <b>2.1 HISTORY OF FLIGHT</b> <p>On June 12, 2005, about 2226 Pacific daylight time, a Bombardier CL-600-2B19, N960SW, operated by SkyWest Airlines, Inc., as United Express flight 6543, contacted the runway with the nose landing gear partially extended at the Los Angeles International Airport (LAX), Los Angeles, California. The airline transport pilot and first officer, 1 flight attendant, and 14 passengers were not injured; the airplane sustained substantial damage. Instrument meteorological conditions prevailed for the 14 CFR Part 121 scheduled domestic passenger flight that was operating on an instrument flight rules (IFR) flight plan. The flight originated from LAX at 2137, with a planned destination of Santa Barbara Municipal Airport (SBA), Santa Barbara, California.</p> <p>A review of the SkyWest Airlines Aircraft Flight Log disclosed that the accident flight was scheduled to be the flight crew's fourth trip of the day, corresponding to the airplane's eighth flight. The 31-minute accident flight was scheduled to depart from LAX at 2125, and terminate in SBA at 2156. The accident flight crew indicated that the preflight inspection was normal and that no maintenance discrepancies were noted.</p> <p>During post accident interviews, the flight crew stated to a National Transportation Safety Board investigator that the takeoff and en route portions of the flight to SBA were normal and uneventful. The captain stated that as the airplane entered the vicinity of the airport, he began the landing checklist and called for the first officer to extend the landing gear to the down and locked position. Upon manipulating the landing gear lever into the down position, both pilots heard the nose landing gear (NLG) doors open almost immediately.</p> <p>Several seconds after the landing gear lever was selected to the down position, the pilots noted a "gear disagree" warning message displayed on the Engine Indicating and Crew Alerting System (EICAS), accompanied by a simultaneous warning chime. The primary page on the EICAS system displayed that the main landing gear (MLG) were down and locked with green box indications, and the nose gear was showing a red box, indicating that the nose landing gear was not fully extended.</p> <p>The captain opted to divert back to LAX in consideration that SBA was closing shortly and that LAX has longer runways and more emergency facilities. After receiving a clearance and maneuvering the airplane back toward Los Angeles, the pilots began to troubleshoot the gear indication with use of the airplane's Quick Reference Handbook (QRH). Following the checklist, the first officer pulled the manual release handle located between the pilot's seats, during which time the gear indication remained unchanged.</p> <p>With the EICAS continuing to display the unsafe gear indication, and the airplane approaching LAX, the captain declared an emergency. The airplane touched down on runway 35L, making initial contact with the MLG. The airplane continued to roll on the MLG, and as the ground speed dissipated the</p>					
Page 1 FACTUAL REPORT - AVIATION					




National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION 7/7/00	NTSB ID: LAX05FA202 Occurrence Date: 06/12/2005 Occurrence Type: Accident
<p><b>Narrative (Continued)</b></p> <p>Airlines was the sole operator of N960SW since its delivery from Bombardier in October 2003. The airplane was configured with 53 seats; 50 of which were passenger seats located in the main cabin.</p> <p>At the time of this writing there are approximately 740 CL-600-2B19 series airplanes operated in the United States. SkyWest Airlines has the third largest fleet consisting of about 125 airplanes.</p> <p><b>1.3.2 Maintenance, General</b></p> <p>At the time of the accident N960SW had accrued about 4,126 hours of flight time. SkyWest Airlines maintained the airplane on a continuous airworthiness basis following the Bombardier maintenance inspection program. The engines' total time were also about 4,126 hours, as they were the original engines equipped on the airplane at manufacture. The most recent continuous airworthiness check was conducted on April 26, 2005, which consisted of an A-2 inspection.</p> <p><b>1.3.3 Nose Landing Gear System Components</b></p> <p><b>1.3.3.1 System</b></p> <p>The nose landing gear (NLG) system is electrically activated and hydraulically operated by hydraulic system number 3. It is comprised of double-wheel and air-extending (forward retracting) landing gear body. The NLG system encompasses a landing gear lever, proximity sensor system, extension/retraction actuators, uplock assembly, selector valves, priority valve, bypass valves, restrictors, downlock, and check valves.</p> <p><b>1.3.3.2 Landing Gear Lever</b></p> <p>The airplane cockpit is equipped with a landing gear control panel. The control panel is located beneath the ECAS panels in the middle of the center pedestal (between the pilot seats). A landing gear operating lever is installed in the control panel, which when manipulated, sends an electrical extension or retraction command to the proximity sensor system; it additionally sends ground signals directly to the selector valves. The handle consists of a two-position control lever, and is designed to move up or down to select landing gear position; it is held into position by two mechanical detents.</p> <p><b>1.3.3.3 Proximity Sensor Electronic Unit</b></p> <p>The proximity sensor system operates by identifying the position of targets and giving a resulting command. The system is comprised of the Proximity Sensor Electronic Unit (PSEU), multiple proximity sensors, and numerous switches. The PSEU receives information via proximity sensors to determine the position of the nose landing gear.</p> <p>The PSEU serves several functions within the NLG system:</p> <ul style="list-style-type: none"> <li>-determines if the airplane is on the ground or in the air</li> <li>-monitors for gear up, down and transit status</li> <li>-determines if the landing gear doors are open or closed</li> <li>-provides commands to extend or retract the landing gear</li> <li>-provides commands to open and close the NLG forward doors</li> <li>-records faults of any contradictions or discrepancies</li> </ul> <p><b>1.3.3.4 Actuators</b></p> <p>A single piston, double-acting hydraulic actuator is utilized in the NLG system to hydraulically move the NLG body into the extended or retracted position. The actuator assembly includes a piston, cylinder, retractor, and several hydraulic seals. The cylinder body is comprised of two hydraulic ports: one for fluid to extend the actuator piston, and the other used to permit fluid to</p>	
Page 10	

FACTUAL REPORT-AVIATION

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION 7/7/00	NTSB ID: LAX05FA202 Occurrence Date: 06/12/2005 Occurrence Type: Accident
<p><b>Narrative (Continued)</b></p> <p>nose lowered. The nose contacted the runway surface and the airplane slid to a stop. All the crew and passengers egressed the airplane through the main cabin door without further incident.</p> <p>According to a SkyWest Airlines maintenance manager who responded to the accident, the airplane came to rest on the nose landing gear doors; the NLG uplock pin was released from the uplock assembly. The nose of the aircraft was lifted from the runway surface with air bags. As the nose was raised from the runway, the NLG extended freely from the wheel well, and continued to the down and locked position without any outside force (hydraulic or manual). The nose tires continually remained in contact with the runway surface while being recovered. The aircraft was then towed to the United Airlines ramp area.</p> <p><b>1.2 PERSONNEL INFORMATION</b></p> <p><b>1.2.1 Captain</b></p> <p>The captain was hired by SkyWest Airlines on March 23, 1996. A review of information on file with the Federal Aviation Administration (FAA) Airman's Certification Division, Oklahoma City, Oklahoma, revealed that the captain was issued an airline transport pilot certificate on December 22, 1996, with ratings for airplane single engine land, multiengine land and instrument airplane. The captain additionally held an airplane and powerplant mechanic certificate. He was last issued a first-class medical certificate on January 17, 2005, with the limitation that he must wear corrective lenses while exercising the privileges of his airman certificate.</p> <p>The captain received a type rating for the CL-65 on August 4, 2001. SkyWest Airlines records indicated that the captain had accumulated 11,728 hours total flight experience. He had amassed 4,636 hours in the CL-65 series airplane, of which 3,229 hours he was pilot-in-command (PIC). He had flown about 189, 55, and 5 hours in the 90 days, 30 days, and 24 hours, respectively, before the accident. The captain's last CL-65 proficiency check was marked as completed on March 12, 2005; his last competency check and route check marked as completed on September 06, 2004; and his last simulator check marked as completed on September 15, 2004.</p> <p><b>1.2.2 First Officer</b></p> <p>The first officer was hired by SkyWest Airlines on December 2, 2002. According to the FAA, he held a commercial pilot certificate with ratings for airplane single engine land, multiengine land and instrument airplane. He held a first-class medical certificate that was issued on October 14, 2004, without limitation.</p> <p>SkyWest Airlines records indicated that the first officer had accumulated 3,145 hours total flight experience. He had amassed 1,768 hours in the CL-65 series airplane and had flown about 245, 72, and 5 hours in the 90 days, 30 days, and 24 hours, respectively. The first officer's last CL-65 proficiency check was marked as completed on May 20, 2004; his last competency and simulator check was marked as completed on May 13, 2005; and his last route check was marked as completed May 20, 2005.</p> <p><b>1.3 AIRCRAFT INFORMATION</b></p> <p><b>1.3.1 Airplane, General</b></p> <p>The Bombardier Canadair Regional Jet (CRJ) CL-600-2B19 is a twin-engine turbo fanjet. It is certified under the bilateral certification treaty with Canada in effect since 1971. The CRJ-100 (also known as the CRJ-200 and CL-600-2B19) is included in FAA Type Certification A21AS; it was certified January 21, 1993.</p> <p>The accident transport-category airplane, serial number 7853, was manufactured in 2003. SkyWest</p>	
Page 11	

FACTUAL REPORT-AVIATION


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<div style="text-align: center;">    <b>NATIONAL TRANSPORTATION SAFETY BOARD</b>   <b>FACTUAL REPORT</b>   <b>AVIATION</b> </div>	NTSS ID: LAV05FA202 Occurrence Date: 06/12/2005 Occurrence Type: Accident
Narrative (Continued)	
<p>the retract port (on the opposite side of the cylinder). Restrictors installed in the system control the speed of the actuator during extension or retraction.</p> <p>The forward NIG doors are equipped with a similar type of actuator to position the doors in the extended or retracted (open or closed) position.</p> <p>1.3.3.5 Uplock</p> <p>The uplock assembly, which is attached to structure in the nose wheel well, locks the NIG body in the retracted position. The locking mechanism (uplock claw) consists of a latch and latch lever assembly. The latch lever assembly is designed with a roller, which engages a shoulder of the latch to secure it in the up and locked position. The latch-lever pivots on bushings located in the body of the unit.</p> <p>A hydraulic actuator assembly releases the mechanical uplock, permitting the NIG to be extended. When the actuator is fully pressurized, the piston extends resulting in the uplock lever moving. When the uplock lever is moved, the roller mechanism lifts out of engagement with the latch. A combination of the actual weight of the NIG body and springs acting on the uplock latch further turn the latch to release the uplock pin; the NIG is designed to then freely fall to an extended position. Although the uplock is normally released hydraulically, there are two co-axial mechanical release levers installed on the body of the uplock. One is used as the release mechanism during emergency gear landing extension, following an extension/retraction system malfunction, while the other is a manual release used during maintenance.</p> <p>The uplock pin underwent a design improvement in November 2004, removing the possibility that an over torqued pin could cause the pin to stop rotating. At the same time the uplock pin bracket was redesigned with low friction bushings at the pin interface. The accident airplane did not have this modification/upgrade.</p> <p>The airplane maintenance manual (AMM) specifies that the rigging between the root of the uplock claw and the NIG uplock pin is a distance of 0.125 to 0.205 inches (which was applicable to the uplock pin installed on the accident airplane).</p> <p>1.3.3.6 Valves</p> <p>The selector valves are solenoid-operated, four-way, three-position type valves, which control the flow of hydraulic fluid to the extend or retract side of the NIG door actuator and NIG actuator. The landing gear lever position and resulting PSU command will activate the solenoid in the valve (must additionally have the landing gear lever ground).</p> <p>The priority valve is a relief valve, which ensures that the flight controls have hydraulic pressure priority during airplane operation. The valve is designed to close at a certain psi, starving the landing gear of fluid and permitting the flight control systems to function normally.</p> <p>The bypass valve allows hydraulic fluid to flow out of the up port of the NIG actuator back to the return pressure line.</p> <p>1.3.3.7 Doors</p> <p>The NIG system is equipped with three doors used to prevent damage to the system components within the wheel well and increase aerodynamic efficiency when the landing gear is in the retracted position. Two of the doors are operated hydraulically and hinged horizontally along the nose landing gear bay; they are independent of the NIG. The remaining door is located aft of the other NIG doors and hinged perpendicular, mechanically attached to the NIG. During extension, the forward doors open several seconds before the NIG is released from the uplock. The nose gear</p>	

FACTUAL REPORT - AVIATION

Page 15

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<div style="text-align: center;">    <b>NATIONAL TRANSPORTATION SAFETY BOARD</b>   <b>FACTUAL REPORT</b>   <b>AVIATION</b> </div>	NTSS ID: LAV05FA202 Occurrence Date: 06/12/2005 Occurrence Type: Accident
Narrative (Continued)	
<p>assembly will then extend, simultaneously opening the rear door. Upon reaching full extension (when the NIG is downlocked), the forward doors close and remain in that configuration until a retraction command is selected.</p> <p>1.3.4 Nose Landing Gear Extension</p> <p>As the flight crew selects the landing gear lever into the down position, an electrical signal is sent to the PSU. The PSU in turn will determine the ground condition (in air or on ground) and verify that all the required input signals are present and satisfied prior beginning to transit. If all conditions are met, the PSU sends a signal to energize the forward gear door selector valve to the down (door open) position.</p> <p>As the selector valve for the NIG doors opens, hydraulic fluid moves the piston in the door actuator, extending the forward doors to the full open position. The PSU recognizes that the door extended condition has been met and energizes the NIG selector valve. This allows hydraulic fluid from the number 3 hydraulic system to be directed through the priority valve to the selector valve.</p> <p>The selector valve opens, allowing hydraulic fluid to flow to the NIG uplock actuator and to the extend side of the NIG actuator. The selector valve additionally connects the retract side of the NIG actuator to the return pressure line.</p> <p>As the NIG is released from the uplock assembly, the NIG actuator extends, and with the aid of gravity, the NIG will reach the extended position where it is mechanically locked. The PSU senses the gear-down indication and will energize the NIG door selector valve, closing the forward nose landing gear doors. Throughout the process, the PSU updates the SICAS gear icons, graphically displaying the gear position on the screen for the flight crew.</p> <p>During the NIG extension, hydraulic pressure builds up in the retract line between the NIG selector valve and the actuator. This pressure increase is due to the presence of flow controls within the line, allowing a control of motion in the NIG. This is accomplished by providing a backpressure on the retract side of the NIG actuator. This back pressure creates a command pressure to the brake metering valve, enabling a brake command pressure to be sent to the NIG brakes. During the retraction, the pressure in the retract line also creates this brake command pressure to stop the main wheels from spinning when the landing gear are retracted. This increase in brake pressure is recorded on the digital flight data recorder (DFDR).</p> <p>1.3.5 Gear Disagree</p> <p>A function of the PSU is to monitor for unreasonable conditions (gear disagree), while recording faults in both the extension and retraction phases. This information is sent to the SICAS, enabling the flight crew to be aware of positions and activity. Corresponding codes are numerically recorded in the PSU non-volatile memory, recording an activity snapshot during a given period of disagree mode. The SICAS displays the landing gear system's position and faults associated with unreasonable conditions detected; the faults are additionally recorded. If the condition is rectified, the EICAS message will be removed from the display.</p> <p>The landing gear takes from 12 to 16 seconds to complete a cycle. The system allows a maximum of 28 seconds before an unreasonable condition is detected and a gear disagree message is relayed (the DFDR will also reflect if the delay condition is met). This unreasonable condition encompasses a situation if one or more landing gear is in a contradicting position to that of the landing gear lever.</p> <p>1.3.6 Manual Release System</p> <p>The manual release system (MRS) was designed as a fail-safe device in the event of an electrical or hydraulic failure of the landing gear system. The MRS is comprised of the manual release handle</p>	

FACTUAL REPORT - AVIATION


Page 16




<b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LA005FA202
	Occurrence Date: 06/12/2005 Occurrence Type: Accident
<b>Narrative (Continued)</b>	
<p>Review of the data revealed that as the aircraft passed through 3,000 feet, the NLG downlock indications changed to a down and locked indication while the nose gear remained in the not down and locked position. The uplock indications reveal that both the NLG and NRG simultaneously changed from the uplock position to the not uplocked position. Shortly after the indications that all landing gear changed to a not in the uplock position, the DFDR shows the gear disagree warning activated.</p> <p>A further review of the data disclosed the hydraulic pressure for the number 1 and 2 systems remained consistent for the duration of the flight. The number 3 system shows a momentary decrease in pressure at the same time duration as the not uplock indication. The pressure then levels out at 2,900 psi until reference number 422850 (corresponding to time 2208:36) where it drops to 0 psi momentarily then subsequently climbs to about 2,875 psi. The pressure changes are consistent with the manual release system being activated.</p> <p>No increase of brake pressure was recorded during the gear extension attempt.</p> <p>1.5.2 Cockpit Voice Recorder</p> <p>A review of the Cockpit Voice Recorder data revealed that the flight crew followed each step of the QRH. There was no indication that the flight crew ever cycled the landing gear lever, as it is not required in the QRH procedure.</p> <p>1.5 WRECKAGE AND IMPACT INFORMATION</p> <p>The airplane came to rest on runway 35L, with the nose supported by the lower fuselage structure and remaining forward NLG doors. The NLG roller was positioned out of the uplock assembly and the tires resting on the runway surface.</p> <p>The nose section of the airplane was damaged from scraping contact with the runway surface. The NLG forward doors sustained heavy abrasion damage with the remaining edge angled flat with the runway, an indication that they were fully open at the time the airplane made contact with the runway surface. The lower fuselage adjacent to and aft of the NLG wheel well, between stations 220 and 250, was scraped away. The aft door and its respective attachments and links were damaged. The steering manifold along with the electro-hydraulic servo valve, attached hydraulic lines and wiring harness exhibited heavy abrasion. The torque link apex joint sustained light abrasion damage and had an eroded appearance.</p> <p>1.7 TESTS AND RESEARCH</p> <p>1.7.1 Airplane Examination</p> <p>Representatives from Bombardier Aerospace, Messier-Dowty, SkyWest Airlines, the FAA, and the Safety Board initially examined the airplane the day following the accident.</p> <p>The manual release handle was extended out approximately 10 inches. The NLG tire pressure was measured to be about 140 psi, which the Bombardier representative said was an appropriate inflation pressure. The manual release system was cycled several times by use of the handle inside the cockpit; no anomalies were noted. The uplock pin and claw appeared normal, with slight indications of wear on the center of the pin (.25-inch-long wear mark centered on the pin body and about .001 inches diametrically) consistent with the contact point of the uplock claw. The uplock pin rotated freely and did not appear to be contaminated with any debris. The clearance between the back of the uplock pin to the uplock claw was measured to be .2 inches. No fouling or discoloration was noted on any of the NLG components and there was no evidence of wear or jamming of the NLG body or doors. The shock strut pressure was measured at 450 psi with 5 inches of chrome</p>	
<b>FACTUAL REPORT - AVIATION</b>	
Page 11	


<b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LA005FA202
	Occurrence Date: 06/12/2005 Occurrence Type: Accident
<b>Narrative (Continued)</b>	
<p>(inside the cockpit). Downlock assist actuator (only on NLG), release mechanism, landing gear, and landing gear door bypass valves.</p> <p>The flight crew activates the manual release handle by applying a vertical force of about 45 pounds to achieve an approximate 10 inches of handle travel (leaving about 1.5 inches of extra cable available). There is no means for the flight crew to confirm that they have reached the desired amount of handle movement. The mechanical energy from the handle movement is transmitted by a cable circuit to the NLG and NLG release mechanisms. The movement of the lever releases the hydraulically operated landing gear doors, uplocks, bypass valves, and door-bypass valves. The NLG and doors are asisted to the down (extended) position by spring pressure and aerodynamic flow.</p> <p>As the handle is pulled, the hydraulic system 3 pressure drops to approximately 2,800 to 2,900 pounds per square inch (psi). Hydraulic system 3 pressure will be restored to 3,000 psi when the handle is stowed.</p> <p>The manual release system is independent of the normal extension/retraction system with the exception of the NLG and NLG uplocks, as well as the bypass valves.</p> <p>1.3.7 Quick Reference Handbook</p> <p>The Bombardier Aerospace quick reference handbook (QRH) contains a landing gear emergency section, which the flight crews are instructed to follow in the event of a gear disagree message on the ECAS. The gear down disagree checklist, pages 13-6 through 13-7, prescribed a seven-step process to help rectify the problem. A complete copy of the QRH landing gear emergency section is contained in the public docket materials for this accident.</p> <p>In summary, the checklist first required the flight crew to configure the airplane at an airspeed no greater than 200 knots indicated (KIAS) and select the number 2 and 3B hydraulic pumps. The next step advised the flight crew to pull the landing gear manual release handle to "full extension," with a note that the force required to operate the handle is greater than 40 pounds. There was no guidance given as to the distance of travel the handle needs to exceed in an effort to be properly engaged.</p> <p>If the gear disagree message persisted, the checklist instructed the flight crew to turn "off" hydraulic systems 3A and 3B. After verifying the pressure had bled below 200 psi, the hydraulic systems should be selected back on. If the gear disagree message continued, the flight crew was advised to repeat the checklist. An additional note indicated that the manual release handle can be cycled more than once and should be pulled again if there was difficulty with the initial pull. The final step instructed the flight crew to use the landing gear up/unsafe landing procedure checklist if the ECAS still indicated a gear disagree condition.</p> <p>1.4 METEOROLOGICAL INFORMATION</p> <p>A routine aviation weather report (METAR) for LAX was issued at 2250. It stated: skies overcast at 900 feet; mist; visibility 6 miles; winds from 260 degrees at 8 knots; temperature 17 degrees Celsius; dew point 14 degrees Celsius; and altimeter of 29.92 inHg.</p> <p>1.5 FLIGHT RECORDERS</p> <p>1.5.1 Flight Data Recorder</p> <p>The aircraft was equipped with a 1-3 Communications (Fairchild) Model FA-2100 digital flight data recorder (QDR), serial number 000157748, which was removed from the aircraft and sent to the Safety Board's Vehicle Recorder Laboratory for readout and evaluation. A complete printout of the DFDR readout is in the public docket materials for this report.</p>	
<b>FACTUAL REPORT - AVIATION</b>	
Page 12	


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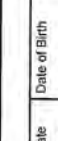
 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: LA05FA202
	Occurrence Date: 06/12/2005
	Occurrence Type: Accident
<b>Narrative (Continued)</b>	
<p>visible at approximately 70 degrees Fahrenheit, all of which the Bombardier representative said was normal.</p> <p>Following the initial examination in Los Angeles, the airplane was temporarily repaired by removing the NLG doors and replacing the steering manifold, hydraulic lines and harnesses. The airplane was ferried to SkyWest Airlines facilities in Salt Lake City, Utah, for further examination and testing.</p> <p>The examination in Salt Lake City occurred on June 17th through 20th, 2005, where numerous NLG systems tests were performed. The NLG system was actuated in many different configurations in an attempt to recreate the extension failure. No discrepancies were noted during the testing.</p> <p>The following components were removed for additional examination: shock strut (including drag brace), uplock assembly, retract/extension actuator, priority valve, selector valve, bypass valve, PSU, landing gear lever, and manual release handle. All further examinations were conducted under the auspice of a Safety Board investigator.</p> <p>1.7.1.1 NLG Assembly</p> <p>The NLG assembly, drag brace, retract actuator, and uplock were examined at Messier-Dowty on August 15 and 16, 2005. All components were defined as being in good condition and functioned within specification.</p> <p>1.7.1.2 PSU</p> <p>The PSU was sent to Eldec Corporation for the extraction of non-volatile memory and examination of unit. After receiving the downloaded data, the unit was functionally tested. According to the manufacturer, the PSU was in serviceable condition and performed to the requirements of the acceptance test procedure/plan (ATP). The following information was gathered from the PSU logic (written as fault code, description, and definition of code as confirmed by Eldec):</p> <ul style="list-style-type: none"><li>-C 114 Prox 21: unreasonable PAR (recorded 28 seconds after gear down selection) Nose gear downlock #1 (proximity sensor indicates not down and locked)</li><li>-D 112 Prox 35: unreasonable PAR (recorded 28 seconds after gear down selection) Nose gear downlock #2 (proximity sensor indicates not down and locked)</li><li>-C 110 Prox 30: unreasonable PAR (recorded 30 seconds after gear down selection) Left nose door closed (proximity sensor indicates left nose door not closed)</li><li>-C 118 Prox 31: unreasonable PAR (recorded 30 seconds after gear down selection) Right nose door closed (proximity sensor indicates right nose door not closed)</li><li>-C 11F Prox 32: unreasonable PAR (recorded 30 seconds after gear down selection) Nose door uplock lock (proximity sensor indicates nose doors not up and locked)</li><li>-C 135 Discrete Input 14: unreasonable GND (recorded 30 seconds after gear down selection) Left nose door open (micro-switch indicates left nose door was open)</li><li>-C 136 Discrete Input 15: unreasonable GND (recorded 30 seconds after gear down selection) Right nose door open (micro-switch indicates right nose door was open)</li></ul> <p>1.7.1.3 Valves</p> <p>The Bypass and NLG selector valves were tested at Tactair Fluid Controls, Inc., on August 11, 2005.</p>	
FACTUAL REPORT - AVIATION	
Page 1a	

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 National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: LA05FA202
	Occurrence Date: 06/12/2005
	Occurrence Type: Accident
<b>Narrative (Continued)</b>	
<p>The components tested in accordance with the ATP requirements. No anomalies were found.</p> <p>The priority valve was examined at Pneudraulics, Inc., on November 09, 2005. A functional check and subsequent teardown of the component revealed no anomalies. The valve was in good condition with no contaminants found inside the unit. The valve tested in accordance with the ATP requirements.</p> <p>1.7.2 System</p> <p>A review was conducted of several discrepancy databases to compile documentation of similar events related to NLG extension. Specifically, investigators sought out instances where the NLG failed to extend into the downlock position upon the activation of both normal and manual release systems. A review of all prior events revealed that 68 percent of the total extension gear disagree reports were related to the NLG, most of which were a result of slow extension. SkyWest Airlines did not have a higher event rate of gear disagree messages than other CBJ operators.</p> <p>Bombardier performed a detailed root cause analysis using the fishbone method in an effort to ascertain a common failure point in both the normal and manual release systems. A copy of their research and findings is contained in the public docket for this accident.</p> <p>Upon completion of the initial analysis, Bombardier determined that three possible scenarios could lead to the accident gear-disagree event:</p> <ul style="list-style-type: none"><li>-Uplock not releasing the NLG body; claw not releasing, latch lever not releasing, insufficient input received on normal and manual operation</li><li>-NLG mechanical jam: drag brace or shock strut assembly</li><li>-Hydraulic blockage: back pressure or hydraulic blockage on "up" side of actuator or suction on "down" side of actuator</li></ul> <p>Further testing was performed to investigate these possibilities. Present to these examinations were representatives from the Safety Board, Transportation Safety Board of Canada, Transport Canada, Bombardier Aerospace, Messier-Dowty, and SkyWest Airlines.</p> <p>A retraction simulation revealed that the NLG uplock pin could be located anywhere between the uplock and 15 inches away from the uplock and not leave any indication on the DFR of increased brake pressures when the NLG is retracting from that position. This result is similar to the accident scenario (and other reported events), which indicates that the NLG was likely somewhere in this range of travel after the flight crew attempted to extend the landing gear.</p> <p>Another test was performed in an effort to simulate a hydraulic lock by capping the up line in the actuator. The testing revealed that with a hydraulic blockage, the NLG body will move between 0 and 5 inches away from the uplock and stay in that position due to the hydraulic fluid trapped in the actuator. This condition resulted in an increase in pressure in the hydraulic line between the NLG selector valve and the NLG actuator; it also showed an increase of brake pressure on the DFR.</p> <p>Another test to simulate hydraulic lock was performed by capping the down line in the actuator. This test revealed that with a vacuum, the NLG would extend almost to the downlock position, requiring only about 5 pounds of force to lock. It was determined that suction and internal leakage would allow the NLG to extend.</p> <p>A test was performed to evaluate the NLG system if the manual release handle was not pulled completely. During the test the manual release handle was pulled until the NLG body released from the uplock. After it was released, the handle was pushed in about 1 inch and locked in that position. This resulted in a hydraulic lock between the bypass valve and the actuator stopping any further movement of the NLG; this condition resulted in an increase of brake pressure on the DFR.</p> <p>Testing was also performed to simulate a combination of improper rigging of the uplock pin, a jam</p>	
FACTUAL REPORT - AVIATION	
Page 1b	

 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSS ID: LAX05FA202
	Occurrence Date: 06/12/2005 Occurrence Type: Accident
<b>Narrative (Continued)</b> Landing gear subsequently extended in the down and locked position. According to Bombardier Aerospace, a review of incident airplane's DEDR reveals that the manual release handle was not in the pulled position during the hydraulic system bleed down as required per the QRH sequence of steps. A representative from Bombardier stated that selecting landing gear lever to the "up" position while the manual release handle is pulled will have the same effect as the bleed procedure: it removes the hydraulic pressure from the extend line of the retract actuator and NLG uplock actuator. A detailed account of this event is contained in the public docket for this accident. As a result of the incident, Delta Airlines maintenance examined the airplane at their Macon, Georgia, facilities. The airplane was positioned on jacks and numerous landing gear swings were performed; the problem could not be replicated. The cause of the failure was not determined and all components of the nose landing gear system passed all functional tests. At the time of this writing the airplane has not had any further issues with the landing gear system.	


 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSS ID: LAX05FA202
	Occurrence Date: 06/12/2005 Occurrence Type: Accident
<b>Narrative (Continued)</b> of the uplock pin, and a worn uplock. The NLG retract actuator was pressurized to 3,000 psi, prior to activating the NLG uplock actuator. With this condition the NLG uplock roller released with 300 psi of pressure, but the NLG latch did not rotate to release the NLG uplock pin. The pressure at the uplock was increased to 3,000 psi and there was still no movement of the NLG, which remained in the uplock latch. The manual release handle was pulled to full extension and there was no additional rotation of the uplock latch. When the hydraulics were switched off, the NLG uplock pin came out of the latch and released the NLG into the down and locked position. Based on the results of this test, further research was performed on the uplock and its interaction with the NLG. Bombardier performed simulations and static analysis on the friction force of the uplock. Specifically looking at the interaction between the pin and the hook. They determined the friction coefficients that were required to stop rotation of the uplock latch at various positions of the uplock pin. Additionally, they assessed the impact of a groove, or imperfection, on the uplock latch simulating a worn condition. With the introduction of this anomaly, the direction of the contact force changed between the latch and the pin, reducing the moment at the bushing (change in moment arm). In short, a worn groove of 0.010 inches on the latch would result in about 1/3 the friction moment necessary to lock the uplock latch. This worn condition was never reported in service of the accident airplane. As a result of the testing, Bombardier Aerospace identified areas of sensitivity of the NLG systems (both normal and manual), under adverse conditions, to include: friction within the system and the sequencing of the hydraulic pressure application. <b>1.8 ADDITIONAL INFORMATION</b> <b>1.8.1 QRH Change</b> Following the accident, Bombardier changed the QRH to reflect an additional action. Another step to be taken by the flight crew in the event of a gear disagree message was added that dictates the cycling of the landing gear lever. Specifically, the added wording instructs the flight crew to cycle the landing gear lever when the manual release handle is in the extended position. It later states that the flight crew should restore the handle after confirmation that the landing gear is down and locked. <b>1.8.2 Prior Events</b> SkyWest Airlines has reported a total of three events where the flight crew experienced difficulty extending the NLG using both the normal and manual extension systems (airplane serial numbers: 7595, 7785, 7827). During those events the problem was rectified prior to landing by bleeding the number 3 hydraulic system pressure (as per the QRH) or cycling of the landing gear lever. Bombardier found 13 events reported and confirmed where the normal and manual extension procedures did not initially result in a NLG downlock condition. Summaries of these events are attached to this report in the public docket. <b>1.8.3 Subsequent Event</b> On March 12, 2006, a Bombardier CRJ-900 (serial 7404), N856AS, operated by Atlantic Southeast Airlines, received a gear disagree message on the EICAS while on approach to the destination airport. The EICAS display and corresponding warning chime, indicated that the NLG was not in the down and locked position. The flight crew followed the QRH (updated from the QRH used by the accident flight crew) for the gear disagree checklist. They cycled the landing gear lever, bled the hydraulics, and finally pulled the manual release handle. The EICAS continued to display the gear disagree message. After cycling the manual release handle several times, the flight crew kept the handle in the extended position while cycling the landing gear lever up and then down. The	


 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b> <small>1-800-875-2655</small>		NTSB ID: LAX05FA202  Occurrence Date: 06/12/2005  Occurrence Type: Accident	
<b>First Pilot Information</b>			
Name On File		City On File	
Sex: M    Seat Occupied: Left		Occupational Pilot? Commercial	
Certificate(s): Airline Transport; Commercial			
Airplane Rating(s): Multi-engine Land; Single-engine Land Rotorcraft/Glider/LTA: None Instrument Rating(s): Airplane Instructor Rating(s): None			
Current Biennial Flight Review? 03/2005			
Medical Cert. Class 1		Medical Cert. Status:	
Date of Last Medical Exam: 01/2005			
<b>- Flight Time Matrix</b>			
Total Time	11728	4636	6000
Pilot in Command(PIC)	9518	3229	3500
Instructor			
Instruction Received			
Last 90 Days	189		
Last 30 Days	55		
Last 24 Hours	5		
Seatbelt Used? Yes		Shoulder Harness Used? Yes	
Toxicology Performed? No		Second Pilot? Yes	
<b>Flight Plan/Itinerary</b>			
Type of Flight Plan Filed: IFR			
Departure Point		State	
Same as Accident/Incident Location			
Destination		Airport Identifier	
Santa Barbara		LAX	
Type of Clearance: IFR		Departure Time	
Type of Airspace:		2127	
Weather Information		Time Zone	
Source of WX Information:		PDT	
Company			

FACTUAL REPORT - AVIATION

Page 3

NATIONAL TRANSPORTATION SAFETY BOARD <b>FACTUAL REPORT</b> AVIATION <small>NTSB Form 108.1 (Rev. 12-14-09)</small>		NTSB ID: LAX05FA202 Occurrence Date: 06/12/2005 Occurrence Type: Accident		Runway Width	
Landing Facility/Approach Information Airport Name Los Angeles International A/rp		Airport ID: LAX	Airport Elevation 128 Ft. MSL	Runway Used 25L	Runway Length 11096
Runway Surface Type: Concrete Runway Surface Condition: Dry					
Approach/Arrival Flown: ILS					
VFR Approach/Landing: Straight-In					
<b>Aircraft Information</b> Aircraft Manufacturer Bombardier Aerospace, Inc.		Model/Serial CL-600-2B19	Serial Number 7845		
Airworthiness Certificate(s): Transport					
Landing Gear Type: Retractable - Tricycle Amelior Built A/c? No		Number of Seats: 53	Certified Max. Gross Wt. 54000 LBS	Number of Engines: 2	Rated Power: 9181 LBS
Engine Type: Turbo Fan		Engine Manufacturer General Electric	Model/Serial: CF-34-3B1		
- Aircraft Inspection Information Type of Last Inspection Continuous Airworthiness		Date of Last Inspection 04/2005	Time Since Last Inspection 342.5 Hours	Airframe Total Time 4126.6 Hours	
- Emergency Locator Transmitter (ELT) Information ELT Installed? Type: Yes /		ELT Operated? No	ELT Aided in Locating Accident Site? No		
<b>Owner/Operator Information</b> Registered Aircraft Owner SKYWEST AIRLINES INC					
		Street Address 444 South River Road	City St. George	State UT	Zip Code 84790
Operator of Aircraft SKYWEST AIRLINES INC		Street Address 444 South River Road	City St. George	State UT	Zip Code 84790
Operator Does Business As: - Type of U.S. Certificate(s) Held: Air Carrier Operating Certificate(s); Flag Carrier/Domestic		Operator Designator Code: SWIA			
Operating Certificate(s): Regulation Flight Conducted Under: Part 121; Air Carrier Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					
Factual Report - Aviation					

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LAX05FA202	
	Occurrence Date: 06/12/2005	
	Occurrence Type: Accident	
Administrative Information Investigator-in-Charge (IIC) Zoë Kellher		
Additional Persons Participating in This Accident/Incident Investigation: Billy Hendrix Federal Aviation Administration Los Angeles, CA Robert Cortez Skywest Airlines St. George, UT Otto Dietrich Bombardier Aerospace Mirabel, Quebec, CA, Murray Wyville Messier-Dowty, Inc Ontario, Canada,		
<div style="text-align: right;">Page 5</div>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LAX05FA202				
	Occurrence Date: 06/12/2005				
	Occurrence Type: Accident				
Weather Information WOF ID: LAX    Observation Time: 2250    Time Zone: PDT    WOF Elevation: 126 Ft. MSL    WOF Distance From Accident Site: NM    Direction From Accident Site: Deg. Mag.					
Sky/Lowest Cloud Condition: Clear    Fl. AGL: 6    Condition of Light: Night					
Lowest Ceiling: Overcast    900 Ft. AGL    Visibility: 6    SM    Altimeter: 29.92    "Hg					
Temperature: 17 °C    Dew Point: 14 °C    Weather Conditions at Accident Site: Visual Conditions					
Wind Direction: 280    Wind Speed: 8    Wind Gusts:					
Visibility (RVR): Fl.    Visibility (RW): SM					
Precip and/or Obscuration: No Obscuration; No Precipitation					
Accident Information Aircraft Damage: Substantial    Aircraft Fire: None    Aircraft Explosion: None					
- Injury Summary Matrix					
First Pilot	Fatal	Serious	Minor	None	TOTAL
Second Pilot				1	1
Student Pilot				1	1
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				1	1
Other Crew					
Passengers				14	14
- TOTAL ABOARD -				17	17
Other Ground					
- GRAND TOTAL -				17	17
<div style="text-align: right;">Page 4</div>					



## Brief of Accident

Adopted 11/29/2006

LAX05FA202 File No. 20639		06/12/2005	Los Angeles, CA	Aircraft Reg No. N960SW	Time (Local): 22:26 PDT	
Make/Model: Bombardier Aerospace, Inc. / CL-600-2B19 Engine Make/Model: General Electric / CF-34-3B1 Aircraft Damage: Substantial Number of Engines: 2 Operating Certificate(s): Flag Carrier/Domestic Name of Carrier: SKYWEST AIRLINES INC Type of Flight Operation: Scheduled; Domestic; Passenger Only Reg. Flight Conducted Under: Part 121: Air Carrier				Fatal Crew 0 Pass 0	Serious 0 0	Minor/None 3 14
Last Depart. Point: Same as Accident/Incident Location Destination: Santa Barbara, CA Airport Proximity: On Airport/Airstrip Airport Name: Los Angeles International Airp Runway Identification: 25L Runway Length/Width (ft): 11096 / 200 Runway Surface: Concrete Runway Surface Condition: Dry				Condition of Light: Night Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: 900 Ft. AGL, Overcast Visibility: 6.00 SM Wind Dir/Speed: 260 / 008 Kts Temperature (°C): 17 Precip/Obscuration: No Obscuration; No Precipitation		
Pilot-in-Command		Age: 42		Flight Time (Hours)		
Certificate(s)/Rating(s)		Airline Transport; Commercial; Multi-engine Land; Single-engine Land		Total All Aircraft: 11728 Last 90 Days: Unk/Nr Total Make/Model: 4636 Total Instrument Time: Unk/Nr		
Instrument Ratings		Airplane				

The airplane was damaged during a landing with the nose landing gear partially extended. As the airplane descended toward the destination airport, the crew moved the landing gear handle to the extend position. The pilots noted a "gear disagree" warning message displayed on the Engine Indicating and Crew Alerting System (EICAS) that showed the main landing gear were down and locked, and the nose gear was not fully extended. The pilots opted to land at an alternate airport and began to troubleshoot the gear indication with use of the airplane's Quick Reference Handbook (QRH). Despite their efforts, which included using the manual release handle, the nose gear failed to extend. The airplane touched down on the main landing gear and the nose lowered to the ground as the speed dissipated. Review of the CVR found that the flight crew followed each step of the Quick Reference Handbook checklist. The flight crew did not cycle the landing gear lever, nor was that action part of the QRH procedure at the time. The digital flight data recorder (DFDR) revealed that the main landing gear transitioned into the down and locked position but the nose gear remained partially extended between the uplocked and downlocked positions. A further review of the data disclosed the hydraulic pressure remained constant throughout the extension and did not show the pressure changes that should have occurred with normal system operation. The only pressure changes noted in the duration of the flight were consistent with the manual release system being activated. No increase of brake pressure was recorded during the gear extension attempt, indicating that there was no hydraulic backpressure on the retract side of the NLG actuator. The components of the nose landing gear (NLG) system were tested, revealing no anomalies or malfunctions that could have precluded normal operation. Several simulations were conducted exploring various potential problem scenarios; however, none of the simulations produced the hydraulic system and brake pressure readings on the accident flight's DFDR data. A review of several maintenance discrepancy databases for events where the NLG failed to extend into the downlock position found that the operator did not have a higher event rate of gear disagree messages.

## Brief of Accident (Continued)

LAX05FA202 File No. 20639		06/12/2005	Los Angeles, CA	Aircraft Reg No. N960SW	Time (Local): 22:26 PDT
than the rest of the worldwide fleet. Simulations and static analysis on the friction force of the uplock was performed, specifically detailing the interaction between the pin and the latch. As a result of the testing, areas of potential problems with the NLG extension systems (both normal and manual) under adverse conditions were found to include: friction within the system and the sequencing of the hydraulic pressure application. Bombardier subsequently modified the QRH procedure, adding another step to specifically recycle the gear selector handle.					

LAX05FA202  
File No. 20639

06/12/2005

Los Angeles, CA

Aircraft Reg No. N960SW

Time (Local): 22:26 PDT

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: APPROACH

## Findings

1. (C) LANDING GEAR NORMAL RETRACTION/EXTENSION ASSEMBLY - MALFUNCTION
2. (C) LANDING GEAR EMERGENCY EXTENSION ASSEMBLY - MALFUNCTION
3. (C) REASON FOR OCCURRENCE UNDETERMINED


Occurrence #2: WHEELS UP LANDING

Phase of Operation: LANDING - FLARE/TOUCHDOWN


Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.  
failure of the nose landing gear to extend to the down and locked position for undetermined reasons.

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 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: LAX05FA063		Aircraft Registration Number: VT-AIM	
		Occurrence Date: 12/19/2005		Most Critical Injury: None	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time		State	Zip Code	Local Time	Time Zone
Nearest City/Place Los Angeles		CA	90009	2030	PST
Airport Proximity: On Airport/Airstrip		Distance From Landing Facility: 0			
Aircraft Information Summary		Model/Serial		Type of Aircraft	
Boeing		747-400		Airplane	
Revenue Sightseeing Flight: No		Air Medical Transport Flight: No			
<b>Narrative</b> Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: 1.1 History of Flight <p>On December 19, 2005, at 2030 Pacific standard time, the four right body landing gear (RBLG) tires on a Boeing 747-400, Indian registry VT-AIM, operating as Air India 136, burst during takeoff from Los Angeles International Airport, Los Angeles, California. Air India was operating the airplane under the provisions of 14 CFR Part 129. The captain, first officer, a relief captain, 14 flight attendants, and 256 passengers were not injured; the airplane sustained substantial damage. The scheduled international passenger flight was originating at the time and was destined for Frankfurt International Airport, Frankfurt, Germany. Visual meteorological conditions prevailed and an instrument flight plan was in effect.</p> <p>Following the airplane's liftoff from runway 25R, a member of the Los Angeles airport operations was notified that there appeared to be foreign object debris (FOD) on the runway. The airport operations specialist was positioned near the end of runway 25R, on the taxiway, and had heard two loud, succinct booms as the airplane rotated from the runway. The specialist proceeded down runway 25R and noted a substantial amount of debris on the runway and adjoining taxiways.</p> <p>The majority of the debris was located about 2,500 feet to 10,000 feet from the east end of the 12,091-foot runway. The first identified debris field contained two sections of rubber and was located about 2,500 feet from the east end of the runway. About 4,000 feet from the east end of the runway were metal pieces identified as landing gear wheel fragments. The majority of the debris continued down the runway to about the 10,000-foot point, and contained large sections of the wheels and rubber portions of the tires.</p> <p>After the event, the airplane circled off shore to jettison fuel in order to land. The specialist that reported and identified the initial debris on runway 25R reported that after the airplane landed there was some debris on runway 25L. As the airplane approached the east end of runway 25L to land, the specialist noted that none of the main body landing gear tires on the right side were evident. The airplane touched down at 2155.</p> <p>Examination of the runway 25R surface revealed no marks along the right side of the runway centerline prior to the 2,500-foot point. Rubber tire marks were noted in a feather-like, brush pattern approximately 3,000 feet from the east end of the runway, and again approximately 10,000 feet from the east end of the runway. Groove marks along the runway centerline and to the right of the centerline were present intermittently on the surface about mid-runway length.</p> <p>Following the landing, emergency crews responded and sprayed water on the airplane's brake system to keep them cool. The passengers were deplaned using the stairs while the airplane was on the runway. Airport operations personnel closed both runway 25L and 25R overnight to facilitate the clean up of the runways.</p>					
FACTUAL REPORT - AVIATION					

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 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LAX06FA063	Narrative (Continued)
	Occurrence Date: 12/19/2005	
	Occurrence Type: Accident	

The captain, the flying pilot for this leg of the flight, reported that the time leading up to the takeoff was uneventful. They taxied the airplane for 15 to 20 minutes. As he reached the airplane for takeoff, he felt a slight vibration. He continued the takeoff, which he identified as normal, but felt a shudder. At 400 feet above ground level (agl), the engine indication and crew alerting system (EICAS) displayed warning messages to the flight crew. Shortly thereafter, a tower controller informed the crew that there was debris on the runway. After receiving a series of messages from EICAS, the captain climbed the airplane to 15,000 feet and attempted to retract the flaps. The flaps remained extended 10 to 20 degrees. As the airplane was climbing, an air traffic controller advised the captain that there were metal hinges and brake parts on the runway. The captain jettisoned the fuel and returned to land. While on an extended final for runway 25L, he extended the flaps to 25 degrees, however, the landing gear warning horn went off and the flaps automatically retracted to 20 degrees. During the touchdown, the thrust reversers came to the interlock position; however, engines 2 and 3 did not go past interlock. The airplane was brought to a stop using manual braking. The rescue crews confirmed that there was no fire and the passengers were deployed.

Prior to the flight, the first officer (FO) performed a walk-around of the airplane. No mechanical problems or abnormalities were identified by the FO or reported to the captain. A maintenance engineer also examined the airplane prior to its departure with no problems noted.

Information regarding the takeoff portion of the flight was obtained from the flight data recorder (FDR). Approximately 39 seconds after the airplane began its takeoff roll, the lateral acceleration increased from approximately 0.9 to 0.153 g down to -0.161 g and the airplane traveled approximately 3,000 feet. About 18 seconds later, the vertical acceleration peaked at 1.96 g, the lateral acceleration peaked at -1.083 g, and the airplane traveled approximately 7,290 feet. Less than 1 second later, the air-to-ground discrete transitioned from "Ground" to "Air". Twelve seconds later, the gear disagree discrete transitioned from "Normal" to "Disagree."

1.2 Damage to Aircraft

The airplane was examined on the United Airlines maintenance ramp at Los Angeles International Airport on December 21, 2005. National Transportation Safety Board investigators, personnel from the Federal Aviation Administration (FAA), and Air India were present.


The forward end of the BSLG wheel well is the station (STA) 1350 bulkhead, and the aft end of the wheel well is the STA 1480 bulkhead. The third vertical stiffener from the inboard end of the wheel well on the STA 1350 bulkhead exhibited impact damage and a cracked upper cap. A hydraulic return line located between the brake control valve and the anti-skid valve was pierced by the cracked vertical stiffener. There was deformation to a flight control hydraulic pressure line that ran along the STA 1350 bulkhead and a clamp had torn away where it attached to a stiffener. The electrical control unit on top of the flap control valve exhibited impact damage. There was a small puncture (1 inch by 1/2 inch) in the upper pressure deck, and a light assembly attached to the pressure deck had a piece of rubber embedded in it. There were several areas of black rubber transfer on the wheel well structure, and numerous small pieces of rubber debris were found in the wheel well. No evidence of any metal rim debris was found in the wheel well. Towards the aft end of the wheel well was a damaged hydraulic pressure line situated between the brake control valve and BSLG, and a damaged pressure line that runs from the brake accumulator through the STA 1480 bulkhead. There was no damage evident to any of the flight control cables or flap torque tubes that run through the wheel well.

There was puncture damage and many areas of black rubber transfer to the exterior of the forward body landing gear door that normally stays closed unless the landing gear is in transit. There was puncture damage through both the interior and exterior surfaces of the main body landing gear door that is slaved to the BSLG, and the link that attaches the door to the gear was broken at each end

Page 14

FACTUAL REPORT - AVIATION

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 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LAX06FA063	Narrative (Continued)
	Occurrence Date: 12/19/2005	
	Occurrence Type: Accident	

Where the tie rods attach. The downlock bungee failed at its attach point to the downlock link. The exterior of the main wing landing gear door exhibited black rubber transfer and puncture damage.

The wing-to-body fairing exhibited several areas of puncture damage between STA 1480 and the end of the fairing at STA 1680. There were pieces of the wheel assemblies and brake fragments found within the fairing. The wing-to-body fairing frames at STA 1540, 1580, and 1620 exhibited impact damage. The 1540 frame had a small puncture in the web and cracked upper cap. The 1580 frame was missing a large piece of the web and lower cap while the upper cap was present but deformed. The 1620 frame had a hole in the web and a cracked upper cap. The fuselage skin underneath the wing-to-body fairing had several punctures adjacent to the fairing damage and several large pieces of the fragmented wheels were found embedded in the skin. The damage to the fuselage under the wing-to-body fairing was located in the area between two lap joints on the lower right side of the fuselage. Between STA 1520 and 1560, there were three relatively large holes, which measured 10 inches by 8 inches, 10 inches by 10 inches, and 9 inches by 4 inches, respectively, along with several smaller holes and scraping damage. There were three additional holes between STA 1600 and 1640 that measured 3 inches by 3 inches, 8 inches by 2 inches, and 10 inches by 16 inches, along with several more areas with dents and scraping damage. The lower fuselage skin aft of the wing-to-body fairing between STA 1680 and 1720 sustained two small punctures, which measured 1 inch by 1/2 inch and 2 inches by 2 inches, respectively.

The lap joint on the aft cargo door sustained impact damage that peeled a small section of skin upwards. There was some scraping, and paint and rubber transfer associated with this damage. The leading edge of the right horizontal stabilizer had some rubber transfer and impact damage, and the right inboard elevator sustained puncture damage.

Examination of the wheel fragments revealed that the bead flanges fractured at the transition area to the hub. The failed outer flange pieces from both wheels were smaller than the inner flange pieces. A majority of the fragments from all four flanges were recovered and reconstructed on the tarmac. There was significant abrasion damage on the outer most circumferences of all the bead flanges. The outer hub circumferences also exhibited the same abrasion damage. The intact wheel assemblies that remained on the forward axle also exhibited the same abrasion damage, although lighter in appearance.

1.3 Other Damage

Following the accident, airport personnel performed inspections of runways 25L and 25R at Los Angeles International Airport. Airport personnel noted that seven runway centerline lights were damaged on runway 25R between taxiways J and M. In addition, two runway centerline lights and one taxiway leading lights were damaged on runway 25L just west of taxiway G. The runway concrete damage was limited to skid marks, scrape marks, and grooving on the concrete.

1.4 Aircraft Information

1.4.1 General Aircraft History

The airplane was manufactured in 1991 and delivered to Air Canada. Air Canada operated the airplane for 13 years from 1991 to 2004. A leasing company acquired the airplane in September 2004, and placed it into storage. In April 2005, Air India leased the airplane for a period of 3 years. The airplane was based in Delhi, and operated on the Delhi to Frankfurt to Los Angeles route three times per week. At the time of the accident, the airplane had accumulated 54,356 hours and 8,376 cycles.

Air India representatives reported that an onboard indication of tire pressure was available on the airplane as standard equipment; however, it had been deactivated for commonality purposes with other Air India airplanes. Real time brake temperatures were displayed to the crew.

Page 15

FACTUAL REPORT - AVIATION



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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX06FA063	Page 1c
	Occurrence Date: 12/19/2005	
	Occurrence Type: Accident	
<b>Narrative (Continued)</b>		
1.4.2 Weight and Balance  A load sheet was obtained from Pacific Aviation, the Los Angeles-based coordinator for Air India. The takeoff weight was 845,649 pounds (383,560 kilograms) and the total fuel weight was 316,361 pounds (143,500 kilograms). The maximum takeoff weight for the airplane was listed as 869,999 pounds (394,625 kilograms) on the load sheet.		
1.4.3 Maintenance Information  The last maintenance performed on the airplane was a 2A Check completed on December 2, 2005, at an Air India maintenance base in Mumbai. On October 6, 2005, a 4A check was completed in Mumbai.  The last major maintenance check was completed on April 15, 2005. The D2 check was completed at the Malaysian Airlines facility at Subang, Kuala Lumpur, Malaysia, prior to the airplane attaining its Indian registration number on April 28, 2005.  The last tire servicing was in Delhi on December 18. The main wheel tire pressures were 200 pounds per square inch (psi) and the nose wheel pressure was 185 psi after servicing. Maintenance personnel recorded the tire pressures after the tires were serviced in Delhi. Tire pressures prior to servicing were not recorded. Transit checks were completed in Frankfurt and Los Angeles. No tire pressures were recorded during the transit checks.  Placards affixed to the main body landing gear struts on the accident airplane showed that the main body gear tires should be inflated to 150-195 psi. It was confirmed that these placard values were incorrect for the certified gross weight of this airplane. Air India confirmed that they inflate the tires to 200 psi instead of the values stated on the placards.		
1.5 Flight Recorders  The airplane was equipped with an L-3 Communications Fairchild Flight Data Recorder in addition to a Honeywell 6022 SS Cockpit Voice Recorder (CVR) 120. A Collins Central Maintenance Computer (CMC) monitored the airplane systems.  1.6 Tests and Research  The two intact forward wheel and brake assemblies, the two damaged aft wheel and brake assemblies, and all of the debris collected from the runways, were shipped to the Boeing Equipment Quality Analysis (BEQA) Laboratory in Seattle, Washington, and examined by the Safety Board Structures Group Chairman and members of the structures group. The complete Structures Group Factual Report is contained in the official docket of this investigation.		
1.6.1 Wheels  The wheels on the RBLG are numbered as follows: 9 forward-inboard, 10 forward-outboard; 11 aft-inboard; and 12 aft-outboard. The RBLG wheels are manufactured in two halves, inner and outer, that are mated together with tie bolts through the center hub area. The outer bead flange is adjacent to the wheel split line on the outer wheel half while there is an extended tube well between the inner bead flange and wheel split line on the inner wheel half. The brake assembly is housed within the inner wheel half and is separated from the wheel by a heat shield. The brake rotor drive keys attach to the wheel flange (chin) with bolts, and the pin and engages holes in the inboard wheel half near the tie bolts. There are three fuse plugs and an over inflation plug installed in each wheel assembly. The fuse plugs have a core that is designed to melt at a specified temperature to relieve tire pressure in the event of an overheated condition. The over inflation plug is designed to release tire pressure in the case of over inflation. There is a		

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX06FA063	Page 1d
	Occurrence Date: 12/19/2005	
	Occurrence Type: Accident	
<b>Narrative (Continued)</b>		
bearing installed in the center diameter of each wheel half.  The number 9 and 10 wheel assemblies exhibited similar damage patterns. The inner tire bead was seated on the number 9 wheel while all of the others were free to rotate around the hubs. There was light abrasion damage to the outer circumference of the bead flanges on both wheels. All of the bearings were free to rotate with grease present. The heat shields and rotor drive keys remained installed although the number 10 heat shield exhibited some minor deformation.  The number 11 and 12 wheel assemblies fractured in the same general manner. The bead flanges fractured from the wheel halves about 2 inches from the split line on both the inner and outer halves at the transition area between the center hub and tube well. The failed outer bead flange pieces from both wheels were smaller than the inner flange pieces. A majority of the fragments from the four flanges were recovered and reconstructed. All of the fracture surfaces were examined and exhibited a dull, grainy appearance consistent with overload. None of the wheel fragments exhibited visible signs of corrosion. There was significant abrasion damage on the outer most circumferences of the bead flanges, and the outer hub circumferences exhibited the same abrasion damage. All of the bearings were free to rotate with grease present. The wheel halves remained mated together with all of the tie bolts installed for both wheels.  The three fuse plugs and one over-inflation valve for each wheel were installed and intact. The fuse plugs from the number 11 and 12 wheels were tested per the Goodrich CMK-32-43-02, Revision 8, by pressurizing them to 225 psi, applying a soap solution, and allowing them to dwell for about 10 minutes. No leakage was noted.  The number 11 inner bead flange had fractured into five fragments comprising the entire circumference. Five (out of nine total) intact rotor drive keys with one still attached to a flange fragment were recovered along with two fractured rotor drive keys. A small piece of one of the fractured rotor drive keys was still attached to a flange fragment. Several segments of the tube well also fractured at the inner bead flange. The rotor drive keys and tube well fragments exhibited radial outward deformation. The number 11 outer bead flange was fractured into seven fragments comprising the entire circumference. There was light abrasion to the outer diameter (OD) of the tube well area on the intact wheel portions that was not present on the mating fragments of tube well. The paint on the inner diameter (ID) and OD of the tube well exhibited no discoloration. There was uniform continuous rubber transfer on both the inner and outer bead flange areas and no evidence of paint peeling or blistering. The tube well area on the number 11 wheel sustained more fragmentation damage than the number 12 wheel tube well area.  The number 12 inner bead flange had fractured into four large fragments that compromised about 90 percent of the circumference of the flange. Portions of heat shield remained attached to three of the fragments. Eight of the nine rotor drive keys remained attached to the inboard flange fragments and all were deformed radially outward. The outboard bead flange fractured into 11 fragments that comprised the entire circumference. There was some smeared rubber on both the inner and outer bead flange areas. There was evidence of two layers of paint on both of the bead seat areas and the upper layer was delaminating or blistering. The paint on the ID and OD of tube well exhibited no discoloration. There was light abrasion to the OD of the tube well areas on the intact wheel portions that was not present on the mating fragments of tube well.  The four inflation valves (part numbers TQJ-781-03) were removed and tested by applying 225 psi to the tire side of the valve. Three of the four valves, numbers 9, 11, and 12, leaked steadily. The number 10 valve did not leak. All four valves were subjected to an X-ray examination in which no obvious damage, deformation, or jamming was noted. The valve core torque was then measured and compared to the design standard of 3 to 5 inch-pounds. The valve cores were then torqued to 4 inch-pounds and air at 50 psi was applied to the tire side of the valve. A soap solution was sprayed on the valve, the pressure was increased to 100 psi, the valves were allowed to dwell for 5 minutes, and then the pressure was dropped back down to 50 psi. Following this pressure test the		

FACTUAL REPORT - AVIATION

This release is pending.

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX06FA063 Occurrence Date: 12/19/2005 Occurrence Type: Accident	
<b>Narrative (Continued)</b>			
cores were removed from the valves and examined.			
The number 9 valve core required less than 1 inch-ounce of torque to advance. After it was torqued to 4 inch-pounds, some bubbling of the soap solution was noted at 50 psi. The bubbling decreased at 100 psi and continued decreasing during the dwell time. At the return to 50 psi, slight foaming was noted. When the core was removed, debris and corrosion were observed at the seating surface of the barrel seal.			
The number 10 valve core required 2.5 inch-pounds of torque to advance. After it was torqued to 4 inch-pounds, no bubbling was observed at any time. When the core was removed, a substantial amount of debris was observed at the seating surface of the barrel seal.			
The number 11 valve core required no measurable amount of torque to advance. After being torqued to 4 inch-pounds, some bubbling of the soap solution was noted at 50 psi. The bubbling did not appreciably change during the increase in pressure, dwell, and decrease in pressure. When the core was removed, debris and corrosion were observed at the seating surface of the barrel seal.			
The number 12 valve core required less than 1 inch-ounce of torque to advance. After it was torqued to 4 inch-pounds, no bubbling was observed at any time. When the core was removed, corrosion was observed at the seating surface of the barrel seal.			
1.6.2 Tires			
Per general tire information supplied by Goodyear, overinflation can cause uneven tread wear. Reduce traction, make the tread more susceptible to cutting, and increase stress on aircraft tires. The manufacturer indicated that proper inflation of aircraft tires is critical. Underinflation can produce uneven tire wear and greatly increases stress and flex heating in the tire, which shortens tire life and can lead to tire blowouts. The RBG tires on the accident airplane were to be pressurized to 200 psi per the Boeing maintenance manual instructions. According to maintenance documentation, a tire pressure difference as small as 10 percent could be cause for damage and removal of the tire.			
About 30 percent of the number 9 tire, made up of three large pieces and numerous smaller pieces, was recovered and identified. The tire was a new Bridgestone tire that had never been retreaded as evidenced by the absence of a flow stop (the rubber was continuous from the tread area around the shoulder to the bead). The operator reported that the tire had undergone 33 landings since installation. The tire was made up of tread rubber, 2 reinforcing plies, 1 undertread cushion, 2 breaker plies, 16 body plies, and the inner liner. Several pieces exhibited evidence of being cut through some or all of the layers and most of the fragments identified from this tire exhibited a diamond shaped appearance consistent with a burst while pressurized. The footprint, the area of the tire in contact with the ground, was measured to be about 13 inches, consistent with a tire that was not grossly over deflected. Over deflected refers to a tire operated either under inflated for a given load or properly inflated for a given load with additional load added. The identified fragments of tire carcass did not exhibit any evidence of bluing (indicative of the presence of heat), inner liner wrinkling, or melted nylon.			
About 50 percent of the number 10 tire, made up five large pieces and numerous smaller pieces, was recovered and identified. The tire was a retread tire that had been retreaded once as evidenced by the presence of 21 on the shoulder. Goodyear manufactured the original casing and Bridgestone-Kong performed the retread. The operator reported that this tire had undergone 175 landings. The tire was made up of tread rubber, 3 reinforcing plies, 1 undertread cushion, 16 body plies, and the inner liner. There was some evidence of FOD damage to the tread but no evidence of cuts through all of the layers on any of the identified pieces. The fragments exhibited a diamond shaped appearance consistent with a burst while pressurized. The footprint was measured to be about 15 1/4 inches, consistent with a tire that was not grossly over deflected. The identified			

FACTUAL REPORT - AVIATION

Page 16

This release is pending.

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX06FA063 Occurrence Date: 12/19/2005 Occurrence Type: Accident	
<b>Narrative (Continued)</b>			
Fragments of the tire carcass did not exhibit any evidence of inner liner wrinkling. There was some minor evidence of localized bluing and melted nylon.			
The number 11 tire was manufactured by Goodyear and had been retreaded once by Goodyear. Based on the retread date and the operator's records, one recovered tire fragment was identified to be from this tire. The operator reported that this tire had undergone 126 landings. This fragment was comprised of four of the body plies with a small area of the sidewall attached. There was evidence of intense heat in the shoulder area with bluing and melted nylon between the sixth and seventh body plies as counted from the exterior, consistent with the tire being operated in an over deflected condition.			
The number 12 tire was manufactured by Goodyear and had been retreaded once by Goodyear. Based on the retread date and the operator's records, two large fragments of recovered tread were identified to be from this tire. The operator reported that this tire had undergone 165 landings and the tread wear was consistent with 165 landings. The two pieces comprised about 112 inches of the 154-inch total circumference of the tire. One of the fragments was comprised of the tread rubber, two reinforcing plies, and the undertread cushion and one body ply. The other was comprised of the tread rubber and one reinforcing ply. There was some moderate bluing to the thicker of the two pieces but no evidence of melted nylon.			
Many of the tire fragments could not be conclusively identified. These fragments showed varying levels of heat. Some of the fragments exhibited smooth, blue areas with beach marks between the ply layers, indicating a relative motion between the plies that occurred over a period of time.			
The four beads from the failed aft tires were examined. All four exhibited gouging and chunking to the bead seat area. All of the damage evidence on the OD of the remaining bead bundles was consistent with the beads rolling on the runway.			
1.6.3 Brakes			
The number 9 and number 10 brake assemblies were intact with minor damage. The number 11 and number 12 brake assemblies were fragmented into many pieces. No anomalies were noted on any of the brake assemblies or fragments.			
1.7 Organization and Management Information			
1.7.1 Company Information			
Air India began operations in 1971. They operate a fleet of 37 airplanes consisting of Boeing 747-400, Boeing 747-300, Boeing 777-200, and Airbus A310 aircraft. Prior to the accident, they had not experienced any other similar events on their fleet of Boeing 747-400 airplanes. On March 13, 2006, the accident airplane experienced a tire burst of the aft-inboard (number 8) tire located on the left main body gear. During takeoff on April 1, 2006, the accident airplane experienced tire bursts of the aft-outboard (number 7) and aft-inboard (9 tires) located on the left main body gear during takeoff.			
1.8 Additional Information			
1.8.1 Wreckage Release			
The airplane was released to an Air India representative on December 22, 2005. The flight data recorder, cockpit voice recorder, all tire remnants, all wheel assemblies and pieces, and brake discs were retained. The flight data recorder and cockpit voice recorder were released on December 29, 2005. All tire remnants, wheel assemblies and pieces, and brake discs, excluding four tire valves, were released to Air India on February 21, 2006. The tire valves were released to Air			

FACTUAL REPORT - AVIATION

Page 17

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX06FA063 Occurrence Date: 12/19/2005 Occurrence Type: Accident	
Landing Facility/Approach Information			
Airport Name Los Angeles Intl	Airport ID: KLAX	Airport Elevation: 126 Ft MSL	Runway Used 25R
Runway Surface Type: Asphalt	Runway Length 12091	Runway Width 150	
Runway Surface Condition: Dry			
Approach/Arrival Flown: ILS: Visual			
VFR Approach/Landing: Precautionary Landing			
Aircraft Information			
Aircraft Manufacturer Boeing	Model/Series 747-400	Serial Number 25074	
Airworthiness Certificate(s): Transport			
Landing Gear Type: Retractable - Tricycle			
Amateur Built A/c? No	Number of Seats: 317	Certified Max Gross Wt. 869999 LBS	Number of Engines: 4
Engine Type: Turbo Fan	Engine Manufacturer: Pratt & Whitney	Model/Series: PW4056-3	Rated Power: 58000 LBS
- Aircraft Inspection Information			
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 12/2005	Time Since Last Inspection 54055 Hours	Airframe Total Time 54356 Hours
- Emergency Locator Transmitter (ELT) Information			
ELT Installed? Type Yes /	ELT Operated? No	ELT Added in Locating Accident Site? No	
Owner/Operator Information			
Registered Aircraft Owner Wells Fargo Bank Northwest, National Association		Street Address City New York State NY Zip Code 10020	
Operator of Aircraft Air India		Street Address City Air - India Building Nariman Point State Zip Code Mumbai - 400 021 Operator Designator Code: ANY	
Operator Does Business As: - Type of U.S. Certificate(s) Held: Air Carrier Operating Certificate(s) Foreign Operation			
Operating Certificate: Operator Certificate:			
Regulation Flight Conducted Under: Part 125; Foreign			
Type of Flight Operation Conducted: Scheduled; International; Passenger Only			
Factual Report - Aviation			

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX06FA063 Occurrence Date: 12/19/2005 Occurrence Type: Accident	
Narrative (Continued) India on May 9, 2006. The Safety Board retained no parts or pieces.			
Factual Report - Aviation			

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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX06FA063		Occurrence Date: 12/19/2005		Occurrence Type: Accident	
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site		
LAX	2050	PST	126 Ft. MSL	0 NM	0 Deg. Mag.		
Sky/Lowest Cloud Condition: Few							
Lowest Ceiling: None		FL AGL	Visibility:	9	SM	Altitude: 30.25	
Temperature: 17 °C		Dew Point: 16 °C	Weather Conditions at Accident Site: Visual Conditions				
Wind Direction: 260		Wind Speed: 4	Wind Gusts:				
Visibility (RVR):		FL	Visibility (RVR)	SM			
Precip and/or Obscuration: No Obscuration; No Precipitation							
Accident Information							
Aircraft Damage: Substantial			Aircraft Fire: None		Aircraft Explosion: None		
- Injury Summary Matrix							
	Fatal	Serious	Minor	None	TOTAL		
First Pilot				1	1		
Second Pilot				1	1		
Student Pilot							
Flight Instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants				14	14		
Other Crew				1	1		
Passengers				256	256		
-TOTAL ABOARD-				273	273		
-Other Ground-							
-GRAND TOTAL-				273	273		

This space for finding

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: LAX06FA063		Occurrence Date: 12/19/2005		Occurrence Type: Accident	
First Pilot Information							
Name	On File	City	State	Date of Birth	On File	Age	
Sex: M	Seat Occupied: Left	Occupational Pilot?		Certificate Number: On File		54	
Certificates: Airline Transport: Foreign							
Airplane Rating(s): Multi-engine Land							
Rotorcraft/Glider/LTA: None							
Instrument Rating(s): Airplane							
Instructor Rating(s): None							
Current Biennial Flight Review?							
Medical Cert. Class 1				Medical Cert. Status: With Waivers/Limitations			
				Date of Last Medical Exam: 12/20/05			
Flight Time Matrix							
	ATC	Time Made and Model	Engine	Multi-Engine	High	Instrument	Unusable-2
Total Time	12400	2420					
2 Pilot in Command(PIC)							
Instructor							
Resumption Received							
Last 90 Days	206						
Last 30 Days							
Last 24 Hours							
Seatbelt Used? Yes	Shoulder Harness Used? Yes			Toxicology Performed? No		Second Pilot? Yes	
Flight Plan/Itinerary							
Type of Flight Plan Filed: IFR							
Departure Point	State			Airport Identifier		Departure Time	Time Zone
Los Angeles	CA			LAX		2030	PST
Destination	State			Airport Identifier			
Frankfurt				FRA			
Type of Clearance: IFR							
Type of Airspace:							
Weather Information							
Source of WX Information:							

This area is for editing

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX06FA063
	Occurrence Date: 12/19/2005
	Occurrence Type: Accident
Administrative Information Investigator-in-Charge (IIC) Kristi Dunks	
Additional Persons Participating in This Accident/Incident Investigation: Michael Levine Federal Aviation Administration Los Angeles, CA Steven Campbell Goodrich Corporation Troy, OH Chris Dubuque The Boeing Company Seattle, WA Dave Zitzman Goodyear Tire and Rubber Company Akron, OH Rudy Ranucci Bridgestone Aircraft Tire, Inc. Miami, FL	
Page 5 FACTUAL REPORT - AVIATION	

**National Transportation Safety Board**  
 Washington, DC 20594

Printed on : 1/10/2012 7:28:31 PM

**Brief of Accident**

**Adopted 03/26/2007**

LAX06FA063 File No. 21107	12/19/2005	Los Angeles, CA	Aircraft Reg No. VT-AIM	Time (Local): 20:30 PST												
Make/Model: Boeing / 747-400 Engine Make/Model: Pratt & Whitney / PW4056-3 Aircraft Damage: Substantial Number of Engines: 4 Operating Certificate(s): Foreign Operation Name of Carrier: Air India Type of Flight Operation: Scheduled; International; Passenger Only Reg. Flight Conducted Under: Part 129; Foreign			<table border="1"> <thead> <tr> <th></th> <th>Fatal</th> <th>Serious</th> <th>Minor/None</th> </tr> </thead> <tbody> <tr> <td>Crew</td> <td>0</td> <td>0</td> <td>17</td> </tr> <tr> <td>Pass</td> <td>0</td> <td>0</td> <td>256</td> </tr> </tbody> </table>		Fatal	Serious	Minor/None	Crew	0	0	17	Pass	0	0	256	
	Fatal	Serious	Minor/None													
Crew	0	0	17													
Pass	0	0	256													
Last Depart. Point: Los Angeles, CA Destination: Frankfurt Airport Proximity: On Airport/Airstrip Airport Name: Los Angeles Intl Runway Identification: 25R Runway Length/Width (ft): 12091 / 150 Runway Surface: Asphalt Runway Surface Condition: Dry			Condition of Light: Night Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 9.00 SM Wind Dir/Speed: 260 / 004 Kts Temperature (°C): 17 Precip/Obscuration: No Obscuration; No Precipitation													
Pilot-in-Command Age: 54 Certificate(s)/Rating(s) Airline Transport; Foreign; Multi-engine Land Instrument Ratings Airplane			Flight Time (Hours) Total All Aircraft: 12400 Last 90 Days: 208 Total Make/Model: 2420 Total Instrument Time: Unk/Nr													

The four right main body landing gear tires burst during the takeoff ground roll, and the crew performed a precautionary landing. Pieces of the tires and wheel assemblies penetrated the fuselage structure and the airplane incurred substantial damage. Post accident examination revealed that the valve cores on three of the four inflation valves, including the two aft valves, were not torqued to the manufacturer's specifications and leaked steadily. Examination of the right aft main body landing gear tires (number 11 and 12) showed that they were operated in an over deflected condition at some point prior to the event, which resulted in internal damage to the tires. The aft tires failed first as a result of the internal damage and initiated the accident sequence. Damage to the forward tires was consistent with the tires bursting due to their impact by debris from the aft tires.



LAX06FA083  
File No. 21107

12/19/2005

Los Angeles, CA

Aircraft Reg No. VT-AIM

Time (Local): 20:30 PST

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: TAKEOFF - ROLL/RUN

## Findings


1. (C) LANDING GEAR, TIRE VALVE STEM - UNDERTORQUED
2. (C) MAINTENANCE, INSTALLATION - INADEQUATE - COMPANY MAINTENANCE PERSONNEL
3. (C) LANDING GEAR, TIRE - BURST

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.

The incorrect installation of the inflation valve cores in the number 11 and number 12 wheel assemblies that allowed the tires to be operated in an over deflected condition that resulted in their failure.

This report is for internal use only.

		NTSB ID: ENG06IA018		Aircraft Registration Number: N330AA	
Occurrence Date: 06/02/2006		Most Critical Injury: None			
Occurrence Type: Incident		Investigated By: NTSB			
<b>Location/Time</b>					
Nearest City/Place Los Angeles	State CA	Zip Code	Local Time 1227	Time Zone PDT	
<b>Aircraft Information Summary</b>					
Aircraft Manufacturer Boeing		Model/Series 767-223(ER)		Type of Aircraft Airplane	
Revenue Sighting Flight: No		Air Medical Transport Flight: No			
<b>Narrative</b>					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident.</p> <p><b>HISTORY:</b></p> <p>On June 2, 2006, at 1227 Pacific daylight time, an American Airlines Boeing 767/223(ER) was substantially damaged when the left engine, a General Electric (GE) CF6-80A, had an uncontained high-pressure turbine (HPT) stage 1 disk failure during a high-power ground run for maintenance on the ground at the Los Angeles International Airport (LAX), Los Angeles, California. In response to a write up by the pilots of the airplane's inbound flight to LAX that the left engine was lagging the right engine by about 2 percent during a climb from FL 360 to 380, maintenance personnel repositioned the airplane from the terminal to a run up pad to test the engine. The maintenance personnel on the airplane, after starting the engines, had accelerated both engines to maximum power with the electronic engine controls (EEC) ON. Although both engines were able to attain maximum power, left engine's power lever was about a full knob width further forward than the right engine's power lever. The maintenance personnel then turned the left engine's EEC OFF and made two idle-to-maximum power-to-idle power excursions. The mechanics on board stated that after the engine had attained maximum power and was decelerating the second time, they heard a loud bang that was followed by a fire on the left side of the airplane and a left engine fire warning in the cockpit. The maintenance personnel accomplished an emergency shutdown of the engines, discharged one fire bottle into the left engine's nacelle, and evacuated the airplane. Units from the nearby on-airport Los Angeles Fire Department fire station responded to the airplane and extinguished the fire within 20 seconds after they arrived on scene. The three maintenance personnel on board the airplane and two ground observers were not injured. Although the airplane and engines were substantially damaged, the Safety Board categorized this event as an incident rather than an accident because there was no intent for flight as defined by 14 CFR 830.2.</p> <p>The examination of the left engine revealed that it had been cut in two at the HPT module with the front and rear sections of the engine hanging from the respective engine mounts. The HPT stage 1 and 2 disks were both missing from the engine. The HPT stage 2 disk was recovered essentially intact from the run up pad near the airplane. But the HPT stage 1 disk was found in four pieces that were recovered from the left engine's pylon, the belly of the airplane, the right engine's exhaust duct, and from a vacant lot, which was approximately 2,600 feet away from the airplane, on the south side of the airport across runways 7L/23R and 7R/25L. Liberated debris from the left engine resulted in numerous holes in the fuselage as well as the left and right wings that had numerous holes in the fuel tanks from where fuel leaked that fed the fire that burned the left wing and left side of the fuselage aft of the wing.</p> <p><b>TESTS AND RESEARCH</b></p> <p>The metallurgical examination of the broken pieces of the HPT stage 1 disk at the Safety Board's Materials Laboratory revealed the disk had failed from a radial rim-to-bore fracture that originated from an intergranular fatigue crack. The CF6-80A and -80C2 HPT stage 1 disk has 80</p>					
<b>FACTUAL REPORT - AVIATION</b>					

Page 1

The report is for filing

NATIONAL TRANSPORTATION SAFETY BOARD <b>FACTUAL REPORT</b> AVIATION		NTSB ID: ENG061A018 Occurrence Date: 06/02/2006 Occurrence Type: Incident	
Landing Facility/Approach Information			
Airport Name	Airport ID	Airport Elevation	Runway Used
Los Angeles	KLAX	FL MSL	NA
Runway Surface Type:			
Runway Surface Condition:			
Approach/Arrival Flown:	Unknown		
VFR Approach/Landing:	None		
Aircraft Information	Model/Serial 787-223(ER)		
Aircraft Manufacturer	Serial Number 22330		
Airworthiness Certificate(s): Transport			
Landing Gear Type: Tricycle	Number of Seats: 167	Certified Max Gross Wt.	Number of Engines: 2
Amateur Built A/C? No		350000 LBS	
Engine Type: Turbo Fan	Engine Manufacturer: General Electric	Model/Serial: CF6-80A	Rated Power: 46930 LBS
- Aircraft Inspection Information			
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time
		Hours	Hours
- Emergency Locator Transmitter (ELT) Information			
ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?	
Owner/Operator Information			
Registered Aircraft Owner	Street Address	City	State
			Zip Code
Operator of Aircraft	Street Address	City	State
AMERICAN AIRLINES INC	PO Box 619616		Zip Code
		Dallas/Ft Worth Airport	TX
Operator Does Business As: American Airlines			
Operator Designator Code: AALA			
- Type of U.S. Certificate(s) Held:			
Air Carrier Operating Certificate(s): Flag Carrier/Domestic			
Operating Certificate:			
Regulation Flight Conducted Under: Unknown			
Type of Flight Operation Conducted: Non-scheduled; Domestic; Passenger Only			

Page 2

FACTUAL REPORT - AVIATION

The report is for filing

 NATIONAL TRANSPORTATION SAFETY BOARD  
**FACTUAL REPORT**  
 AVIATION

NTSB ID: ENG061A018

Occurrence Date: 06/02/2006

Occurrence Type: Incident

## Narrative (Continued)

blade slots. The fatigue crack initiated from a small depression in the aft corner radius of blade slot bottom No. 31. The examination of the disk also revealed that there were two other blade slots, Nos. 30 and 72, that had had intergranular fatigue cracks that had also initiated from small depressions in the aft corner radius. Intergranular fatigue cracks are associated with very high stresses that exceed the material's capabilities. The examination of the disk confirmed the blade slots' aft corner radii conformed to the HPT stage 1 disk's engineering drawing requirements. In addition, the metallurgical examination determined the disk's hardness and grain structure conformed to the material's requirements. The cause of the disk burst was completely unrelated to the pilot's report of the engine being unable to make climb thrust.

The disassembly and examination of the engine did not reveal anything that could have caused the disk failure. A review of American Airlines' records on its two overhauls of the failed disk and on American Airlines' overhaul and repair procedures of CF6-80A and -80C2 HPT stage 1 disks in general did not reveal anything that could have caused the dents on the blade slot bottom aft corner radii from where the fatigue cracks initiated. In addition, a review of GE's CF6-80A and -80C2 HPT stage 1 disk manufacturing process and CF6-80A and -80C2 HPT module assembly procedure also did not reveal anything that could have caused the dents on the blade slot bottom aft corner radii.

Following a previous uncontained CF6-80C2 HPT stage 1 disk failure from a fatigue crack that originated in a blade slot bottom aft corner that occurred during a high-power run for maintenance and that was preceded by the finding of two -80C2 HPT stage 1 disks during routine overhaul inspection to have fatigue cracks progressing from the blade slot bottom aft corners, GE issued a Service Bulletin (SB) to inspect the CF6-80C2 HPT stage disk blade slot bottom aft corners. The SB was subsequently superseded with a SB that provided focused and enhanced inspection procedures to improve the probability of detecting a crack in the blade slot bottom aft corner area. However, the SBs only required the inspection to be accomplished when the HPT stage 1 disk was disassembled to the piece part level. When the FAA issued an airworthiness directive (AD) to mandate the inspection of the CF6-80C2 HPT stage 1 disks, the AD followed the SB and only required the inspection be accomplished when the HPT stage 1 disk was disassembled to the piece part level. GE then issued an SB that promulgated the focused and enhanced inspections being accomplished on the CF6-80C2 HPT stage 1 disks to the CF6-80A HPT stage 1 disks. Although SB required the CF6-80A HPT stage 1 disk inspections to be accomplished when the disk had been disassembled to piece part level, a CF6-80A HPT stage 1 disk was discovered to have a fatigue crack in a blade slot bottom aft corner shortly after the SB was issued. Following an in-flight uncontained failure of a CF6-80A HPT stage 1 disk from a fatigue crack that originated in a blade slot bottom aft corner, the FAA issued an AD to mandate the focused and enhanced inspection procedures for the CF6-80A HPT stage 1 disk blade slot bottom aft corners, but the AD only required the inspection to be accomplished when the disk had been disassembled to the piece part level. It was not until another CF6-80A HPT stage 1 disk was found to have a fatigue crack coming from a blade slot bottom aft corner that GE issued SBs for the CF6-80A and -80C2 disks that established a compliance schedule for the accomplishment of the focused and enhanced inspections of the blade slot bottom aft corners that the FAA mandated with an AD. Although the two previous disk failures had occurred at 7,547 and 12,495 cycles since new (CSN) and the five disks with cracks were found at 5,144, 9,532, 9,359, 9,058, and 9,459 CSN, the compliance schedule in the SBs and consequently the AD allowed the American Airlines HPT stage 1 disk that had 9,186 CSN when it failed to remain in service.

Page 1a

FACTUAL REPORT - AVIATION

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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ENG06IA018		Occurrence Date: 06/02/2006		Occurrence Type: Incident	
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	NM	Direction From Accident Site	Deg. Mag.
Sky/Lowest Cloud Condition:			Ft. MSL		Ft. AGL		
Lowest Ceiling:			Ft. AGL		Condition of Light:		
Temperature: °C			°C		SM		
Wind Direction:			Wind Speed:		Wind Gusts:		
Visibility (RVR):			FL		SM		
Precip and/or Obscuration:							
Accident Information							
Aircraft Damage: Substantial			Aircraft Fire: Ground		Aircraft Explosion: Ground		
- Injury Summary Matrix							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
Second Pilot							
Student Pilot							
Flight Instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants							
Other Crew							
Passengers							
- TOTAL ABOARD -							
Other Ground							
- GRAND TOTAL -							
FACTUAL REPORT - AVIATION							
Page 4							

This space for listing

National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: ENG06IA018		Occurrence Date: 06/02/2006		Occurrence Type: Incident	
First Pilot Information							
Name		City		State		Date of Birth	
Sex: M		Seat Occupied:		Occupational Pilot?		Certificate Number:	
Airplane Rating(s):							
Rotorcraft/Glider/LTA:							
Instrument Rating(s):							
Instructor Rating(s):							
Current Biennial Flight Review?							
Medical Cert. Status:				Date of Last Medical Exam:			
- Flight Time Matrix							
Total Time		Airplane Single Engine		Airplane Multi-Engine		Night	
Pilot in Command(PIC)		Instructor		Simulator		Recorded	
Instruction Received		Last 90 Days		Last 30 Days		Last 24 Hours	
Seabird Used?		Shoulder Harness Used?		Toxicology Performed?		Second Pilot?	
Flight Plan/Itinerary							
Type of Flight Plan Filed: None							
Departure Point		State		Airport Identifier		Departure Time	
Destination		State		Airport Identifier		Time Zone	
Type of Clearance: None							
Type of Airspace:							
Weather Information							
Source of Wx Information:							
FACTUAL REPORT - AVIATION							
Page 3							



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 <b>FACTUAL REPORT</b> AVIATION CITATION	NTSB ID: ENG06IA018	Page 5 FACTUAL REPORT - AVIATION
	Occurrence Date: 06/02/2006	
	Occurrence Type: Incident	
Administrative Information Investigator-in-Charge (IIC) Jim Hookey		
Additional Persons Participating in This Accident/Incident Investigation:		

**National Transportation Safety Board**  
**Washington, DC 20594**

Printed on : 1/10/2012 7:26:51 PM

**Brief of Incident**

**Adopted 01/31/2008**

ENG06IA018	06/02/2006	Los Angeles, CA	Aircraft Reg No. N330AA	Time (Local): 12:27 PDT
File No. 22967				
Make/Model:	Boeing / 767-223(ER)		Fatal	Serious
Engine Make/Model:	General Electric / CF6-80A		0	0
Aircraft Damage:	Substantial		0	3
Number of Engines:	2		0	0
Operating Certificate(s):	Flag Carrier/Domestic			
Name of Carrier:	AMERICAN AIRLINES INC.			
Type of Flight Operation:	Non-scheduled; Domestic; Passenger Only			
Reg. Flight Conducted Under:	Unknown			
Last Depart. Point:		Condition of Light:		
Destination:		Weather Info Src:	Unknown	
Airport Proximity:	On Airport/Airstrip	Basic Weather:		
Airport Name:	Los Angeles	Lowest Ceiling:		
Runway Identification:	NA	Visibility:		
Runway Length/Width (ft):	Unk/Nr	Wind Dir/Speed:		
Runway Surface:		Temperature (°C):	Unk/Nr	
Runway Surface Condition:		Precip/Obscuration:		
Pilot-in-Command	Age:	Flight Time (Hours)		
Certificate(s)/Rating(s)		Total All Aircraft:	Unk/Nr	
		Last 90 Days:	Unk/Nr	
		Total Make/Model:	Unk/Nr	
Instrument Ratings		Total Instrument Time:	Unk/Nr	

The Boeing 767 was undergoing a high-power test of the left-hand General Electric (GE) CF6-80C2 engine to troubleshoot a pilot's report of the engine being unable to make climb thrust. During the test, the engine experienced an uncontained failure of the high pressure turbine (HPT) stage 1 disk. Examination of the pieces of the disk revealed the disk failed from an intergranular fatigue crack that originated from a small depression on the blade slot bottom aft corner radius. There were two other intergranular fatigue cracks that originated from small depressions on other blade slot bottom aft corner radii. Intergranular fatigue cracks are typically associated with very high stresses that exceed the material's capability. GE issued service bulletins (SB) to require inspections of CF6-80A and -80C2 HPT stage 1 disks that the FAA mandated with airworthiness directives (AD), but the SBs and AD did not establish a compliance schedule. When the SBs and AD was revised to establish a compliance schedule, the schedule was such that disks with much higher cycles since new, than those that had previously failed or were found cracked, were permitted to remain in service. On August 26, 2006, the Safety Board issued safety recommendation A-06-60 through A-06-64, which addressed these deficiencies. The recommendations can be found at the following url address: [http://www.ntsb.gov/recs/letters/2006/A06\\_60\\_64.pdf](http://www.ntsb.gov/recs/letters/2006/A06_60_64.pdf).

ENG06IA018  
File No. 22987

06/02/2006

Los Angeles, CA

Aircraft Reg No. N330AA

Time (Local): 12:27 PDT

Occurrence #1: LOSS OF ENGINE POWER(TOTAL) - MECH FAILURE/MALF  
Phase of Operation: STANDING


#### Findings

1. (C) TURBINE ASSEMBLY, TURBINE WHEEL - FATIGUE
2. (C) ACFT/EQUIP, INADEQUATE DESIGN - MANUFACTURER
3. (F) ACFT/EQUIP, INADEQUATE DESIGN - FAA(OTHER/ORGANIZATION)

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this incident as follows. The HPT stage 1 disk failed from an intergranular fatigue crack because of GE's inadequate design of the CF6-80 series HPT stage 1 disk. The inadequate design of the disk resulted in a high stress area in the blade slot bottom aft corner that was at or nearly at the material's capability so that there was no damage tolerance such that a small dent could cause a crack to initiate and propagate to failure. Contributing to the disk's failure was the FAA's failure to mandate an accelerated inspection schedule after a previous CF6-80A uncontained HPT stage 1 disk failure had occurred and after other CF6-80A HPT disks had been found during routine overhaul to have cracks in the blade slot bottom aft corners.

This space is for finding

		NTSB ID: LAX07IA014		Aircraft Registration Number: N614AS	
Occurrence Date: 10/19/2006		Most Critical Injury: None			
Occurrence Type: Incident		Investigated By: NTSB			
Location/Time		Time Zone			
Nearest City/Place Los Angeles		Local Time PDT			
State CA		Zip Code 90009			
Distance From Landing Facility					
Aircraft Information Summary		Model/Series 737-790		Type of Aircraft Airplane	
Boeing					
Revenue Sighting Flight No		Air Medical Transport Flight: No			
<p><b>Narrative</b></p> <p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident.</p> <p><b>HISTORY OF FLIGHT</b></p> <p>On October 19, 2006, about 0100 Pacific daylight time, a Boeing 737-790, N614AS, returned to Los Angeles International Airport (LAX), Los Angeles, California, after experiencing a hydraulic system malfunction while en route to Licenciado Benito Juarez International Airport (MMEX [MEX]), Mexico City, Mexico. Alaska Airlines operated the commercial flight under the provisions of 14 Code of Federal Regulations (CFR) Part 121, as ASA flight 250. An instrument flight rules (IFR) flight plan had been filed. There were no injuries to the two flight crew, three cabin flight attendants, and the unknown number of passengers; the airplane was not damaged. The flight departed LAX about 2400.</p> <p>According to Alaska Airlines flight safety personnel, after entering Mexican airspace at cruise altitude, the flight crew was alerted to a System B hydraulic failure. The flight crew opted to return to the United States (US). Upon reaching US airspace the flight crew declared an emergency with a return to LAX. While on a 5-mile final approach to LAX at 2,500 feet above ground level (agl), the flight crew selected flaps 15 and extended the landing gear. Five minutes later, about 800 feet agl, the System A Hydraulic Quantity gauge dropped to 0 pounds per square inch (psi), which illuminated both System A LOW PRESSURE LIGHTS, and the airplane went to manual reversion. The flight crew noted that the pressure gauge read 2,900 psi for about 1 minute after the hydraulic quantity went to 0 psi; the pressure gauge also dropped to 0 psi. At that point, the airplane became difficult to control in the mechanical reversion mode; however, the flight crew was able to land the airplane without further incident at 0330.</p> <p><b>TESTS AND RESEARCH</b></p> <p><b>Hydraulics</b></p> <p>Alaska Airlines maintenance personnel along with a Federal Aviation Administration (FAA) airworthiness inspector and personnel from Boeing examined the airplane, and noted that the hydraulic failure of System B (the initiating event) was attributed to a catastrophic failure of the engine driven pump. ASA maintenance personnel found a spoiler hydraulic line that had fractured and subsequently bled out the System A hydraulic (the second event), and led to the dual hydraulic failure event.</p> <p>Maintenance personnel replaced System A and B case drain filters, as well as, the System B return filter; all of the filters contained chunks of metal. The engine driven pump (EDP), part number 66087, serial number 2040, for the number 2 engine was replaced. As maintenance personnel were performing the leak check for the EDP, hydraulic fluid was observed coming from the number 2 engine pylon area. While troubleshooting the leak, maintenance found the B-nut (part number 312A3110-2) in the hydraulic pressure tube assembly, unscrewed from its mating tube, it had migrated about 9 inches from the end of the tube. Maintenance personnel replaced the entire tube assembly as a</p>					

Factual Report - Aviation

Page 1

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This event is being

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA014		Occurrence Date: 10/19/2006		Occurrence Type: Incident	
Landing Facility/Approach Information		Airport Name		Airport ID: Airport Elevation		Runway Used Runway Length Runway Width	
Runway Surface Type: Runway Surface Condition:				Ft. MSL		NA	
Approach/Arrival Flow: ILS							
VFR Approach/Landing: None							
Aircraft Information		Aircraft Manufacturer		Model/Serial		Serial Number	
Boeing		737-790				30343	
Airworthiness Certificate(s): Normal; Transport							
Landing Gear Type: Retractable - Tricycle		Number of Seats: 177		Certified Max Gross Wt.		Number of Engines: 2	
Engine Type: Turbo Fan		Engine Manufacturer: General Electric		Model/Serial: CRM66SER		Rated Power: 27300 LBS	
Type of Last Inspection		Date of Last Inspection		Time Since Last Inspection		Airframe Total Time	
Continuous Airworthiness				Hours		Hours	
- Emergency Locator Transmitter (ELT) Information		ELT Installed? No		ELT Operated? No		ELT Aided in Locating Accident Site? No	
Owner/Operator Information		Registered Aircraft Owner		Street Address		City State Zip Code	
Alaska Airlines, Inc.		18300 Pacific Hwy S		Seattle		WA 98188	
Operator of Aircraft		Alaska Airlines, Inc.		Street Address		City State Zip Code	
		18300 Pacific Hwy S		Seattle		WA 98188	
Operator Does Business As:		Operator Designator Code: ASAA					
- 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: Scheduled; International; Passenger Only							

FACTUAL REPORT - AVIATION

Page 2

15-Nov-07  
National Transportation Safety Board  
**FACTUAL REPORT**  
AVIATION

NTSB ID: LAX07IA014

Occurrence Date: 10/19/2006

Occurrence Type: Incident

Narrative (Continued)

precautionary measure. The EOP for the number 2 engine was sent to Parker Aerospace for additional inspection/teardown.

Maintenance personnel conducted a Hydraulic System Filter replacement through the remainder of the hydraulic system. The ground spoiler "up" line was cracked and replaced as were other items as required by Alaska Airlines 282920-01025 Hydraulic System Restoration.

## System A Failure

The tube assembly (part number 272A4451) and case drain filter were sent to Boeing's laboratory for additional testing. Laboratory personnel reported that the tube had a fatigue fracture with an initiation crack located at the toe of the welding root that grew to about half the perimeter of the tube. They also noted that the tube and fitting had been damaged and most likely occurred after removal of the B-nut as there was no evidence of the B-nut having been seated against those surfaces. Laboratory results of the tube and fitting materials were consistent with the drawing requirements.

## System B Failure

The Engine Driven Pump (part number 66087, serial number 2040) was examined by Parker Aerospace Engineering. During disassembly technicians noted steel particles in the pumps housing, a sheared and seized impeller drive shaft, erosion at the inlet port of the port plate and cap, and a heavy wear pattern of the port plate. They also noted cylinder barrel face wear with bronze transfer, damaged front housing stroking piston bore, the rotating group was stuck in the cylinder barrel bore with damage to bottom of barrel, the rotating group shoe gap was found to be excessive, and rotating group thrust washer was found to have worn with light galling. The drive shaft seal was found to be in fair condition with little damage, and all of the bearings were found to have ingested metal debris. Parker Aerospace was not able to determine the cause of the engine driven pump failure.

## ADDITIONAL INFORMATION

According to Alaska Airlines, Boeing indicated that the failure of the Spoiler hydraulic line/tube (part number 272A4451) was a known event. Boeing has modified the tube, and Alaska Airlines reported that they will modify their fleet with the new hydraulic line/tube.

The Boeing Air Safety Investigation department confirmed that the loss of hydraulic for System B was due to a disconnect of tube part number 312A2110-2, from tube part number 272A1151-7; the B-nut that joins the two tubes together had unscrewed. While on final approach the System A tube, part number 272A4451-87 fractured and lead to the failure of System A. Examination of the B-nut for tube 312A2110-2 revealed no discrepancies with the threads of the B-nut. Boeing personnel further noted that tube part number 272A4451-87 was replaced in production at 1/n2346 by tube 272A4451-200. The original tube 272A4451-87 was constructed out of titanium; the new tube, part number 272A4451-200 is constructed of stainless steel.

FACTUAL REPORT - AVIATION

Page 1a

This space for finding

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA014		Occurrence Date: 10/19/2006		Occurrence Type: Incident	
<b>Weather Information</b>							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site	Deg. Mag.	
LAX	0050	PDT	125 Ft. MSL	NM			
Sky/Lowest Cloud Condition: Clear							
Lowest Ceiling: None		FL AGL	Visibility:	10	SM	Altitude: 30.04 °Hg	
Temperature: 17 °C		Dew Point:	8 °C	Weather Conditions at Accident Site: Visual Conditions			
Wind Direction: 110		Wind Speed: 3	Wind Gusts:				
Visibility (RVR):		FL	Visibility (RWV)	SM			
Precip and/or Obscuration: No Obscuration; No Precipitation							
<b>Accident Information</b>							
Aircraft Damage: None			Aircraft Fire: None		Aircraft Explosion: None		
<b>- Injury Summary Matrix</b>							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
Second Pilot				1	1		
Student Pilot				1	1		
Flight Instructor							
Check Pilot							
Pilot Engineer							
Cabin Attendants			3		3		
Other Crew							
Passengers							
- TOTAL ABOARD -				5	5		
Other Ground							
- GRAND TOTAL -				5	5		

FACTUAL REPORT - AVIATION

Page 4


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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA014		Occurrence Date: 10/19/2006		Occurrence Type: Incident	
<b>First Pilot Information</b>							
Name	City	State	Date of Birth	Age			
On File	On File	On File	On File	46			
Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File				
Certificate(s): Airline Transport							
Airplane Rating(s): Multi-engine Sea							
Rotorcraft/Glider/LTA: None							
Instrument Rating(s): Airplane							
Instructor Rating(s): None							
Current Biennial Flight Review?							
Medical Cert.: Class 1			Date of Last Medical Exam: 08/2006				
<b>- Flight Time Matrix</b>							
Total Time	10363	8113	Accepted Multi-Engine	High	Instrument	Basic	Upper Than All
Pilot in Command (PIC)	3870	2642					
Instructor							
Instruction Received							
Last 90 Days							
Last 30 Days							
Last 24 Hours							
Seatbelt Used? Yes	Shoulder Harness Used? Yes		Toxicology Performed? No		Second Pilot? Yes		
<b>Flight Plan/Itinerary</b>							
Type of Flight Plan Filed: IFR							
Departure Point	State	Altitude Identifier	Departure Time	Time Zone			
Same as Accident/Incident Location		LAX	0000	PDT			
Destination	State	Altitude Identifier					
Mexico City	UN	MMX					
Type of Clearance: IFR							
Type of Airspace:							
Weather Information							
Source of WX Information:							
Company							

FACTUAL REPORT - AVIATION

Page 3

This record is being

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX07IA014
	Occurrence Date: 10/19/2006
	Occurrence Type: Incident
Administrative Information Investigator-in-Charge (IIC) Teeloye C. Cornejo	
Additional Persons Participating in This Accident/Incident Investigation: Jim Dodge Federal Aviation Administration Seattle, WA	
Page 5	

**National Transportation Safety Board**  
Washington, DC 20594

Printed on : 1/10/2012 7:22:12 PM

**Brief of Incident**

Adopted 03/31/2008

LAX07IA014 File No. 23170	10/19/2006	Los Angeles, CA	Aircraft Reg No. N614AS	Time (Local): 01:00 PDT												
Make/Model: Boeing / 737-790 Engine Make/Model: General Electric / CFM56SER Aircraft Damage: None Number of Engines: 2 Operating Certificate(s): Flag Carrier/Domestic Name of Carrier: Alaska Airlines, Inc. Type of Flight Operation: Scheduled; International; Passenger Only Reg. Flight Conducted Under: Part 121: Air Carrier			<table border="1"> <thead> <tr> <th></th> <th>Fatal</th> <th>Serious</th> <th>Minor/None</th> </tr> </thead> <tbody> <tr> <td>Crew</td> <td>0</td> <td>0</td> <td>5</td> </tr> <tr> <td>Pass</td> <td>0</td> <td>0</td> <td>0</td> </tr> </tbody> </table>		Fatal	Serious	Minor/None	Crew	0	0	5	Pass	0	0	0	
	Fatal	Serious	Minor/None													
Crew	0	0	5													
Pass	0	0	0													
Last Depart. Point: Same as Accident/Incident Location Destination: Mexico City, UN Airport Proximity: Off Airport/Airstrip			Condition of Light: Night Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 10.00 SM Wind Dir/Speed: 110 / 003 Kts Temperature (°C): 17 Precip/Obscuration: No Obscuration; No Precipitation													
Pilot-in-Command      Age: 46			Flight Time (Hours)													
Certificate(s)/Rating(s) Airline Transport: Multi-engine Sea			Total All Aircraft: 10363 Last 90 Days: Unk/Nr Total Make/Model: 8113 Total Instrument Time: Unk/Nr													
Instrument Ratings Airplane																

During cruise flight, just after entry into foreign airspace, the flight crew was alerted to a System B hydraulic failure, and they decided to return to, and land in the United States (US). Upon re-entry to US airspace, the flight crew declared an emergency and requested to land at the departure airport. On final approach, about 5 minutes after selecting flaps to 15 and lowering the landing gear, the flight crew was alerted to the System A hydraulic quantity gage, that had dropped to 0 pounds per square inch (psi). At this point both System A LOW PRESSURE LIGHTS illuminated and the airplane went into the manual reversion mode. The flight crew indicated that the airplane was difficult to control; however, they landed uneventfully at the airport. Maintenance personnel for the airline, and the airplane manufacturer, inspected the hydraulic systems. They noted that the initiating event was a failed engine driven pump. The secondary event was a cracked hydraulic line that failed due to fatigue. A metallurgical examination revealed the fatigue fracture initiated at the toe of the welding root where they were able to locate a crack that had propagated through half the perimeter. The airframe manufacturer redesigned the affected tube, part number 272A4451-87, a titanium tube, with part number 272A4451-200, a stainless steel tube.

LAX07IA014  
File No. 23170

10/19/2006

Los Angeles, CA

Aircraft Reg No. N614AS

Time (Local): 01:00 PDT

Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION  
Phase of Operation: CRUISE - NORMAL

## Findings

1. (C) FUEL SYSTEM,PUMP - FAILURE
2. (C) HYDRAULIC SYSTEM,LINE - FATIGUE
3. (C) HYDRAULIC SYSTEM,LINE - FRACTURED
4. (C) FLUID,HYDRAULIC - LEAK

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this incident as follows:

A complete failure and depressurization of both hydraulic systems due to two separate events: 1) the failure of a engine driven pump on the 'A' system, and 2) the fatigue fracture and failure of a hydraulic line on the 'B' system.


This space for future use


National Transportation Safety Board FACTOR REPORT AVIATION		NTSB ID: LAX07LA127		Aircraft Registration Number: N625UA	
		Occurrence Date: 04/12/2007		Most Critical Injury: Serious	
		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code 90045	Local Time 1315	Time Zone PDT	
Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 757-200		Type of Aircraft Airplane	
Revenue Sighting Flight: No		Air Medical Transport Flight: No			
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On April 12, 2007, at 1315 Pacific daylight time, a Boeing 757-200, N625UA, experienced moderate turbulence while on descent into Los Angeles International Airport, Los Angeles, California. United Airlines operated the airplane under the provisions of 14 CFR Part 121. The 2 airline transport pilots and the 104 passengers were not injured; 1 flight attendant was seriously injured; and 5 flight attendants had minor injuries. The airplane was not damaged. Visual meteorological conditions prevailed, and an instrument flight plan had been filed. The flight originated at John F. Kennedy Airport, New York, at 1151 eastern daylight time.</p> <p>United Airlines stated in the Pilot-Operator Aircraft Accident Report that while at flight level 400 (40,000 feet), the flight deck received information about turbulence below 12,000 feet. The captain advised the flight attendants to have the cabin secured and be in their seats within 15 minutes. The first officer gave the 'prepare for landing' announcement around flight level 250 (25,000 feet) as the airplane was descending, which was after the captain had notified the flight attendants to prepare the cabin, but before the end of the stated 15 minutes. While descending through 15,500 feet, the airplane experienced a moderate 'jolt' lasting 1-2 seconds. By this time it had been more than 15 minutes since the captain gave the flight attendants the secure cabin instructions. The cabin crew reported injuries to all flight attendants and no injuries to passengers. All six flight attendants received medical attention after landing. One flight attendant was seriously injured with a closed fibular fracture; the five other flight attendants had minor injuries.</p> <p>In a written statement, the first officer said that turbulence departing New York had been very bad, therefore, in order to mitigate any passenger anxiety, when he made the 'prepare for landing' announcement he added that the turbulence would not be as bad as it was on departure. He understood the captain's instructions to the flight attendants, and this announcement was aimed at the passengers.</p> <p>In written statements provided by the flight attendants, they confirmed that they understood the instructions to have the cabin cleaned up and be seated within 15 minutes. As they were finishing the cabin clean up, the first officer's 'prepare for landing' announcement indicated that the turbulence would not be as bad as they expected.</p> <p>After landing, the airplane's Digital Flight Data Recorder (DFDR) was removed from the airplane. The DFDR data provided by United was examined by National Transportation Safety Board technical experts. The turbulence occurred as the aircraft was coming out of a 12-degree right bank and descending through 15,400 pressure altitude. The event lasted approximately 10-11 seconds, starting at Subframe Reference Number 43371 (20:28:18 GMT per the captain's clock, and 20:27:36 GMT per the DFDR clock). The bank angle of the aircraft was between 8 and 12 degrees right wing down during the event. Vertical acceleration fluctuated between .5 and 2.06 G's. Longitudinal acceleration spiked up to .2 G's about the same time as the 2 G vertical spike. Lateral</p>					

Page 1

FACTUAL REPORT - AVIATION



 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: LAX07LA127 Occurrence Date: 04/12/2007 Occurrence Type: Accident
<b>Narrative (Continued)</b> <p>acceleration fluctuated between .1 G left and .05 G's to the right during the incident. The data showed that the autopilot was engaged and in control of the aircraft during the incident.</p>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: LAX07LA127 Occurrence Date: 04/12/2007 Occurrence Type: Accident
<b>Landing Facility/Approach Information</b>		
Airport Name Los Angeles	Airport ID: KLAX	Airport Elevation FL MSL
Runway Surface Type: Runway Surface Condition:	Runway Used NA	Runway Length Runway Width
Approach/Arrival Flow: Unknown		
VFR Approach/Landing: Unknown		
<b>Aircraft Information</b>		
Aircraft Manufacturer Boeing	Model/Serial 757-200	Serial Number 24978
Airworthiness Certificate(s): Transport		
<b>Landing Gear Type: Retractable - Tricycle</b>		
Aircraft Built Aft? No	Number of Seats: 120	Certified Max Gross Wt. 236800 LBS
Engine Type: Turbo Jet	Engine Manufacturer: Pratt & Whitney	Model/Serial: 2037
<b>Aircraft Inspection Information</b>		
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 03/2007	Time Since Last Inspection Hours
Airframe Total Time 54600 Hours		
<b>Emergency Locator Transmitter (ELT) Information</b>		
ELT Installed?/Type No	ELT Operated? No	ELT Aided in Locating Accident Site?
<b>Owner/Operator Information</b>		
Registered Aircraft Owner Finova Capital Leasing		
Street Address City Scottsdale		
State AZ		
Zip Code 85258		
Operator of Aircraft UNITED AIRLINES		
City Chicago		
State IL		
Zip Code 60666		
Operator Does Business As: Operator Designator Code: UALA		
<b>Type of U.S. Certificate(s) Held:</b> 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: Scheduled; Domestic; Passenger Only		

This report for billing


National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07LA127		Occurrence Date: 04/12/2007		Occurrence Type: Accident	
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site		
KLAX	2050	PDT	FL MSL	NM	Deg. Mag.		
Sky/Lowest Cloud Condition: Scattered				700 FL AGL			
Lowest Ceiling: None		FL AGL	Visibility: 7	SM	Altimeter: 29.84	Hg	
Temperature: 19 °C	Dew Point: -6 °C	Weather Conditions at Accident Site: Visual Conditions					
Wind Direction: 320	Wind Speed: 20	Wind Gusts: 32					
Visibility (RVR):	FL	Visibility (RVV):	SM				
Precip and/or Obscuration: No Obscuration; No Precipitation							
Accident Information							
Aircraft Damage: None				Aircraft Fire: None		Aircraft Explosion: None	
- Injury Summary Matrix							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
Second Pilot				1	1		
Student Pilot				1	1		
Flight Instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants		1	5		6		
Other Crew							
Passengers				104	104		
- TOTAL ABOARD -		1	5	106	112		
Other Ground							
- GRAND TOTAL -		1	5	106	112		
FACTUAL REPORT - AVIATION							
Page 4							

This report for billing

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07LA127		Occurrence Date: 04/12/2007		Occurrence Type: Accident	
First Pilot Information							
Name	City	State	Date of Birth	Age			
On File	On File	On File	On File	41			
Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File				
Certificate(s):		Airline Transport; Flight Instructor					
Airplane Rating(s):		Multi-engine Land; Single-engine Land					
Rotorcraft/Glider/LTA: None							
Instrument Rating(s):		Airplane					
Instructor Rating(s):		Airplane Multi-engine; Airplane Single-engine; Instrument Airplane					
Current Biennial Flight Review? 10/2006							
Medical Cert. Status:		Date of Last Medical Exam: 02/2007					
Medical Cert. Class: 1							
- Flight Time Matrix							
Alt A/C	Time Under Control	Engine	Engine	Engine	Engine	Engine	Engine
14000	4500						
Total Time							
Pilot in Command (PIC)							
Instructor							
Instruction Received							
Last 90 Days	90						
Last 30 Days	34						
Last 24 Hours	7						
Seatbelt Used? Yes	Shoulder Harness Used? Yes	Toxicology Performed? No	Second Pilot? Yes				
Flight Plan/Itinerary							
Type of Flight Plan Filed: IFR							
Departure Point	State	Airport Identifier	Departure Time	Time Zone			
New York	NY	KJFK	1151	EDT			
Destination	State	Airport Identifier					
Los Angeles	CA	KLAX					
Type of Clearance: IFR							
Type of Airspace:							
Weather Information							
Source of WX Information:							
FACTUAL REPORT - AVIATION							
Page 3							



This report is being

 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: LAX07LA127	Occurrence Date: 04/12/2007 Occurrence Type: Accident	
Administrative Information Investigator-in-Charge (IIC) Van S. McKenny			
Additional Persons Participating in This Accident/Incident Investigation: Norm Cook Federal Aviation Administration Los Angeles, CA Jeff Plantz United Airlines Chicago, IL			
Page 5 FACTUAL REPORT - AVIATION			

**National Transportation Safety Board**  
**Washington, DC 20594**

Printed on : 1/10/2012 7:08:11 PM

**Brief of Accident**

**Adopted 12/20/2007**

LAX07LA127 File No. 22764	04/12/2007	Los Angeles, CA	Aircraft Reg No. N525UA	Time (Local): 13:15 PDT
Make/Model: Boeing / 757-200 Engine Make/Model: Pratt & Whitney / 2037 Aircraft Damage: None Number of Engines: 2 Operating Certificate(s): Flag Carrier/Domestic Name of Carrier: UNITED AIRLINES Type of Flight Operation: Scheduled; Domestic; Passenger Only Reg. Flight Conducted Under: Part 121: Air Carrier			Fatal 0 Serious 1 Minor/None 7	Crew 0 Pass 0 104
Last Depart. Point: New York, NY Destination: Los Angeles, CA Airport Proximity: Off Airport/Airstrip			Condition of Light: Day Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 7.00 SM Wind Dir/Speed: 320 / 020 Kts Temperature (°C): 19 Precip/Obscuration: No Obscuration/ No Precipitation	
Pilot-in-Command	Age: 41	Flight Time (Hours)		
Certificate(s)/Rating(s) Airline Transport, Flight Instructor, Multi-engine Land, Single-engine Land	Total All Aircraft: 14000 Last 90 Days: Unk/Nr Total Make/Model: 4500 Total Instrument Time: Unk/Nr			
Instrument Ratings Airplane				

While at flight level FL400 (40,000 feet) the flight deck received information about turbulence below 12,000 feet. The captain advised the flight attendants to have the cabin secured and be in their seats within 15 minutes. The first officer gave the 'prepare for landing' announcement in the descent around flight level FL250 (25,000 feet), which was after the captain had notified the flight attendants to prepare the cabin, but before the end of the stated 15 minutes. While descending through 15,500 feet, the airplane experienced a moderate 'jolt' lasting 1-2 seconds. By this time it had been more than 15 minutes since the captain gave the flight attendants the secure cabin instructions. The cabin crew reported injuries to all flight attendants and no injuries to passengers. All six flight attendants received medical attention after landing. One flight attendant was seriously injured with a closed fibular fracture; the five other flight attendants had minor injuries. The first officer said that turbulence during their departure had been very bad, therefore, in order to mitigate any passenger anxiety, when he made the 'prepare for landing' announcement, he added that the turbulence would not be as bad as it was on departure. He understood the captain's instructions to the flight attendants, and this announcement was aimed solely at the passengers. The flight attendants confirmed that they understood the captain's instructions to have the cabin cleaned up and be seated within 15 minutes. As they were finishing the cabin clean up, the first officer's 'prepare for landing' announcement indicated that the turbulence would not be as bad as they had been told to expect. The flight attendants may have interpreted this added information concerning turbulence as a relaxation of the captain's earlier instructions. The Digital Flight Data Recorder (DFDR) indicated the turbulence occurred as the aircraft was coming out of a 12-degree right bank and descending through 15,400 pressure altitude. The event lasted approximately 10-11 seconds. The bank angle of the aircraft was between 8 and 1 degrees right wing down during the event. Vertical acceleration fluctuated between .5 and 2.06 G's. Longitudinal acceleration spiked up to .2 G's about

## Brief of Accident (Continued)

LAX07LA127  
File No. 22784

04/12/2007

Los Angeles, CA

Aircraft Reg No. N525UA

Time (Local): 13:15 PDT

the same time as the 2 G vertical spike. Lateral acceleration fluctuated between .1 G left and .05 G's to the right during the incident. The data showed that the autopilot was engaged and in control of the aircraft during the incident.

## Brief of Accident (Continued)

LAX07LA127  
File No. 22784

04/12/2007

Los Angeles, CA

Aircraft Reg No. N525UA

Time (Local): 13:15 PDT

Occurrence #1: IN FLIGHT ENCOUNTER WITH WEATHER  
Phase of Operation: DESCENT - NORMAL

## Findings


1. (C) WEATHER CONDITION - TURBULENCE
2. (F) CREW/GROUP COORDINATION - CONFLICTING - FLIGHTCREW


Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows. The flight's encounter with a turbulence event that occurred while the flight attendants were unseated. Contributing to the accident was the apparent conflicting information provided by the flight deck to the flight attendants and the flight attendants' interpretation of that information.

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX071A198 Occurrence Date: 06/29/2007 Occurrence Type: Incident
<b>Narrative</b> (Continued)		
<p>Three of the four bead flanges fractured at the transition area to the hub. The inboard bead flange on one wheel assembly was intact for about 75 percent of the circumference. The failed outboard flange pieces from both wheels were smaller than the inboard flange pieces. A majority of the fragments from the three failed flanges were recovered and reconstructed on the tarmac. A Safety Board structural engineer examined all of the fracture surfaces, and noted overload signatures. There was significant abrasion damage on the outer most circumferences of all the bead flanges.</p> <p>Examination of runway 25R revealed gouging consistent with the dimensions between the wheel flanges beginning at about the taxiway W intersection. The gouging was present, although not continuous, until about 200 feet beyond the taxiway X intersection. The gouging was at or to the left of the runway centerline. Investigators were not able to examine the landing runway (25L) since it was in use at the time of the examination.</p> <p>Tire pressures were measured in all remaining tires on the airplane, and the pressures ranged between 179 and 205 pounds per square inch (psi). In addition, the airplane was equipped with a tire pressure indicating system. The data review results from the engine indicating and crew alerting system (EICAS) agreed with the measured pressures.</p> <p>The No. 11 and 12 tires, wheels, and brake assemblies were retained for further examination.</p> <p><b>FLIGHT RECORDERS</b></p> <p>The airplane was equipped with a Honeywell Solid State Flight Data Recorder (FDR), model number 980-4700-003, serial number 3972, which recorded airplane flight information in a digital format using solid-state flash memory as the recording medium. The FDR recording contained approximately 53.8 hours of data.</p> <p><b>TESTS AND RESEARCH</b></p> <p><b>Engine Indicating and Crew Alerting System (EICAS)</b></p> <p>The Boeing 747-400 airplane was equipped with an EICAS computer in the cockpit. The fault summary report for the incident flight was captured and reviewed. The first fault noted on the report occurred at 0144, and was listed as "ABNORMAL TIRE PRESSURE CONDITION". At 0144:50, the EICAS system recorded a tire pressure on the right aft wheel of the RBLG, tire No. 12, of 144 psi. All other main landing gear tire pressures were between 204 and 231 psi. Beginning at 0153, numerous faults with the brake system, hydraulic system, and RBLG were recorded and stored in the computer.</p> <p>Examination of the FDR data revealed at the time of the 0144 EICAS message, the airplane's position at LAX was just prior to a turn onto taxiway B, which was a parallel taxiway to runway 25R.</p> <p><b>Tire Pressure and Tire Pressure Indication System (TPIS)</b></p> <p>The airplane was equipped with a TPIS that continually monitored the tire pressure and supplied fault signals to the EICAS computer. For the month preceding the incident, the recorded tire pressures for the main landing gear wheels varied between 194 and 234 psi. Prior to departure on the day of the incident, the tire pressures were checked by maintenance personnel and no anomalies were noted. The tire pressures were provided to the flight crew with the flight dispatch paperwork.</p> <p><b>Weight and Balance</b></p> <p>Air China provided the weight and balance data for the airplane for the incident flight, and for the month of June 2007. On the incident flight, the takeoff weight was 811,430 pounds. For the</p>		

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX071A198 Occurrence Date: 06/29/2007 Occurrence Type: Incident	Aircraft Registration Number: B-2470 Most Critical Injury: None Investigated By: NTSB
<b>Location/Time</b>			
Nearest City/Place Los Angeles	State CA	Zip Code 90045	Local Time 0155 Time Zone PDT
Airport Proximity: On Airport/Airstrip Distance From Landing Facility:			
<b>Aircraft Information Summary</b>			
Aircraft Manufacturer Boeing		Model/Series 747-400	Type of Aircraft Airplane
Revenue Sightseeing Flight: No		Air Medical Transport Flight: No	
<b>Narrative</b>			
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: <b>HISTORY OF FLIGHT</b> <p>On June 29, 2007, about 0155 Pacific daylight time, Air China flight 984, a Boeing 747-400, B-2470, experienced burst tires and accompanying wheel disintegration during takeoff from Los Angeles International Airport (LAX), Los Angeles, California. Air China was operating the airplane as a scheduled international passenger/cargo flight under the provisions of 14 Code of Federal Regulations (CFR) Part 129. The captain, first officer, 2 backup crew, 10 flight attendants, and 233 passengers were not injured; the airplane sustained minor damage. Visual meteorological conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed. The flight was departing as a non-stop to Beijing, China.</p> <p>According to the flight crew, during the takeoff roll from runway 25R at LAX, the two aft tires, numbers (No.) 11 (inboard) and 12 (outboard), on the right body landing gear (RBLG) burst and the two aft wheels fractured, which caused minor damage to the airplane. Prior to returning to LAX, the captain dumped fuel in order to reduce the landing weight. The airplane landed uneventfully on runway 25L.</p> <p><b>WRECKAGE AND IMPACT INFORMATION</b></p> <p>The 25R and 25L runways were closed while airport operations personnel collected the foreign object debris (FOD). Maintenance technicians replaced the No. 11 and 12 wheels and moved the airplane to the ramp area for further examination. Technicians deflated the No. 9 and No. 10 tires due to the damage that they sustained. Airport operations personnel reported that the first debris on the takeoff runway consisted of rubber tire fragments, followed by metal and carbon brake fragments, and then metal wheel debris.</p> <p>National Transportation Safety Board investigators and the FAA examined the airplane on June 29 and 30, 2007, at LAX. The examination revealed numerous punctures, scraping damage, and areas of black rubber transfer on the forward RBLG door, the inboard RBLG door, and the inboard right wing landing gear (RWLG) door. Some of the wire bundles on the RBLG were damaged and/or severed, and the four brake hydraulic lines were severed near the outboard trunnion. Scraping and mechanical damage were noted on the strut, drag brace, and various brackets on the RBLG. Minor damage was observed in the RBLG wheel well area. The No. 9 tire exhibited several cuts, and the No. 10 tire exhibited several cuts and had one large chunk missing. The wing-to-body fairing exhibited several areas of puncture damage, and black rubber transfer marks were located between STA 1490 and the end of the fairing at STA 1680. Fragmented sections of the wheel assemblies and brake fragments were embedded in the fairing. The fuselage aft of the wing-to-body fairing sustained one small punctured hole and several areas of denting and/or scraping/gouging damage.</p> <p>Fragmented from the aft wheel assemblies (S/N A1868 and 3829) were recovered from the runways.</p>			

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX07IA198
	Occurrence Date: 06/29/2007
	Occurrence Type: Incident
<b>Narrative</b> (Continued)	
<p>shield. Both axle bushings appeared normal with grease present in the grooves. The stack height was about 5 3/8 inches.</p>	
FACTUAL REPORT - AVIATION	
Page 1c	

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: LAX07IA198
	Occurrence Date: 06/29/2007
	Occurrence Type: Incident
<b>Narrative</b> (Continued)	
<p>north of June, the takeoff weights ranged from about 518,000 and 847,000 pounds. The maximum takeoff weight for the airplane was 850,000 pounds.</p> <p><b>Wheels</b></p> <p>On July 23 and 24, 2007, at the facilities of Boeing Equipment Quality Analysis Laboratory, Everett, Washington, under the supervision of a Safety Board structures engineer, the tires, wheel and brake assemblies, and associated debris were examined.</p> <p>The No. 11 wheel assembly inboard bead flange was fractured from the wheel and recovered in 4 sections, which comprised 85 percent of the circumference. The outboard bead flange was partially intact, which comprised 75 percent of the wheel. All fracture surfaces exhibited a dull, rough appearance consistent with overload. No visible evidence of corrosion was observed on any of the wheel fragments. The tire pressure indication system (TPIS) components remained installed.</p> <p>The No. 12 wheel assembly inboard bead flange was fractured from the wheel and recovered in 4 sections, which comprised the entire flange circumference. The outboard bead flange was fractured from the wheel and recovered in 7 sections, which comprised 80 percent of the wheel. All fracture surfaces exhibited a dull, rough appearance consistent with overload. No visible evidence of corrosion was observed on any of the wheel fragments. The tire pressure indication system (TPIS) components remained installed.</p> <p>The 6 fuse plugs, 2 inflation valves, and 2 over pressure valves were removed and tested by applying 180 psi and a soap solution. The No. 11 over pressure valve exhibited signs of leakage. Examination of that valve revealed a slightly higher leakage rate (4 psi versus 2 psi) over a 24-hour period as compared to a new valve. A detailed examination of the valve was unable to determine the reason for the higher leakage.</p> <p><b>Tires</b></p> <p>The No. 11 tire was originally manufactured by Goodyear-Thailand and had been recently retreaded by Goodyear-Thailand. Sixteen tire fragments and two bead bundles were identified to be from the No. 11 tire, which comprised 30 percent of the tire. The fragments exhibited evidence of intense heat damage in the lower sidewall area with bluing and melted nylon. Many of the fragments failed in a diamond-shaped pattern consistent with a burst under pressure. The centerline tread depth on the fragments measured between 2/32 and 4/32 inches.</p> <p>The No. 12 tire was originally manufactured by Goodyear-Thailand and had never been retreaded. Eighteen tire fragments and two bead bundles were identified to be from the No. 12 tire, which comprised 25 percent of the tire. Two mating sections exhibited evidence of a cut through all the plies and the inner liner about 1-inch wide. The failure pattern of the two mating sections did not indicate a tire burst due to a cut. The other fragments exhibited evidence of intense heat damage in the shoulder area with bluing and melted nylon. Many of the fragments failed in a diamond-shaped pattern consistent with a burst under pressure. The centerline tread depth on the fragments measured between 5/32 and 6/32 inches.</p> <p><b>Brakes</b></p> <p>The No. 11 brake assembly rotors were missing. The torque takeout clevis was abraded to about 3/4 inches from the lower edge of the bushing and there was deformation to the piston housing heat shield. Both axle bushings appeared normal with grease present in the grooves. The stack height was about 4 3/4 inches.</p> <p>The No. 12 brake assembly rotors were missing. The torque takeout clevis was abraded to about 9/16 inches from the lower edge of the bushing and there was deformation to the piston housing heat</p>	
FACTUAL REPORT - AVIATION	
Page 1b	

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA198		Occurrence Date: 06/29/2007		Occurrence Type: Incident																																																																														
First Pilot Information																																																																																				
Name	City	State	Date of Birth	Age																																																																																
On File	On File		On File	43																																																																																
Sex: M	Seat Occupied: Left	Occupational Pilot?	Certificate Number: On File																																																																																	
Certificate(s): Airline Transport																																																																																				
Airplane Rating(s): Multi-engine Land																																																																																				
Rotorcraft/Glider/TA: None																																																																																				
Instrument Rating(s): Airplane																																																																																				
Instructor Rating(s): None																																																																																				
Current Biennial Flight Review? 04/2007																																																																																				
Medical Cert. Status: Without Waivers/Limitations																																																																																				
Date of Last Medical Exam: 01/2007																																																																																				
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FACTUAL REPORT - AVIATION																																																																																				
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA198		Occurrence Date: 06/29/2007		Occurrence Type: Incident	
Landing Facility/Approach Information							
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width		
LOS ANGELES INTL	LAX	126 Ft. MSL	25R	12091	150		
Runway Surface Type: Concrete							
Runway Surface Condition: Dry							
Approach/Arrival Flown: NONE							
VFR Approach/Landing: None							
Aircraft Information							
Aircraft Manufacturer	Model/Serial	Serial Number					
Boeing	747-400	29070					
Airworthiness Certificate(s): Transport							
Landing Gear Type: Retractable - Tricycle							
Analogue Built Act? No	Number of Seats: 303	Certified Max Gross Wt.	853000 LBS	Number of Engines: 4			
Engine Type: Turbo Fan	Engine Manufacturer: Pratt & Whitney	Model/Serial: PW4056-3	Rated Power: 56000 LBS				
- Aircraft Inspection Information							
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Hours	Airframe Total Time			
Continuous Airworthiness	06/2007						
- Emergency Locator Transmitter (ELT) Information							
ELT Installed? Type Yes /	ELT Operated? No	ELT Aided in Locating Accident Site? No					
Owner/Operator Information							
Registered Aircraft Owner	Street Address	City	State	Zip Code			
SCA Plum Air Lease Co LTD and SL Echo LTD	C/O Sanwa Business Credit Co LTD 6-1 Nishishinjuku	Tokyo		163-1508			
Operator of Aircraft	Street Address	City	State	Zip Code			
Air China	Beijing						
Operator Does Business As:							
- Type of U.S. Certificate(s) Held:							
Air Carrier Operating Certificate(s): Foreign Operation							
Operating Certificate:							
Regulation Flight Conducted Under: Part 129: Foreign							
Type of Flight Operation Conducted: Scheduled; International; Passenger Only							
FACTUAL REPORT - AVIATION							
Page 2							

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA198 Occurrence Date: 06/29/2007 Occurrence Type: Incident	
Administrative Information			
Investigator-in-Charge (IIC) Howard Plogens			
Additional Persons Participating in This Accident/Incident Investigation:  Mike Levins Federal Aviation Administration Los Angeles, CA  Dr. Yao Hongyi General Administration of Civil Aviation of China Beijing, China,  Gao Li Zhu Air China Beijing, China,  David Ziltzman Goodyear Tire & Rubber Company Akron, OH  Brian Webber The Boeing Company Seattle, WA  William Siron Goodrich Corporation Troy, OH  Liu Yi General Administration of Civil Aviation of China Beijing, China,			

FACTUAL REPORT - AVIATION				Page 5
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: LAX07IA198 Occurrence Date: 06/29/2007 Occurrence Type: Incident			
Weather Information					
WFO ID	Observation Time	Time Zone	WFO Elevation	WFO Distance From Accident Site	Direction From Accident Site
KLAX	0150	PDT	126 FL MSL	NM	Deg. Mag.
Sky/Lowest Cloud Condition: Clear				FL AGL	Condition of Light: Night
Lowest Ceiling: None		FL AGL	Visibility: 9	SM	Altimeter: 29.96
Temperature: 22 °C		Dew Point: 15 °C	Weather Conditions at Accident Site: Visual Conditions		
Wind Direction: 240		Wind Speed: 9	Wind Gusts:		
Visibility (RVR):		FL	Visibility (RVV)	SM	
Precip and/or Obscuration: No Obscuration; No Precipitation					
Accident Information					
Aircraft Damage: Minor			Aircraft Fire: None		
Aircraft Explosion: None			Aircraft Explosion: None		
- Injury Summary Matrix					
First Pilot	Fatal	Serious	Minor	None	TOTAL
Second Pilot				1	1
Student Pilot				1	1
Flight Instructor					
Check Pilot					
Flight Engineer					
Cabin Attendants				10	10
Other Crew				2	2
Passengers				223	223
-TOTAL BOARD -				237	237
Other Ground					
-GRAND TOTAL-				237	237
FACTUAL REPORT - AVIATION					
Page 4					

Brief of Incident

Adopted 08/28/2008

LAX07IA198 File No. 24116	06/29/2007	Los Angeles, CA	Aircraft Reg No. B-2470	Time (Local): 01:55 PDT
Make/Model: Boeing / 747-400 Engine Make/Model: Pratt & Whitney / PW4056-3 Aircraft Damage: Minor Number of Engines: 4 Operating Certificate(s): Foreign Operation Name of Carrier: Air China Type of Flight Operation: Scheduled; International; Passenger Only Reg. Flight Conducted Under: Part 129; Foreign			Crew Fatal: 0 Pass Serious: 0 Minor/None: 14 223	
Last Depart. Point: Same as Accident/Incident Location Destination: Beijing Airport Proximity: On Airport/Airstrip Airport Name: LOS ANGELES INTL Runway Identification: 25R Runway Length/Width (Ft): 12091 / 150 Runway Surface: Concrete Runway Surface Condition: Dry			Condition of Light: Night Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 9.00 SM Wind Dir/Speed: 240 / 009 Kts Temperature (°C): 22 Precip/Obscuration: No Obscuration; No Precipitation	
Pilot-in-Command      Age: 43  Certificate(s)/Rating(s) Airline Transport, Multi-engine Land  Instrument Ratings Airplane			Flight Time (Hours)  Total All Aircraft: 17085 Last 90 Days: 232 Total Make/Model: 392 Total Instrument Time: 18015	

While taxiing for departure, the airplane's No. 12 tire on the right body landing gear contacted foreign object debris (FOD), which resulted in a cut tire and loss of pressure. An electronic message reflecting the loss of pressure in the No. 12 tire was displayed on the engine indicating and crew alerting system (EICAS) in the cockpit; however, no further action was taken by the flight crew. During the takeoff roll, the two aft tires, No. 11 (inboard) and 12 (outboard), on the right body landing gear (RBLG) burst and their associated wheels fractured, which caused minor damage to the airplane. The airplane returned back to the airport and landed uneventfully. Examination of the airplane's systems and wheel assemblies revealed no additional anomalies.


Brief of Incident (Continued)

LAX07IA198 File No. 24116	06/29/2007	Los Angeles, CA	Aircraft Reg No. B-2470	Time (Local): 01:55 PDT
Occurrence #1: AIRFRAME/COMPONENT/SYSTEM FAILURE/MALFUNCTION Phase of Operation: TAKEOFF - ROLL/RUN				
Findings 1. (C) LANDING GEAR, TIRE - CUT/SEVERED 2. (F) CAUTION/WARNING SYSTEM/LIGHT(S) - NOT DETECTED - FLIGHTCREW 3. (C) LANDING GEAR, TIRE - BURST 4. (C) LANDING GEAR, WHEEL - DISINTEGRATED				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
 The loss of pressure in the number 12 tire due to inadvertent contact with foreign object debris while taxiing prior to takeoff, which resulted the number 11 tire to over deflect and burst during takeoff roll. Contributing to the incident was the failure of the flight crew to detect and act upon the EICAS message alerting them to the loss of pressure in the number 12 tire.




This space for finding

		NTSB ID: OPS07IA009A		Aircraft Registration Number: C-FUWS	
FACTUAL REPORT		Occurrence Date: 08/16/2007		Most Critical Injury: None	
AVIATION		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code	Local Time 1257	Time Zone PDT	
Airport Proximity: Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer Boeing		Model/Series 737-700		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No      Air Medical Transport Flight: No					
<p><b>Narrative</b></p> <p>Chief narrative statement of facts, conditions and circumstances pertinent to the accident/incident.</p> <p>On August 16, 2007, at 1257 Pacific Daylight time, a runway incursion occurred involving West Jet (WJA) Flight 900 and Northwest Airlines (NWA) Flight 180 at Los Angeles International Airport, Los Angeles, California during daytime. Visual flight rules conditions. WJA900 landed runway 24R and exited on reverse taxiway Y. While exiting, the flight crew of WJA 900 switched to the north ground control (GC2) frequency without instruction and advised they were on the reverse taxiway. Y, for gate 35. The GC2 controller thought that the WJA aircraft was south of runway 24L and instructed the flight to taxi via taxiway E to the gate. When WJA900 was approaching runway 24L on the reverse taxiway, the pilot saw NWA180 begin its take-off roll and questioned whether or not they had clearance to cross the runway. The GC2 controller, realizing WJA 900 had not received a crossing (AMASS) alerted and separation was lost. According to the Airport Movement Area Safety System (AMASS) alerted and separation was lost. According to the AMASS data, NWA180 passed within 37 feet of the WJA 900. The FAA classified this incident as a controller operational error, a pilot deviation, and a runway incursion.</p> <p>According to the North Local Controller (LC2), he stated that he took the LC2 position when WJA900 was on a 2 mile final for runway 24R. He then instructed NWA180 to taxi onto runway 24L, conducted some coordination, and then cleared NWA180 for takeoff. As he was looking at the tower radar display to determine the next arrival aircraft, he heard the AMASS alert: "Warning, runway occupied. He looked at the aircraft involved (WJA900 and NWA180) and saw WJA900 stopped on taxiway Y short of runway 24L but across the hold bar. NWA180 appeared to be past V1 speed so he allowed the aircraft to continue on departure roll. He stated that he did not recall receiving any verbal coordination from GC2 about crossing runway 24L.</p> <p>According to the North Ground Controller (GC2), he stated that when WJA900 made initial contact on the GC2 frequency, he looked at the airplane. The pilot advised they were on taxiway Y and were going to gate 35. The GC2 controller stated that he looked from the airplane to the gate and verified the gate available then scanned back to the airplane to determine the appropriate taxi route. Seeing no traffic between WJA900 and the gate, he told him to taxi to the gate. Immediately after issuing the taxi instructions to WJA900, he scanned west for conflicting traffic on the taxiway and noted there was an America West jet and issued a sequence for conflicting traffic. GC2 stated that he did not look to the approach end of runway 24L and did not coordinate with LC2, as he did not recognize that WJA900 was north of runway 24L, needing to cross the active runway.</p> <p>The GC2 controller stated that the training he received for that type of situation was to ask the LC2 to confirm that the flight had been cleared to cross the runway. In this incident, he stated he did not do that because he did not recognize that WJA900 was north of runway 24L. He added that it was not a willful breaking of the rules. He did not believe he was crossing the aircraft.</p> <p>TOWER FACILITY INFORMATION</p>					

FACTUAL REPORT - AVIATION

Page 1

This space for finding

		NTSB ID: OPS07IA009A	
FACTUAL REPORT		Occurrence Date: 08/16/2007	
AVIATION		Occurrence Type: Incident	
<p><b>Narrative</b></p> <p>(Continued)</p> <p>The Los Angeles Air Traffic Control Tower is a Level 12 ATC facility. The tower is centrally located on the airport between the north and south complexes. The tower can accommodate up to 13 positions; 2 local control (LC1/LC2), 2 local assist (LA1/LA2), 3 ground control (GC1/GC2/GC3), 2 clearance delivery (CD1/CD2), 1 helicopter position (HC), 1 traffic management coordinator (TM), and 2 supervisors (AS1/AS2).</p> <p>On the day of the incursion, LAX was in a west configuration, and the inbound runways, 24L and 25R, were in use for arriving and departing aircraft. The north complex was landing and departing runway 24R/24L and the south complex was landing and departing runway 25R/25L.</p> <p>AMASS</p> <p>AMASS is a computer software enhancement to the airport surface detection equipment (ASDE). The system provides logic predicting the path of aircraft landing and/or departing, and aircraft and/or vehicle movements on runways. Visual and auditory alerts are activated when logic projects a potential collision. AMASS alerts controllers to a potential collision when an aircraft or vehicle is occupying a runway and when arriving or departing aircraft cross a certain threshold or attain a certain speed. The system works by processing surveillance data from ground radar, and then predicting possible conflicts based on the position, velocity, and acceleration of arriving and departing aircraft and vehicles.</p>			

FACTUAL REPORT - AVIATION

Page 1a

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS07IA009A		Occurrence Date: 08/16/2007		Occurrence Type: Incident																																																																	
First Pilot Information																																																																							
Name	City	State	Date of Birth	Age																																																																			
On File	Occupational Pilot?		Certificate Number: On File																																																																				
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CALGARY ALTA			YYC																																																																				
Destination	State		Altitude	Departure Time	Time Zone																																																																		
Same as Accident/Incident Location	KLAX																																																																						
Type of Clearance:																																																																							
Type of Airspace:																																																																							
Weather Information																																																																							
Source of WX Information:																																																																							
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FACTUAL REPORT - AVIATION																																																																							
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS07IA009A		Occurrence Date: 08/16/2007		Occurrence Type: Incident	
Landing Facility/Approach Information							
Airport Name	Airport ID:	Altitude Elevation	Runway Used	Runway Length	Runway Width		
Runway Surface Type:							
Runway Surface Condition:							
Approach/Arrival Flown:							
VFR Approach/Landing:							
Aircraft Information							
Aircraft Manufacturer	Model/Serial	737-700	Serial Number				
Boeing							
Airworthiness Certificate(s):							
Landing Gear Type:							
Amateur Built Acft? No	Number of Seats:	Certified Max Gross Wt.	LBS	Number of Engines:			
Engine Type:	Engine Manufacturer:	Model/Serial:	Rated Power:				
- Aircraft Inspection Information							
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Hours	Airframe Total Time	Hours		
- Emergency Locator Transmitter (ELT) Information							
ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?					
Owner/Operator Information							
Registered Aircraft Owner	Street Address	City	State	Zip Code			
Operator of Aircraft	Street Address	City	State	Zip Code			
WESTJET AIR CENTER INC							
Operator Does Business As:	Operator Designator Code: DTYA						
- Type of U.S. Certificate(s) Held:							
Air Carrier Operating Certificate(s): Foreign Operation							
Operating Certificate:							
Regulation Flight Conducted Under: Part 129: Foreign							
Type of Flight Operation Conducted: Scheduled: International; Passenger Only							
FACTUAL REPORT - AVIATION							
Page 2							

NATIONAL TRANSPORTATION SAFETY BOARD <b>FACTUAL REPORT</b> AVIATION	NTSB ID: OPS07IA009A Occurrence Date: 08/16/2007 Occurrence Type: Incident
Administrative Information Investigator-in-Charge (IIC) Hilton Hall Additional Persons Participating in This Accident/Incident Investigation: Dan Diggins HQ	

Page 5

National Transportation Safety Board FACTUAL REPORT AVIATION				NTSB ID: OPS07IA009A			
Occurrence Date: 08/16/2007				Occurrence Type: Incident			
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site		
KLAX	1250		FL MSL	NM			Deg. Mag.
Sky/Lowest Cloud Condition: Clear							
Lowest Ceiling: None		FL AGL	Visibility:	8	SM	Altimeter:	29.93
Temperature: 22 °C	Dew Point: 16 °C	Wind Speed: 10	Weather Conditions at Accident Site: Visual Conditions				
Wind Direction: 230	Wind Speed: 10	Wind Gusts:					
Visibility (RVR):	FL	Visibility (RVV)	SM				
Precip and/or Obscuration:							
Accident Information							
Aircraft Damage: None				Aircraft Fire: None			
Aircraft Explosion				None			
- Injury Summary Matrix							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
Second Pilot				1	1		
Student Pilot				1	1		
Flight instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants				4	4		
Other Crew							
Passengers				136	136		
- TOTAL ABOARD -				142	142		
Other Ground							
- GRAND TOTAL -				142	142		
FACTUAL REPORT - AVIATION							

### Brief of Incident

**Adopted 11/30/2007**

OPS07IA009A		08/16/2007		Los Angeles, CA		Aircraft Reg No. C-FUWS		Time (Local): 12:57 PDT	
Make/Model:		Boeing / 737-700				Fatal		Serious	
Engine Make/Model:						0		0	
Aircraft Damage:		None				Crew		Minor/None	
Number of Engines:		Unk/Nr				Pass		6	
Operating Certificate(s):		Foreign Operation				0		138	
Name of Carrier:		WESTJET AIR CENTER INC							
Type of Flight Operation:		Scheduled; International; Passenger Only							
Reg. Flight Conducted Under:		Part 129; Foreign							
Last Depart. Point:		CALGARY ALTA				Condition of Light:			
Destination:		Same as Accident/Incident Location				Weather Info Src:		Weather Observation Facility	
Airport Proximity:						Basic Weather:		Visual Conditions	
Airport Name:		Unk/Nr				Lowest Ceiling:		None	
Runway Identification:		Unk/Nr				Visibility:		8.00 SM	
Runway Length/Width (Ft):		Unk/Nr				Wind Dir/Speed:		230 / 010 Kts	
Runway Surface:						Temperature (°C):		22	
Runway Surface Condition:						Precip/Obscuration:			
Pilot-in-Command		Age:				Flight Time (Hours)			
Certificate(s)/Rating(s)						Total All Aircraft:		Unk/Nr	
						Last 90 Days:		Unk/Nr	
						Total Make/Model:		Unk/Nr	
Instrument Ratings						Total Instrument Time:		Unk/Nr	

On August 16, 2007, at approximately 1257 Pacific Daylight time, a runway incursion occurred involving West Jet (WJA) 900, B737 and Northwest Airlines (NWA) flight 380, an A320, at Los Angeles International Airport, Los Angeles, California.

WJA900 landed on runway 24R and exited at taxiway Y then changed to ground control frequency without authorization while the airplane was holding between the parallel runways. The tower controller cleared NWA180 for takeoff from runway 24L. Meanwhile, the pilot of WJA900 contacted ground control and said, "Ground, WJA900 with you on reverse [taxiway] yankee for gate 35." The ground controller believed that the tower controller had instructed the flight to cross runway 24L and responded, "WJA900, Los Angeles tower, taxi [via taxiway] echo to the gate."

Ten seconds later, the pilot of NWA900 confirmed that the flight was cleared to cross runway 24L. The ground controller asked who called and the pilot again asked whether or not they were cleared to cross the runway. The ground controller then realized that NWA900 had not been instructed to cross runway 24L and told NWA900 to stop. According to the FAA and JWA, the airplane crossed the hold short line but did not enter the runway. According to the FAA, the two aircraft missed colliding by 37 feet (wingtip of A320 to the nose of the B737) as NWA180 departed runway 24L.

The Airport Movement Area Safety System (AMASS) activated on this incident.

## Brief of Incident (Continued)

OPS07IA009A File No. 22762	08/16/2007	Los Angeles, CA	Aircraft Reg No. C-FUWS	Time (Local): 12:57 PDT
Occurrence #1: NEAR COLLISION BETWEEN AIRCRAFT				
Phase of Operation: TAXI - FROM LANDING				
Findings				
1. (C) CONTROL TOWER - IMPROPER				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.

The LAX north ground controller's failure to properly coordinate with the tower local controller prior to providing taxi instructions that permitted an aircraft to cross an active runway while another aircraft was departing.

\*\*This report was modified on December 12, 2007.\*\*

**National Transportation Safety Board  
Washington, DC 20594**

Printed on : 1/10/2012 5:28:06 PM

**Brief of Incident**

**Adopted 11/30/2007**

OPS07IA009A		08/16/2007		Los Angeles, CA		Aircraft Reg No. C-FUWS		Time (Local): 12:57 PDT	
File No. 22762									
Make/Model: Boeing / 737-700						Fatal		Serious	
Engine Make/Model:						Crew		0	
Aircraft Damage: None						Pass		0	
Number of Engines: Unk/Nr								Minor/None	
Operating Certificate(s): Foreign Operation								6	
Name of Carrier: WESTJET AIR CENTER INC								136	
Type of Flight Operation: Scheduled; International; Passenger Only									
Reg. Flight Conducted Under: Part 129: Foreign									
Last Depart. Point: CALGARY ALTA									
Destination: Same as Accident/Incident Location									
Airport Proximity:									
Airport Name: Unk/Nr									
Runway Identification: Unk/Nr									
Runway Length/Width (Ft): Unk/Nr									
Runway Surface:									
Runway Surface Condition:									
Condition of Light:									
Weather Info Src: Weather Observation Facility									
Basic Weather: Visual Conditions									
Lowest Ceiling: None									
Visibility: 8.00 SM									
Wind Dir/Speed: 230 / 010 Kts									
Temperature (°C): 22									
Precip/Obscuration:									
Pilot-in-Command		Age:						Flight Time (Hours)	
Certificate(s)/Rating(s)								Total All Aircraft: Unk/Nr	
								Last 90 Days: Unk/Nr	
								Total Make/Model: Unk/Nr	
Instrument Ratings								Total Instrument Time: Unk/Nr	

On August 16, 2007, at approximately 1257 Pacific daylight time, a runway incursion occurred involving West Jet (WJA) 900, B737 and Northwest Airlines (NWA) flight 180, an A320, at Los Angeles International Airport, Los Angeles, California.

WJA900 landed on runway 24R and exited at taxiway Y then changed to ground control frequency without authorization while the airplane was holding between the parallel runways. The tower controller cleared NWA180 for takeoff from runway 24L. Meanwhile, the pilot of WJA900 contacted ground control and said, "Ground, WJA900 with you on reverse [taxiway] yankee for gate 35." The ground controller believed that the tower controller had instructed the flight to cross runway 24L and responded, "WJA900, Los Angeles tower, taxi [via taxiway] echo to the gate."

Ten seconds later, the pilot of WJA900 confirmed that the flight was cleared to cross runway 24L. The ground controller asked who called and the pilot again asked whether or not they were cleared to cross the runway. The ground controller then realized that WJA900 had not been instructed to cross runway 24L and told WJA900 to stop. According to the FAA and WJA, the airplane crossed the hold short line but did not enter the runway. According to the FAA, the two aircraft missed colliding by 17 feet (wingtip of A320 to the nose of the B737) as NWA180 departed runway 24L.


The Airport Movement Area Safety System (AMASS) activated on this incident.


**Brief of Incident (Continued)**

OPS07IA009A		08/16/2007		Los Angeles, CA		Aircraft Reg No. C-FUWS		Time (Local): 12:57 PDT	
File No. 22762									
Occurrence #1: NEAR COLLISION BETWEEN AIRCRAFT									
Phase of Operation: TAXI - FROM LANDING									
Findings									
1. (C) CONTROL TOWER - IMPROPER:									
Findings Legend: (C) = Cause, (F) = Factor									

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
The LAX north ground controller's failure to properly coordinate with the tower local controller prior to providing taxi instructions that permitted an aircraft to cross an active runway while another aircraft was departing.

\*\*This report was modified on December 12, 2007.\*\*

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION SAFETY REPORT	NTSB ID: OPR07AD09B
	Occurrence Date: 08/16/2007
	Occurrence Type: Incident
<b>Narrative</b> (Continued)	
<p>The Los Angeles Air Traffic Control Tower is a Level 12 ATC facility. The tower is centrally located on the airport between the north and south complexes. The tower can accommodate up to 13 positions; 1 local control (LC1/LC2), 2 local assist (LA1/LA2), 3 ground control (GC1/GC2/GC3), 2 clearance delivery (CD1/CD2), 1 helicopter position (HC), 1 traffic management coordinator (TM), and 2 supervisors (AS1/AS2).</p> <p>On the day of the incursion, LA1 was in a west configuration, and the inbound runways, 24L and 25R, were in use for arriving and departing aircraft. The north complex was handling and departing runway 24R/24L and the south complex was landing and departing runway 25R/25L.</p> <p>AMASS</p> <p>AMASS is a computer software enhancement to the airport surface detection equipment (ASDE). The system provides logic predicting the path of aircraft landing and/or departing, and aircraft and/or vehicle movements on runways. Visual and auditory alerts are activated when logic projects a potential collision. AMASS alerts controllers to a potential collision when an aircraft or vehicle is occupying a runway and when arriving or departing aircraft cross a certain threshold or attain a certain speed. The system works by processing surveillance data from ground radar, and then predicting possible conflicts based on the position, velocity, and acceleration of arriving and departing aircraft and vehicles.</p>	
FACTUAL REPORT - AVIATION	

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION SAFETY REPORT	NTSB ID: OPR07AD09B			
	Occurrence Date: 08/16/2007			
	Occurrence Type: Incident			
<b>Location/Time</b>				
Nearest City/Place Los Angeles	State CA	Zip Code 1257	Local Time PDT	Time Zone PDT
Airport Proximity: Distance From Landing Facility:				
<b>Aircraft Information Summary</b>				
Aircraft Manufacturer Airbus Industrie		Model/Series A320		Type of Aircraft Airplane
Revenue Seeing Flight: No      Air Medical Transport Flight: No				
<b>Narrative</b>				
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On August 16, 2007, at 1257 Pacific Daylight time, a runway incursion occurred involving West Jet (WJA) flight 900 and Northwest Airlines (NWA) flight 180 at Los Angeles International Airport, Los Angeles, California during daytime visual flight rules conditions. WJA900 landed runway 24R and exited on reverse taxiway X. While exiting, the flight crew of WJA 900 switched to the north ground control (GC2) frequency without instruction and advised they were on the reverse taxiway, Y, for gate 35. The GC2 controller thought that the WJA aircraft was south of runway 24L and instructed the flight to taxi via taxiway E to the gate. When WJA900 was approaching runway 24L on the reverse taxiway, the pilot saw NWA180 begin its take-off roll and questioned whether or not they had clearance to cross the runway. The GC2 controller, realizing WJA 900 had not received a crossing clearance, stopped WJA900 from crossing the runway. The Airport Movement Area Safety System (AMASS) alerted and separation was lost. According to the AMASS data, NWA180 passed within 37 feet of the WJA 900. The FAA classified this incident as a controller operational error, a pilot deviation, and a runway incursion.</p> <p>According to the North Local Controller (LC2), he stated that he took the LC2 position when WJA900 was on a 2 mile final for runway 24R. He then instructed NWA180 to taxi onto runway 24L, conducted some coordination, and then cleared NWA180 for takeoff. As he was looking at the tower radar display to determine the next arrival aircraft, he heard the AMASS alert: Warning, runway occupied. He looked at the aircraft involved (WJA900 and NWA180) and saw WJA900 stopped on taxiway X short of runway 24L but across the hold bars. NWA180 appeared to be past V1 speed so he allowed the aircraft to continue on departure roll. He stated that he did not recall receiving any verbal coordination from GC2 about crossing runway 24L.</p> <p>According to the North Ground Controller (GC2), he stated that when WJA900 made initial contact on the GC2 frequency, he looked at the airplane. The pilot advised they were on taxiway Y and were going to gate 35. The GC2 controller stated that he looked from the airplane to the gate and verified the gate available then scanned back to the airplane to determine the appropriate taxi route. Seeing no traffic between WJA900 and the gate, he told him to taxi to the gate. Immediately after issuing the taxi instructions to WJA900, he scanned west for conflicting traffic on the taxiway and noted there was an America West jet and issued a sequence to those crews. The GC2 stated that he did not look to the approach and of runway 24L and did not coordinate with LC2, as he did not recognize that WJA900 was north of runway 24L, needing to cross the active runway.</p> <p>The GC2 controller stated that the training he received for that type of situation was to ask the LC2 to confirm that the flight had been cleared to cross the runway. In this incident, he stated he did not do that because he did not recognize that WJA900 was north of runway 24L. He added that it was not a willful breaking of the rules. He did not believe he was crossing the aircraft.</p> <p>TOWER FACILITY INFORMATION</p>				
FACTUAL REPORT - AVIATION				




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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS07IA009B		Occurrence Date: 08/16/2007		Occurrence Type: Incident																																																																																									
<b>First Pilot Information</b>																																																																																															
Name		City		State		Date of Birth																																																																																									
Sex:		Seat Occupied:		Occupational Pilot?		Certificate Number:																																																																																									
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Airplane Rating(s):																																																																																															
Rotorcraft/Glider, TA:																																																																																															
Instrument Rating(s):																																																																																															
Instructor Rating(s):																																																																																															
Current Biennial Flight Review?																																																																																															
Medical Cert.:				Date of Last Medical Exam:																																																																																											
<table border="1"> <tr> <td>At AC</td> <td>The Name of the Pilot</td> <td>Engine</td> <td>Multi-Engine</td> <td>Rating</td> <td>Instrument</td> <td>Rating</td> <td>Rating</td> </tr> <tr> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td colspan="8">Total Time</td> </tr> <tr> <td colspan="8">Pilot in Command (PIC)</td> </tr> <tr> <td colspan="8">Instructor</td> </tr> <tr> <td colspan="8">Instruction Received</td> </tr> <tr> <td colspan="8">Last 90 Days</td> </tr> <tr> <td colspan="8">Last 30 Days</td> </tr> <tr> <td colspan="8">Last 24 Hours</td> </tr> <tr> <td colspan="4">Shoulder Harness Used?</td> <td colspan="4">Toxicology Performed?</td> </tr> <tr> <td colspan="4">Scatbelt Used?</td> <td colspan="4">Second Pilot?</td> </tr> </table>								At AC	The Name of the Pilot	Engine	Multi-Engine	Rating	Instrument	Rating	Rating									Total Time								Pilot in Command (PIC)								Instructor								Instruction Received								Last 90 Days								Last 30 Days								Last 24 Hours								Shoulder Harness Used?				Toxicology Performed?				Scatbelt Used?				Second Pilot?			
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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS07IA009B		Occurrence Date: 08/16/2007		Occurrence Type: Incident	
<b>Landing Facility/Approach Information</b>							
Airport Name		Airport ID:		Airport Elevation FL MSL		Runway Used	
Runway Surface Type:		Runway Length		Runway Width			
Runway Surface Condition:							
Approach/Arrival Flow:							
VFR Approach/Landing:							
<b>Aircraft Information</b>							
Aircraft Manufacturer		Model/Serial		Serial Number			
Airbus Industrie		A320					
Airworthiness Certificate(s):							
<b>Landing Gear Type</b>							
Amateur Built? No		Number of Seats:		Certified Max Gross Wt.		Number of Engines:	
Engine Type:		Engine Manufacturer:		Model/Serial:		Rated Power:	
<b>Aircraft Inspection Information</b>							
Type of Last Inspection		Date of Last Inspection		Time Since Last Inspection Hours		Airframe Total Time Hours	
- Emergency Locator Transmitter (ELT) Information							
ELT Installed? Type		ELT Operated?		ELT Aided in Locating Accident Site?			
<b>Owner/Operator Information</b>							
Registered Aircraft Owner		Street Address		City		State	
Operator of Aircraft		Street Address		City		State	
NORTHWEST AIRLINES INC		5101 Northwest Drive		St. Paul		MN	
Operator Does Business As:		Operator Designator Code: MRSD		Zip Code		55111	
- 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: Scheduled; Domestic; Passenger Only							
FACTUAL REPORT - AVIATION							
Page 2							



 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: OPS07/A009B	
	Occurrence Date: 08/18/2007	
	Occurrence Type: Incident	
<b>Administrative Information</b> Investigator-in-Charge (IIC) Hilton Hall  Additional Persons Participating in This Accident/Incident Investigation: Dan Diggs HQ		
<div style="text-align: right;">Page 5</div>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: OPS07/A009B																																																																															
	Occurrence Date: 08/16/2007																																																																															
	Occurrence Type: Incident																																																																															
<b>Weather Information</b> WOF ID:      Observation Time:      Time Zone:      WOF Elevation:      WOF Distance From Accident Site:      Direction From Accident Site:      Deg. Mag. KLAX: 1250      FL MSL:      NM      Condition of Light:																																																																																
Sky/Lowest Cloud Condition: Clear      FL AGL:      8      SM      Altimeter:      29.83      "Hg Lowest Ceiling: None      Visibility:      8      SM      Allimeter:      29.83      "Hg																																																																																
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Precip and/or Obscuration:																																																																																
<b>Accident Information</b> Aircraft Damage: None      Aircraft Fire:      Aircraft Explosion:																																																																																
<b>- Injury Summary Matrix</b> <table border="1"> <thead> <tr> <th></th> <th>Fatal</th> <th>Serious</th> <th>Minor</th> <th>None</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>First Pilot</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>Second Pilot</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>Student Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Check Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Engineer</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cabin Attendants</td> <td></td> <td></td> <td></td> <td>3</td> <td>3</td> </tr> <tr> <td>Other Crew</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Passengers</td> <td></td> <td></td> <td></td> <td>149</td> <td>149</td> </tr> <tr> <td>- TOTAL ABOARD -</td> <td></td> <td></td> <td></td> <td>154</td> <td>154</td> </tr> <tr> <td>Other Ground</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>- GRAND TOTAL -</td> <td></td> <td></td> <td></td> <td>154</td> <td>154</td> </tr> </tbody> </table>				Fatal	Serious	Minor	None	TOTAL	First Pilot				1	1	Second Pilot				1	1	Student Pilot						Flight Instructor						Check Pilot						Flight Engineer						Cabin Attendants				3	3	Other Crew						Passengers				149	149	- TOTAL ABOARD -				154	154	Other Ground						- GRAND TOTAL -				154	154
	Fatal	Serious	Minor	None	TOTAL																																																																											
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Other Crew																																																																																
Passengers				149	149																																																																											
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<div style="text-align: right;">Page 4</div>																																																																																

**National Transportation Safety Board  
Washington, DC 20594**

Printed on : 1/10/2012 5:29:34 PM

**Brief of Incident**

**Adopted 11/30/2007**

OPS07IA009B File No. 22762	08/16/2007	Los Angeles, CA	Aircraft Reg No. N348NW	Time (Local): 12:57 PDT		
Make/Model: Airbus Industrie / A320				Fatal	Serious	Minor/None
Engine Make/Model:			Crew	0	0	5
Aircraft Damage: None			Pass	0	0	149
Number of Engines: Unk/Nr						
Operating Certificate(s): Flag Carrier/Domestic						
Name of Carrier: NORTHWEST AIRLINES INC						
Type of Flight Operation: Scheduled; Domestic; Passenger Only						
Reg. Flight Conducted Under: Part 121; Air Carrier						
Last Depart. Point: Same as Accident/Incident Location				Condition of Light:		
Destination: MEMPHIS, TN				Weather Info Src: Weather Observation Facility		
Airport Proximity:				Basic Weather: Visual Conditions		
Airport Name: Unk/Nr				Lowest Ceiling: None		
Runway Identification: Unk/Nr				Visibility: 8.00 SM		
Runway Length/Width (Ft): Unk/Nr				Wind Dir/Speed: 230 / 010 Kts		
Runway Surface:				Temperature (°C): 22		
Runway Surface Condition:				Precip/Obscuration:		
Pilot-in-Command Age:				Flight Time (Hours)		
Certificate(s)/Rating(s)				Total All Aircraft: Unk/Nr		
				Last 90 Days: Unk/Nr		
				Total Make/Model: Unk/Nr		
Instrument Ratings				Total Instrument Time: Unk/Nr		

On August 16, 2007, at approximately 1257 Pacific daylight time, a runway incursion occurred involving West Jet (WJA) 900, B737 and Northwest Airlines (NWA) flight 180, an A320, at Los Angeles International Airport, Los Angeles, California.

WJA900 landed on runway 24R and exited at taxiway Y then changed to ground control frequency without authorization while the airplane was holding between the parallel runways. The tower controller cleared NWA180 for takeoff from runway 24L. Meanwhile, the pilot of WJA900 contacted ground control and said, "Ground, WJA900 with you on reverse [taxiway] yankee for gate 35." The ground controller believed that the tower controller had instructed the flight to cross runway 24L and responded, "WJA900, Los Angeles tower, taxi [via taxiway] echo to the gate."

Ten seconds later, the pilot of WJA900 confirmed that the flight was cleared to cross runway 24L. The ground controller asked who called and the pilot again asked whether or not they were cleared to cross the runway. The ground controller then realized that WJA900 had not been instructed to cross runway 24L and told WJA900 to stop. According to the PAA and WJA, the airplane crossed the hold short line but did not enter the runway. According to the PAA, the two aircraft missed colliding by 37 feet (wingtip of A320 to the nose of the B737) as NWA180 departed runway 24L.

The Airport Movement Area Safety System (AMASS) activated on this incident.

**Brief of Incident (Continued)**

OPS07IA009B File No. 22762	08/16/2007	Los Angeles, CA	Aircraft Reg No. N348NW	Time (Local): 12:57 PDT
Occurrence #: NEAR COLLISION BETWEEN AIRCRAFT				
Phase of Operation: TAKEOFF - ROLL/RUN				
Findings				
1. (C) CONTROL TOWER - IMPROPER				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
The LAX north ground controller's failure to properly coordinate with the tower local controller prior to providing taxi instructions that permitted an aircraft to cross an active runway while another aircraft was departing.

\*\*This report was modified on December 12, 2007.\*\*





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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: WPR09LA036		Occurrence Date: 11/11/2008		Occurrence Type: Accident																																																																									
First Pilot Information																																																																															
Name	On File	City	State	Date of Birth	Age																																																																										
Sex: M	Seat Occupied: Left	Occupational Pilot? Yes	On File	On File	52																																																																										
Certificate(s):		Airline Transport																																																																													
Airplane Rating(s): Multi-engine Land; Single-engine Land																																																																															
Rotorcraft/Glider/LTA: None																																																																															
Instrument Rating(s): Airplane																																																																															
Instructor Rating(s): Instrument Airplane																																																																															
Current Biennial Flight Review? 09/2008				Date of Last Medical Exam: 08/2008																																																																											
Medical Cert. Class 1				Medical Cert. Status: With Waivers/Limitations																																																																											
<table border="1"> <tr> <th>- Flight Time Matrix</th> <th>At AC</th> <th>Two-Engine and More</th> <th>Single-Engine</th> <th>Multi-Engine</th> <th>Night</th> <th>Instrument</th> <th>Rated</th> <th>Logbook Time At</th> </tr> <tr> <td>Total Time</td> <td>6000</td> <td>350</td> <td>1500</td> <td>4500</td> <td>663</td> <td>264</td> <td>132</td> <td>0</td> </tr> <tr> <td>Pilot in Command (PIC)</td> <td>3400</td> <td>285</td> <td>1400</td> <td>2000</td> <td></td> <td></td> <td></td> <td>0</td> </tr> <tr> <td>Instructor</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> <tr> <td>Instruction Received</td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td></td> <td>0</td> </tr> <tr> <td>Last 30 Days</td> <td>85</td> <td>85</td> <td>0</td> <td>85</td> <td>10</td> <td>3</td> <td>0</td> <td>0</td> </tr> <tr> <td>Last 24 Hours</td> <td>62</td> <td>62</td> <td>0</td> <td>62</td> <td>5</td> <td>2</td> <td>0</td> <td>0</td> </tr> <tr> <td>Seabell Used? Yes</td> <td>3</td> <td>3</td> <td>0</td> <td>3</td> <td>0</td> <td>0</td> <td>0</td> <td>0</td> </tr> </table>								- Flight Time Matrix	At AC	Two-Engine and More	Single-Engine	Multi-Engine	Night	Instrument	Rated	Logbook Time At	Total Time	6000	350	1500	4500	663	264	132	0	Pilot in Command (PIC)	3400	285	1400	2000				0	Instructor	0	0	0	0	0	0	0	0	Instruction Received								0	Last 30 Days	85	85	0	85	10	3	0	0	Last 24 Hours	62	62	0	62	5	2	0	0	Seabell Used? Yes	3	3	0	3	0	0	0	0
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Seabell Used? Yes	3	3	0	3	0	0	0	0																																																																							
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FACTUAL REPORT - AVIATION																																																																															
Page 3																																																																															

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: WPR09LA036		Occurrence Date: 11/11/2008		Occurrence Type: Accident	
Landing Facility/Approach Information							
Airport Name	Airport ID:	Airport Elevation	Runway Used	Runway Length	Runway Width		
Los Angeles International	KLAX	98 Ft. MSL	25L	11095	200		
Runway Surface Type: Asphalt							
Runway Surface Condition: Dry							
Approach/Arrival Flown: Visual							
VFR Approach/Landing: Unknown							
Aircraft Information							
Aircraft Manufacturer	Model/Serial	Serial Number					
CESSNA	680	680-0169					
Airworthiness Certificate(s): Transport							
Landing Gear Type: Tricycle							
Amateur Built Aircraft? No	Number of Seats: 9	Certified Max Gross Wt.	33000 LBS	Number of Engines: 2			
Engine Type:	Engine Manufacturer:	Model/Serial:	Rated Power:				
Turbo Fan	P&W CANADA	PW306C	6040 LBS				
- Aircraft Inspection Information							
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time				
AAIP	08/2008	240 Hours	1009 Hours				
- Emergency Locator Transmitter (ELT) Information							
ELT installed? Type: Yes / Unknown	ELT Operated? No	ELT Aided in Locating Accident Site? No					
Owner/Operator Information							
Registered Aircraft Owner	Street Address						
ACME INTERNATIONAL SERVICES INC	C/O NET-JETS SALES INC						
	City	State	Zip Code				
	OKLAHOMA CITY	OK	73102				
Operator of Aircraft:							
Net-Jets, Inc	City	State	Zip Code				
	Columbus	OH	43219				
Operator Does Business As:							
Operator Designator Code:							
- Type of U.S. Certificate(s) Held:							
Air Carrier Operating Certificate(s): Fractional Ownership							
Operating Certificate:							
Regulation Flight Conducted Under: Part 91: General Aviation							
Type of Flight Operation Conducted: Positioning							
FACTUAL REPORT - AVIATION							
Page 2							

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: WPR09LA036																																																																															
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	Occurrence Type: Accident																																																																															
<b>Administrative Information</b> Investigator-In-Charge (IIC) Dennis J. Hogenson  Additional Persons Participating in This Accident/Incident Investigation: George Erdel FAA LAX FSDO Los Angeles, CA Richard Melkia NetJets, Inc. Columbus, OH																																																																																
<b>Weather Information</b> WFO ID: KLAX    Observation Time: 2253    Time Zone: PST    WOF Elevation: 125 Ft. MSL    WOF Distance From Accident Site: NM    Direction From Accident Site: Deg. Mag. Sky/Lowest Cloud Condition: Clear    FL AGL: 10    SM    Condition of Light: Night/Dark    *Hg: 30.14 Lowest Ceiling: None    FL AGL: 11    *C    Visibility: 10    SM    Altimeter: 30.14    *Hg: 30.14 Temperature: 14    Dew Point: 11    Wind Direction: 100    Wind Speed: 3    Weather Conditions at Accident Site: Visual Conditions Wind Gusts: Visibility (RVR): FL    Visibility (RVV): SM Precip and/or Obscuration: No Obscuration; No Precipitation																																																																																
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<b>FACTUAL REPORT - AVIATION</b>																																																																																
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 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: WPR09LA036																																																																															
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Page 4																																																																																

**National Transportation Safety Board  
Washington, DC 20594**

Printed on : 1/10/2012 5:24:01 PM

**Brief of Accident**

**Adopted 11/09/2009**

WPR09LA036 File No. 25995	11/11/2008	Los Angeles, CA	Aircraft Reg No. N320QS	Time (Local): 23:10 PST
Make/Model: Cessna / 680 Engine Make/Model: P&W Canada / PW308C Aircraft Damage: Substantial Number of Engines: 2 Operating Certificate(s): Fractional Ownership Type of Flight Operation: Positioning Reg. Flight Conducted Under: Part 91: General Aviation			Fatal 0 Crew 0 Pass 0	Serious 0 Minor/None 2 0
Last Depart. Point: Scottsdale, AZ Destination: Same as Accident/Incident Location Airport Proximity: On Airport/Airstrip Airport Name: Los Angeles International Runway Identification: 25L Runway Length/Width (Ft): 11095 / 200 Runway Surface: Asphalt Runway Surface Condition: Dry			Condition of Light: Night/Dark Weather Info Src: Pilot Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 10.00 SM Wind Dir/Speed: 100 / 003 Kts Temperature ("C): 14 Precip/Obscuration: No Obscuration; No Precipitation	
Pilot-in-Command Age: 52 Certificate(s)/Rating(s) Airline Transport; Multi-engine Land; Single-engine Land Instrument Ratings Airplane			Flight Time (Hours) Total All Aircraft: 6000 Last 90 Days: 85 Total Make/Model: 350 Total Instrument Time: 396	

The captain reported that following an uneventful landing, the ground controller cleared the airplane to parking via a left turn on the adjoining taxiway. The captain stated that the flight crew observed the marshaller, who was located on the parking ramp, and continued in the direction of the parking area. Shortly after turning towards the parking ramp, the airplane collided with a ground service vehicle that pulled in front of the airplane. The service vehicle was traveling perpendicular to the airplane's direction of travel. The driver of the service vehicle reported that he was driving on the non-movement service road located adjacent to the taxiway and briefly looked away from the road towards the active runway. When the driver looked back towards the service road, he observed the accident airplane and applied brakes. The ground vehicle stopped in front of the airplane's left wing just before the collision occurred. At the time of the collision the airplane was transitioning from a movement area to a non-movement area. The service vehicle was operating in a non-movement area and not required to be in contact with air traffic control.

Updated at Nov 9 2009 11:53AM

**Brief of Accident (Continued)**

WPR09LA036 File No. 25995	11/11/2008	Los Angeles, CA	Aircraft Reg No. N320QS	Time (Local): 23:10 PST
<b>OCCURRENCES</b>				
Taxi-from runway - Ground collision				
<b>FINDINGS</b>				
Personnel Issues-Psychological-Attention/monitoring-Monitoring environment-Airport personnel - C				
Findings Legend: (C) = Cause, (F) = Factor				

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.  
 Failure of the ground service vehicle driver to maintain adequate clearance/distance from the taxiing airplane.

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION 7-17-80		NTSB ID: DCA09FA022	
Occurrence Date: 12/26/2008		Occurrence Type: Accident	
Other Aircraft Involved		Aircraft Manufacturer	
Registration Number	Model/Serial Number		
Accident Information			
Aircraft Damage: Substantial		Accident Occurred During:	
Crew	Name	Certificate No.	Injury
Pilot			
2			
3			
4			
5			
6			
Operator Information			
Name	Operator Designator Code	Doing Business As	
AMERICAN AIRLINES INC	ALA		
Street Address	City	State	Zip Code
-Type of 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 Operations Conducted: Scheduled; Domestic; Passenger Only			
Flight Plan/Itinerary			
Type of Flight Plan Filed:	State	Airport Identifier	
Last Departure Point	State	Airport Identifier	
Destination	State	Airport Identifier	
Weather Information			
Investigator's Source:	Facility ID:	Observation Time (Local):	
Sky/Lowest Cloud Condition:	FL AGL		
Lowest Ceiling:	FL AGL	Visibility:	SM
		Altimeter:	ft/g
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION 7-17-80		NTSB ID: DCA09FA022		Most Critical Injury: None	
Occurrence Date: 12/26/2008		Occurrence Type: Accident		Investigated By: NTSB	
Location/Time		State: CA		Time Zone: PST	
Nearest City/Place Los Angeles Intl Airport		Zip Code 0859			
Aircraft Information		Aircraft Manufacturer: MCDONNELL DOUGLAS		Model/Serial Number DC-9-83(MD)	
Registration Number N9617R	Type of Aircraft:		Amateur Built Aircraft?		
Injury Summary:	Fatal	Serious	Minor	Name 129	
Revenue Seeing Flight: No		Air Medical Transport Flight: No			
Narrative					
Brief narrative statement of facts, conditions and circumstances pertain to the accident/incident: On December 26, 2008, at 0859 Pacific standard time, American Airlines flight 1350, an MD-83 (registration N9617R), impacted its tug during pushback operations at Los Angeles International Airport. No injuries were reported to the 124 passengers, 3 flight attendants, 2 pilots, or the tug operator; however, the airplane sustained substantial damage to the lower portion of the forward fuselage. The number 1 engine was started during the pushback. The tug operator stated that as he was preparing to transition the airplane from being pushed back to pulling it forward, the airplane began to accelerate forward. The tug operator applied the brakes but the airplane continued to move forward, causing the tug to jack-knife back and forth until it was impacted by the airplane. FDR data and crew interview statements indicate that an increase in power on the number 1 engine was commanded around the time the tug was preparing to pull the airplane forward. Updated on Feb 3 2009 12:48PM					
PRELIMINARY INFORMATION - SUBJECT TO CHANGE					



This field is for testing.

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: WPR09LA255 Occurrence Date: 05/21/2009 Occurrence Type: Accident		Aircraft Registration Number: N843AE Most Critical Injury: None Investigated By: NTSB	
Location/Time Nearest City/Place: Los Angeles State: CA Zip Code: 90008 Local Time: 1625 Time Zone: PDT Airport Proximity: On Airport/Airstrip Distance From Landing Facility:					
Aircraft Information Summary Aircraft Manufacturer: EMBRAER Model/Series: EMB-135/KL Type of Aircraft: Airplane					
Revenue Sightseeing Flight: No Air Medical Transport Flight: No					
Narrative <p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On May 21, 2009, about 1625 Pacific daylight time, an Embraer EMB-135KL, N843AE, taxied into a parked and unoccupied Embraer EMB-135KL, N843AE, while leaving the terminal hub at Los Angeles International Airport (LAX), Los Angeles, California. American Eagle operated the airplane under 14 Code of Federal Regulations Part 121 as flight 3085. The captain, first officer, 1 flight attendant, and 44 passengers were not injured. The accident airplane received substantial damage to the left horizontal stabilizer, and the parked airplane received substantial damage to the right horizontal stabilizer. The other Embraer was parked at the gate with no flight crew or passengers onboard. There were no ground injuries. Visual meteorological conditions prevailed for the flight and an instrument flight rules flight plan had been filed. The flight was destined for San Diego International Airport (SAN), San Diego, California.</p> <p>In the company's submitted report (National Transportation Safety Board (NTSB) Pilot/Operator Aircraft Accident/Incident Report Form 6120.1), American Eagle reported that ramp personnel pushed the airplane back and instructed the captain to set the parking brake. After setting the parking brake, the tug was disconnected. The first officer contacted LAX ground control and was given a taxi clearance. As the captain started to taxi the airplane, along the taxiway center line, the flight crew felt a "bump." The captain stopped the airplane. The captain set the parking brake and shutdown the engines. Ramp personnel radioed the flight crew stating that their left horizontal stabilizer had struck the right horizontal stabilizer of an airplane parked at the gate.</p> <p>According to a Federal Aviation Administration (FAA) inspector who responded to the accident, the airplane had been pushed back from the gate via ground tow. Once disconnected from the tow bar, the captain started to taxi the airplane to the runway. As the captain was maneuvering around a parked airplane, the left horizontal stabilizer of the taxiing airplane struck the right horizontal stabilizer of the parked airplane.</p> <p>The FAA inspector further reported that the parked airplane had been improperly parked with the right wing tip and horizontal stabilizer well outside the safety lines. It also appeared that the taxiing airplane may have been pushed back in such a manner that the left main landing gear was to the left of the taxi line placing it closer to the parked airplane.</p> <p>Both the solid state flight data recorder (SSFR), and solid state cockpit voice recorder (SSCVR) for the accident airplane were shipped to the NTSB vehicle recorder laboratory, Washington, D.C., for read out.</p> <p>The SSFR was a Honeywell SSFR, model 980-4700, 356 words, serial number 09297. The SSFR was received at the vehicle recorder division in good condition, and a normal extraction of the data was performed. An FDR group was not convened; the event was recorded on the SSFR, with no pertinent findings.</p>					

FACTUAL REPORT - AVIATION


Page 1


This field is for testing.

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION		NTSB ID: DCA09FA022 Occurrence Date: 12/20/2008 Occurrence Type: Accident	
Weather Information (Continued from page 2) Temperature: °C    Dew Point: °C    Wind Direction: Wind Speed: Kts    Gusts: Kts    Weather Conditions at Accident Site:			
Administration Data Notification From:    Date:			
FAA District Office/Coordinator:		Investigator-In-Charge (IIC): Robert F. Hildrup	

PRELIMINARY INFORMATION - SUBJECT TO CHANGE

Page 3

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: WPR09LA255	
	Occurrence Date: 05/21/2009	
	Occurrence Type: Accident	
<b>Narrative (Continued)</b> <p>The SSCVR was a Honeywell 6022 SSCVR 120, serial number 4550. The SSCVR was received at the vehicle recorder division's audio laboratory in good condition, and the data was extracted normally. A CVR group was not convened; the event was recorded on the SSCVR; however, the information did not add anything to the investigation.</p> <p>As a result of the ground collision, American Eagle had the lead-in lines redrawn to a 45-degree angle. If the flight crew was not able to make the drop off prior to the lead-in lines for parking, they would have to taxi the airplane around the building or satellite terminal and rejoin the drop off point.</p> <p>Updated on Aug 1 2011 9:19AM</p>		
<b>FACTUAL REPORT - AVIATION</b>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: WPR09LA255				
	Occurrence Date: 05/21/2009				
	Occurrence Type: Accident				
<b>Landing Facility/Approach Information</b>					
Airport Name Los Angeles Int'l Airport	Airport ID: LAX	Airport Elevation 125 Ft MSL	Runway Used N/A	Runway Length	Runway Width
Runway Surface Type:					
Runway Surface Condition:					
Approach/Arrival Flow: NONE					
VFR Approach/Landing: None					
<b>Aircraft Information</b>					
Aircraft Manufacturer: EMBRAER		Model/Serial EMB-135/KL		Serial Number 145680	
Airworthiness Certificate(s): Transport					
<b>Landing Gear Type: Retractable - Tricycle</b>					
Aircraft Built After? No		Number of Seats: 47		Certified Max Gross Wt.	
Engine Type:		Engine Manufacturer:		Model/Serial:	
LBS		Number of Engines: 2		Rated Power:	
<b>- Aircraft Inspection Information</b>					
Type of Last Inspection		Date of Last Inspection		Time Since Last Inspection	
Continuous Airworthiness		Hours		Airframe Total Time	
- Emergency Locator Transmitter (ELT) Information					
ELT Installed? Type: Yes / Unknown		ELT Operated? No		ELT Aided in Locating Accident Site? No	
<b>Owner/Operator Information</b>					
Registered Aircraft Owner American Eagle Airlines Inc		Street Address 4333 Armon Carter Blvd. MD 5494			
		City Fort Worth		State TX	
		Zip Code 76155			
Operator of Aircraft American Eagle Airlines Inc		Street Address 4333 Armon Carter Blvd. MD 5494			
		City Fort Worth		State TX	
		Zip Code 76155			
Operator Does Business As:		Operator Designator Code: SIMA			
- Type of U.S. Certificate(s) Held:					
Air Carrier Operating Certificate(s): Flag Carrier/Domestic					
<b>Operating Certificate:</b>					
Operator Certificate:			Operator Certificate:		
Regulation Flight Conducted Under: Part 121: Air Carrier					
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only					
<b>FACTUAL REPORT - AVIATION</b>					

This space for finding

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION				NTSB ID: WPR09LA255			
Occurrence Date: 05/21/2009				Occurrence Type: Accident			
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site		
LAX	1553	PDT	125 Ft MSL	0 NM	0 Deg Mag.		
Sky/Lowest Cloud Condition: Few				100 Ft AGL	Condition of Light: Day		
Lowest Ceiling: None				FL AGL	Visibility: 10 SM	Altimeter: 29.93 "Hg	
Temperature: 19 °C		Dew Point: 13 °C	Weather Conditions at Accident Site: Visual Conditions				
Wind Direction: 280		Wind Speed: 13	Wind Gusts:				
Visibility (RVR):		FL	Visibility (RVV)	SM			
Precip and/or Obscuration: No Obscuration; No Precipitation							
Accident Information							
Aircraft Damage: Substantial				Aircraft Fire: None		Aircraft Explosion: None	
- Injury Summary Matrix							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
Second Pilot				1	1		
Student Pilot				1	1		
Flight Instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants				1	1		
Other Crew							
Passengers				44	44		
- TOTAL ABOARD -				47	47		
- Other Ground							
- GRAND TOTAL -				47	47		
FACTUAL REPORT - AVIATION							

Page 4

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION				NTSB ID: WPR09LA255			
Occurrence Date: 05/21/2009				Occurrence Type: Accident			
First Pilot Information							
Name	City	State	Date of Birth	Age			
On File	On File	On File	On File	On File			
Sex: M	Seat Occupied: Left	Occupational Pilot? Yes	Certificate Number: On File				
Certificate(s): Airline Transport; Flight Instructor							
Airplane Rating(s): Multi-engine Land; Single-engine Land							
Rotorcraft/Glider/LTA: None							
Instrument Rating(s):							
Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine; Instrument Airplane							
Current Biennial Flight Review?							
Medical Cert.: Class 1				Date of Last Medical Exam: 05/2009			
Medical Cert. Status: With Waivers/Limitations							
- Flight Time Matrix							
Total Time	ATC	Time Area and Model	Engine Single-Engine	Engine Multi-Engine	Flight	Instrument	Class
Pilot in Command (PIC)	15000	8800					
Instructor							
Instruction Received							
Last 90 Days							
Last 30 Days							
Last 24 Hours							
Seatbelt Used? Yes	Shoulder Harness Used? Yes			Toxicology Performed? No		Second Pilot? Yes	
Flight Plan/Itinerary							
Type of Flight Plan Filed: IFR							
Departure Point	State			Departure Time	Time Zone		
Same as Accident/Incident Location	LAX			1620	PDT		
Destination	State			CA	SAN		
San Diego	CA			SAN			
Type of Clearance: None							
Type of Airspace:							
Weather Information							
Source of Weather Information:							
Company							
FACTUAL REPORT - AVIATION							

Page 3

This form is being

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: WPR09LA255
	Occurrence Date: 05/21/2009
	Occurrence Type: Accident
Administrative Information Investigator-In-Charge (IIC) Tealeye Cornejo	
Additional Persons Participating in This Accident/Incident Investigation: George T Erdel Federal Aviation Administration El Segundo, CA Chad Balentine ALPA Herndon, VA	
Page 5 FACTUAL REPORT - AVIATION	

**National Transportation Safety Board**  
 Washington, DC 20594

Printed on : 1/10/2012 5:19:07 PM

**Brief of Accident**

**Adopted 04/28/2011**

WPR09LA255 File No. 27958	05/21/2009	Los Angeles, CA	Aircraft Reg No. N843AE	Time (Local): 16:25 PDT
Make/Model: Embraer / EMB-135	Engine Make/Model:	Aircraft Damage: Substantial	Number of Engines: 2	Operating Certificate(s): Flag Carrier/Domestic
Name of Carrier: American Eagle Airlines Inc	Type of Flight Operation: Scheduled; Domestic; Passenger Only	Reg. Flight Conducted Under: Part 121: Air Carrier	Fatal 0	Serious 0
			Crew 0	Minor/None 3
			Pass 0	44
Last Depart. Point: Same as Accident/Incident Location	Destination: San Diego, CA	Condition of Light: Day	Weather Info Src: Weather Observation Facility	
Airport Proximity: On Airport/Airstrip	Airport Name: Los Angeles Int'l Airport	Basic Weather: Visual Conditions	Lowest Ceiling: None	
Runway Identification: N/A	Runway Length/Width (Ft): Unk/Nr	Visibility: 10.00 SM	Wind Dir/Speed: 280 / 013 Kts	
Runway Surface:	Runway Surface Condition:	Temperature (°C): 19	Precip/Obscuration: No Obscuration; No Precipitation	
Pilot-in-Command	Age: 50	Flight Time (Hours)	Total All Aircraft: 15000	
Certificate(s)/Rating(s)	Instrument Ratings		Last 90 Days: Unk/Nr	
			Total Make/Model: 8600	
			Total Instrument Time: Unk/Nr	

Following push back from the gate, as the captain was taxiing the airplane from the ramp to the runway, the left horizontal stabilizer struck the right horizontal stabilizer of a parked company airplane at an adjacent gate, resulting in substantial damage to both airplanes' flight control surfaces. According to the flight crew statements and a Federal Aviation Administration (FAA) inspector who responded to the accident site, the parked airplane had been improperly parked with the right wing tip and horizontal stabilizer well outside the safety lines.

Updated at Aug 1 2011 9:19AM

WPR09LA255  
File No. 27958

05/21/2009

Los Angeles, CA

Aircraft Reg No. N843AE

Time (Local): 16:25 PDT

## OCCURRENCES

Taxi-to runway - Ground collision


## FINDINGS

Personnel Issues-Psychological-Attention/monitoring-Monitoring other aircraft-Flight crew - C  
Aircraft-Aircraft handling/service-Parking/securing-Parking/storage-Incorrect use/operation - F

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this accident as follows.  
The flight crew's failure to adequately monitor and maintain clearance from a parked aircraft while taxiing. Contributing to the accident was an improperly parked airplane that encroached upon the taxiway area.

This space is for history

 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: ENG09IA014		Aircraft Registration Number: N670SW	
		Occurrence Date: 09/08/2009		Most Critical Injury: None	
Occurrence Type: Incident		Investigated By: NTSB			
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code 90045	Local Time 1154	Time Zone PDT	
Airport Proximity: On Airport/Airstrip		Distance From Landing Facility:			
Aircraft Information Summary					
Aircraft Manufacturer BOEING		Model/Serial 737/3G7		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No		Air Medical Transport Flight: No			
<b>Narrative</b> Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: <b>HISTORY OF FLIGHT</b> <p>On September 8, 2009, approximately 1154 Pacific Daylight Time (PDT), Southwest Airlines (SWA) Flight 341, a Boeing 737-307, N670SW, experienced a failure of the inboard axle on the right main landing gear (RMG) during landing on runway 24R at Los Angeles International Airport (LAX). The pilot, first officer, 3 flight attendants, 1 jumpseater, and 136 passengers were not injured. Visual meteorological conditions prevailed and an instrument flight rules (IFR) flight plan was filed for the 14 Code of Federal Regulations (CFR) Part 121 scheduled domestic passenger flight. The flight originated at McCarran International Airport, Las Vegas, Nevada, about 1055 PDT.</p> <p>According to the captain, he felt the aircraft swerve during the landing rollout and stopped the airplane on the taxiway. A flight attendant called the cockpit and reported that a deadheading SWA pilot reported that he observed a tire depart the airplane. The RMG inboard wheel and brake assembly separated from the aircraft and was recovered on the north side of the runway near the 4,000 feet remaining marker. The airplane was taxied off the runway to taxiway Y where the passengers were deplaned by airstairs onto waiting buses.</p>					
<b>PERSONNEL INFORMATION</b> <b>Captain</b> <p>The 46-year-old captain held private, flight instructor, commercial and airline transport pilot certificates with type ratings for B737 and S827 airplanes and a first class medical certificate. His most recent medical certificate was issued on June 29, 2009, with no limitations and his most recent flight review was performed on May 16, 2009. He had accrued 230, 77, and 4 flight hours in the last 90 days, 30 days, and 24 hours, respectively.</p> <p><b>First Officer</b>          The 39-year-old first officer held private, flight instructor, commercial and airline transport pilot certificates with a type ratings for B737, LR-44, DA-20, and A320 (SIC only) airplanes and a first class medical certificate. His most recent medical certificate was issued on March 6, 2009, with no limitations and his most recent flight review was performed on March 2, 2009. He had accrued 197, 53, and 4 flight hours in the last 90 days, 30 days, and 24 hours, respectively.</p>					
<b>AIRPLANE INFORMATION</b> <p>The Boeing 737-307 airplane, N670SW, was last inspected during a scheduled A-check on September 7, 2009. According to SWA maintenance records, the RMG was installed on the airplane on November 8, 2003. The RMG was most recently overhauled in October 2003 and the inner cylinder had accrued</p>					
<b>FACTUAL REPORT - AVIATION</b>					
Page 1					

<b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: ENG09IA014 Occurrence Date: 09/09/2009 Occurrence Type: Incident	
<b>Landing Facility/Approach Information</b>			
Airport Name Los Angeles International	Airport ID: KLAS	Runway Used 24R	Runway Length 8925
Runway Surface Type: Concrete	Runway Elevation 125 Ft. MSL	Runway Width 150	
Runway Surface Condition: Dry			
Approach/Arrival Flow: Unknown			
VFR Approach/Landing: Unknown			
<b>Aircraft Information</b>			
Aircraft Manufacturer BOEING	Model/Serial 737/3G7	Serial Number 23794	
Airworthiness Certificate(s): Transport			
<b>Landing Gear Type: Retractable - Tricycle</b>			
Airframe Built At? No	Number of Seats: 145	Certified Max Gross Wt. 139500 LBS	Number of Engines: 2
Engine Type: Turbo Fan	Engine Manufacturer: CFM	Model/Serial: 56 Series	Rated Power:
<b>- Aircraft Inspection Information</b>			
Type of Last Inspection Continuous Airworthiness	Date of Last Inspection 09/2009	Time Since Last Inspection Hours	Airframe Total Time 68060 Hours
- Emergency Locator Transmitter (ELT) Information			
ELT Installed? Type: No	ELT Operated? No	ELT Aided in Locating Accident Site? No	
<b>Owner/Operator Information</b>			
Registered Aircraft Owner Polaris Leasing International, Inc.	Street Address City State CT	Zip Code 06927	
Operator of Aircraft Southwest Airlines, Co.	Street Address City Dallas	State TX	Zip Code 75235
Operator Does Business As:			
- Type of U.S. Certificate(s) Held: Air Carrier Operating Certificate(s) Flag Carrier/Domestic			
Operator Designator Code: SWAA			
Operating Certificate:		Operator Certificate:	
Regulation Flight Conducted Under: Part 121: Air Carrier			
Type of Flight Operation Conducted: Scheduled; Passenger Only			
Page 2			

<b>National Transportation Safety Board</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>		NTSB ID: ENG09IA014 Occurrence Date: 09/08/2009 Occurrence Type: Incident	
<b>Narrative (Continued)</b>			
<p>48,956 hours and 36,016 cycles since new and 18,200 hours and 14,192 cycles since overhaul at the time of the incident. The RWLG inner cylinder should be overhauled every 10 years or 21,000 cycles and has a life limit of 75,000 cycles according to Boeing. The RWLG inboard brake was last replaced on June 27, 2009 and the RWLG inboard wheel was last replaced on August 9, 2009.</p>			
<b>METEOROLOGICAL INFORMATION</b>			
<p>The KLAX METAR reported the following weather at 1153: Wind From 270 degrees at 10 knots, visibility 10 miles, few clouds at 9000 feet, temperature 23 degrees Celsius, dew point 16 degrees Celsius, and an altimeter of 29.87 inches of Mercury.</p>			
<b>TEST AND RESEARCH</b>			
<p>The RWLG Inner Cylinder Assembly (P/N 65-46116-16, S/N 4P27901) was removed from the aircraft and sent to The Boeing Company. The teardown and examination of the inner cylinder was accomplished under the supervision of the NTSB. The inboard axle exhibited a fracture that emanated from the bolt hole at the 12:00 position in the brake mounting flange. The fracture exhibited surface features consistent with fatigue propagation for approximately 3.5 inches. The remainder of the fracture exhibited surface features consistent with ductile separation. The area where the bolt hole inner diameter intersected the chamfer on the outboard face of the flange exhibited scoring and fretting damage to the sermetal coating and microscopic inspection indicated this was the likely area of fatigue crack initiation. A metallographic cross section of the crack initiation point was prepared and the microstructure examination revealed the presence of base metal heat damage in the area of scoring damage. Away from this area the axle material was consistent with the specification and drawing requirements.</p>			
<p>At the request of the NTSB, SNA gathered data on the in-service brake mounting bolt breakaway torque on 13 brake assemblies that required brake replacement due to wear. The breakaway torque on the RWLG outboard brake from the incident airplane was also measured. The brake mounting bolts are to be installed with a final torque of 125-135 foot-pounds per the Aircraft Maintenance Manual, chapter 32-41-41. The in-service mounting bolt torque values on the 14 brake assemblies measured averaged 104 foot-pounds with a minimum measured torque of 35 foot-pounds and a maximum of 175 foot-pounds. The minimum and maximum torque values were recorded on different brakes. Eight of the 14 brakes measured had average torque values greater than 100 foot-pounds but only 3 brakes had average torque values greater than 125 foot-pounds. Six of the 14 brakes had 5 or more brake mounting bolts with torque values less than 100 foot-pounds and these six brakes all had average torque values less than 100 foot-pounds. There is no requirement or guidance to check the bolt torque after installation.</p>			
<b>ADDITIONAL INFORMATION</b>			
<p>Federal Aviation Administration Airworthiness Directive (AD) 2000-05-13 mandates that a one-time magnetic particle inspection of a one-time high frequency eddy current inspection of the RWLG axle flange be performed to detect cracking and a detailed visual inspection of the bolt hole be performed to detect corrosion or fretting. This AD was performed on the incident RWLG on February 17, 2001.</p>			
<p>Examination of the Flight Data Recorder data indicated the landing was essentially normal with no abnormal control inputs or accelerations recorded.</p>			
<p>Updated on Jan 7 2011 6:36PM</p>			
Page 1a			



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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: ENG09IA014		Occurrence Date: 09/08/2009		Occurrence Type: Incident	
Weather Information							
WOF ID	Observation Time	Time Zone	WOF Elevation	WOF Distance From Accident Site	Direction From Accident Site	Deg. Mag.	
KLAX	1153	PDT	125 Ft. MSL	NM			
Sky/Lowest Cloud Condition: Few				900 Ft. AGL		Condition of Light: Day	
Lowest Ceiling: None				Ft. AGL	Visibility	10	SM
Temperature: 23 °C		Dew Point:	16 °C	Weather Conditions at Accident Site: Visual Conditions		*Hg	
Wind Direction: 270		Wind Speed: 10	Wind Gusts:				
Visibility (RVV):		Ft.	SM				
Precip and/or Obscuration:							
Accident Information							
Aircraft Damage: Minor				Aircraft Fier: None		Aircraft Explosion: None	
- Injury Summary Matrix							
First Pilot	Fatal	Serious	Minor	None	TOTAL		
				1	1		
Second Pilot				1	1		
Student Pilot							
Flight Instructor							
Check Pilot							
Flight Engineer							
Cabin Attendants				3	3		
Other Crew				1	1		
Passengers				136	136		
- TOTAL ABOARD -				142	142		
Other Ground							
- GRAND TOTAL -				142	142		
FACTUAL REPORT - AVIATION							
Page 4							

This space for listing

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: ENG09IA014		Occurrence Date: 09/08/2009		Occurrence Type: Incident	
First Pilot Information							
Name	City	State	Date of Birth	Age			
On File	On File	On File	On File	46			
Sex: M	Seat Occupied: Left	Occupational Pilot? Yes	Certificate Number: On File				
Certificate(s): Airline Transport; Flight Instructor; Commercial; Private							
Airplane Rating(s): Multi-engine Land; Single-engine Land							
Rotorcraft/Glider/LTA: None							
Instrument Rating(s): Airplane							
Instructor Rating(s): Airplane Multi-engine; Airplane Single-engine							
Current Biennial Flight Review? 05/2009							
Medical Cert.: Class 1				Medical Cert. Status: Without Waivers/Limitations		Date of Last Medical Exam: 06/2009	
- Flight Time Matrix							
Total Time	ATC	Time Alone and Solo	Aspirin Single Engine	Aspirin Multi-Engine	Night	Instrument	Other
19642	13274	2300	17741	12201	2470	201	
Pilot in Command (PIC)	12406	8821	2300	10705			
Instructor	439	0	1036	103			
Instruction Received							
Last 90 Days	230	225	5	275	5	22	
Last 30 Days	77	74	3	74	2	7	
Last 24 Hours	4	4	4				
Seatbelt Used? Yes	Shoulder Harness Used? Yes		Toxicology Performed? No		Second Pilot? Yes		
Flight Plan/Itinerary							
Type of Flight Plan Filed: IFR							
Departure Point	State		APR Identifier	Departure Time	Time Zone		
Las Vegas	NV		KLAX	1055	PDT		
Destination	State		APR Identifier				
Same as Accident/Incident Location	State		KLAX				
Type of Clearance: IFR							
Type of Airspace:							
Weather Information							
Source of Wx Information:							
Company							
FACTUAL REPORT - AVIATION							
Page 3							



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 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: ENG09IA014
	Occurrence Date: 09/08/2009
	Occurrence Type: Incident
<b>Administrative Information</b> Investigator-in-Charge (IIC) Clinton R. Crookshanks	
<b>Additional Persons Participating in This Accident/Incident Investigation:</b> Eric West FAA Washington, DC Richard Anderson Boeing Seattle, WA Jeff Grenier Southwest Airlines Dallas, TX	
Page 5 FACTUAL REPORT - AVIATION	

**National Transportation Safety Board**  
**Washington, DC 20594**

Printed on : 1/10/2012 5:15:51 PM

**Brief of Incident**

**Adopted 01/07/2011**

ENG09IA014 File No. 27506	09/08/2009	Los Angeles, CA	Aircraft Reg No. N670SW	Time (Local): 11:54 PDT
Make/Model: Boeing / 737 Engine Make/Model: CFM / 56 Series Aircraft Damage: Minor Number of Engines: 2 Operating Certificate(s): Flag Carrier/Domestic Name of Carrier: Southwest Airlines, Co. Type of Flight Operation: Scheduled; Domestic; Passenger Only Reg. Flight Conducted Under: Part 121: Air Carrier			Fatal 0 Serious 0 Minor/None 6	Crew 0 Pass 0 136
Last Depart. Point: Las Vegas, NV Destination: Same as Accident/Incident Location Airport Proximity: On Airport/Airstrip Airport Name: Los Angeles International Runway Identification: 24R Runway Length/Width (Ft): 8925 / 150 Runway Surface: Concrete Runway Surface Condition: Dry			Condition of Light: Day Weather Info Src: Weather Observation Facility Basic Weather: Visual Conditions Lowest Ceiling: None Visibility: 10.00 SM Wind Dir/Speed: 270 / 010 Kts Temperature (°C): 23 Precip/Obscuration:	
Pilot-in-Command	Age: 46	Flight Time (Hours)		
Certificate(s)/Rating(s) Airline Transport; Flight Instructor; Commercial; Private; Multi-engine Land; Single-engine Land		Total All Aircraft: 19642 Last 90 Days: 230 Total Make/Model: 13274 Total Instrument Time: 2671		
Instrument Ratings Airplane				

During landing, the inboard axle of the right main landing gear separated from the airplane. The crew taxied the airplane off the runway and the passengers and crew deplaned with no injuries. Examination of the axle revealed an area of fatigue cracking emanating from the brake mounting bolt hole at the 12:00 position. The fatigue crack likely initiated in an area where there was scoring and fretting damage to the Sermetal coating. In-service examination of brake mounting bolt torque indicated that over time, the brake mounting bolts may loosen allowing the bolts to spin in the holes.

Updated at Jan 7 2011 6:36PM

ENG09IA014  
File No. 27506

09/08/2009

Los Angeles, CA

Aircraft Reg No. N670SW

Time (Local): 11:54 PDT

## OCCURRENCES

Landing-landing roll - Aircraft structural failure

## FINDINGS


Aircraft-Aircraft systems-Landing gear system-Main gear strut/axle/truck-Fatigue/wear/corrosion - C


Findings Legend: (C) = Cause, (F) = Factor


The National Transportation Safety Board determines the probable cause(s) of this incident as follows.

The failure of the right main landing gear inboard axle due to fatigue cracking as a result of fretting damage in one of the brake mounting bolt holes.

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 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>PRELIMINARY REPORT</b> <b>AVIATION</b>		NTSB ID: WPR10A135		Most Critical Injury: None	
		Occurrence Date: 02/16/2010		Investigated By: NTSB	
		Occurrence Type: Incident			
Location/Time		State	Zip Code	Local Time	Time Zone
Nearest City/Place Los Angeles		CA	90009	0634	PST
Aircraft Information		Aircraft Manufacturer		Model/Serial Number	
Registration Number N226SW		EMBRAER		EMB-120ER	
Type of Aircraft: Airplane		Amateur Built Aircraft? No			
Injury Summary:		Fatal	Serious	Minor	None
Revenue Seeing Flight: No		Air Medical Transport Flight: No		31	
<b>Narrative</b> <p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident.</p> <p>On February 16, 2010, about 0634 Pacific standard time, SkyWest Airlines Embraer EMB-120ER, N226SW, operating as United Express flight #6199, taxied into a jet bridge while parking at its assigned terminal gate at the Los Angeles, California, International Airport (LAX). None of the 2 flight crew members, 1 flight attendant, or 28 passengers were injured. No one on the ground was injured. The turboprop airplane sustained minor damage. Visual meteorological conditions prevailed, and an instrument flight plan was filed. SkyWest Airlines operates under the provisions of 14 Code of Federal Regulations Part 121. The scheduled domestic passenger flight originated from Carlsbad, California, at 0654.</p> <p>The incident airplane's captain reported that as he taxied at a normal speed toward gate 82, he observed the lead in-line, a parked fuel truck on his right side, the jet bridge on his left side, and the ramper. The captain indicated that he "felt confident" he could proceed to the gate clear of the obstacles. The captain reported that he was watching the ramper, and, just as the ramper's hands were starting to move upward to perform the stop signal, propeller blades on the left engine struck the jet bridge.</p> <p>SkyWest Airlines is a regional airline headquartered in St. George, Utah. The airline serves as a feeder airline and operates under contract with various major carriers. The incident flight was performed under a code sharing agreement with United Airlines.</p> <p>SkyWest Airlines publishes a "Station Operations Manual" that provides directions to its employees regarding the conduct of ground operations. In pertinent part, the manual indicates that, while the minimum ground crew to guide in arriving airplanes consists of one marshaller, it is preferred to also utilize at least one wing walker. The size of the ground crew should be determined as local conditions warrant.</p> <p>According to the SkyWest LAX station manager (hub director) under certain circumstances, it is acceptable to use a single ground marshaller ("ramper") to lead the Embraer airplane (commonly referred to as a "Brasilia") into terminal 8, gate 82, which is the incident airplane's assigned gate. SkyWest routinely uses this gate for both turboprop (Embraer) and turbojet (Bombardier Canadair Regional Jet) airplanes.</p> <p>The hub director also reported that, at the time of the incident, the jet bridge attached to gate 82 was not in motion. It was parked with its 2 wheels located within the confines of its assigned non-use box. Passengers egress from the Brasilia via the airplane's exit door and stairs. They proceeded to the terminal by walking on the tarmac. The jet bridge is not used for the Brasilia at this gate.</p> <p>The National Transportation Safety Board investigator observed that the tarmac approaching gate 82 is striped with a single airplane nose wheel lead-in line. Along this line there are two specific</p>					
<b>PRELIMINARY INFORMATION - SUBJECT TO CHANGE</b> <div style="text-align: right;">Page 1</div>					

 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>PRELIMINARY REPORT</b> <b>AVIATION</b>		NTSB ID: WPR10A135 Occurrence Date: 02/16/2010 Occurrence Type: Incident																													
Other Aircraft Involved		Model/Serial Number																													
Registration Number		Aircraft Manufacturer																													
Accident Information																															
Aircraft Damage: Minor		Accident Occurred During:																													
<table border="1"> <thead> <tr> <th>Crew</th> <th>Name</th> <th>Certificate No.</th> <th>Injury</th> </tr> </thead> <tbody> <tr> <td>Pilot</td> <td>On File</td> <td>On File</td> <td>None</td> </tr> <tr> <td>2</td> <td>On File</td> <td>On File</td> <td>None</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Crew	Name	Certificate No.	Injury	Pilot	On File	On File	None	2	On File	On File	None	3				4				5				6			
Crew	Name	Certificate No.	Injury																												
Pilot	On File	On File	None																												
2	On File	On File	None																												
3																															
4																															
5																															
6																															
Operator Information		Doing Business As																													
Name		Operator Designator Code																													
SKYWEST AIRLINES INC.		SWIA																													
Street Address		City	State																												
444 S. River Road		St. George	UT																												
		Zip Code	84790																												
-Type of 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 Operations Conducted: Scheduled; Domestic; Passenger Only																															
Flight Plan/Itinerary																															
Type of Flight Plan Filed: IFR																															
Last Departure Point		State	Airport Identifier																												
Carlsbad		CA	CRQ																												
Destination		State	Airport Identifier																												
Same as Accident/Incident Location			LAX																												
Weather Information																															
Investigator's Source: Company		Facility ID: LAX	Observation Time (Local): 0653																												
Sky/Lowest Cloud Condition: Few		1000 Ft. AGL																													
Lowest Ceiling: None		FL AGL	Visibility: 10 SM																												
		Altitude:	29.98 FtHg																												
PRELIMINARY INFORMATION - SUBJECT TO CHANGE																															
Page 2																															

 <b>NATIONAL TRANSPORTATION SAFETY BOARD</b> <b>PRELIMINARY REPORT</b> <b>AVIATION</b>		NTSB ID: WPR10A135 Occurrence Date: 02/16/2010 Occurrence Type: Incident	
Narrative (Continued)			
<p>Locations marked for stopping airplanes. The stop locations are indicated by paint stripes/lines that are oriented perpendicular to the lead-in line. The perpendicular stop lines are marked with letters/numbers. These markings serve to identify for the rampers the location at which the different types of airplanes are to be stopped. The Safety Board investigator noted that, approaching the gate, the first stop line is marked "508," and the line closest to the terminal (and the jet bridge) is marked "8350."</p> <p>According to the SkyWest "Station Operations Manual," rampers are supposed to use specific hand/arm signals and hold wands while guiding airplanes to/from their gates. One of the signals to be used is designed to indicate to the flight deck crew that the ramp area for their arriving airplane is clear of obstructions.</p> <p>The Safety Board investigator observed that the incident airplane's left engine was absent two of its four propeller blades. An oil spray residue was apparent on the left side of the fuselage, and a pool of oil was present below the left engine and wing. Portions of the separated propeller blades were embedded into the bottom of the damaged jet bridge. Portions of the separated blades were found beneath the left and right side of the airplane, and they were fragmented. The left engine's nacelle was bent, and multiple dents were noted in various locations on the left side of the fuselage. The dents were consistent in appearance with blade fragment impact signatures. There was no fire.</p> <p>The Safety Board investigator noted that the Brasilia's nose wheel was positioned on top of the stop line bearing the mark "8350." An investigation is ongoing regarding the conspicuity of the jet bridges from the Brasilia's cockpit, flight crew and ground personnel qualifications and conduct, mishap notification procedures, and ground operating policies.</p> <p>Updated on Feb 25 2010 4:17PM</p>			
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			
Page 1a			

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National Transportation Safety Board PRELIMINARY REPORT AVIATION		NTSB ID: WPR10A135	
Occurrence Date: 02/16/2010			
Occurrence Type: Incident			
Weather Information (Continued from page 2)			
Temperature 14 °C	Dew Point 3 °C	Wind Direction 70	
Wind Speed: 3 Kts	Gusts Kts	Weather Conditions at Accident Site: Visual Conditions	
Administration Data			
Notification From WP Comm Ctr		Date	
FAA District Office/Coordinator Federal Aviation Administration Steven H. Allen		Investigator-in-Charge (IC) Wayne R. Pollack	

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Printed on : 1/10/2012 5:12:39 PM

National Transportation Safety Board PRELIMINARY REPORT AVIATION		NTSB ID: WPR10A199		Most Critical Injury: None	
Occurrence Date: 04/09/2010		Investigated By: NTSB			
Occurrence Type: Accident					
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code 90009	Local Time 1930	Time Zone PDT	
Aircraft Information		Model/Series Number 737-3H4			
Registration Number N624SW	Aircraft Manufacturer BOEING				
Type of Aircraft: Airplane	Anaieur Built Aircraft? No				
Injury Summary: Fatal	Severely Minor	None 109			
Revenue Sightseeing Flight: No		Air Medical Transport Flight: No			
Narrative					
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident.</p> <p>On April 9, 2010, about 1930 Pacific daylight time, a Boeing 737-3H4, N624SW, operated by Southwest Airlines as flight #579, was impacted and substantially damaged by a runway baggage tug at the Los Angeles International Airport, Los Angeles, California (LAX). At the time, the airplane was being pushed back for its scheduled, domestic, passenger flight to Tucson, Arizona. The push back tug had not been disconnected from the airplane, which had one engine operating. None of the 2 pilots, the 3 flight attendants, nor the 104 passengers were injured. No one on the ground was injured. The flight was performed under the provisions of 14 Code of Federal Regulations Part 121.</p> <p>According to airline personnel, a Southwest ground service employee drove a baggage tug to near gate 3, terminal 1, whereupon he exited the tug without first engaging the tug's emergency brake or turning off its electric motor. The employee walked around the tug to the location where transfer bags were located. The employee stated that he picked up one of the bags and placed it on the passenger's seat of the unoccupied tug. Then, as the employee was handling the second transfer bag, he observed that the tug had moved, and it was proceeding in the direction of a hydrant fueling cart that was parked between gates 3 and 5.</p> <p>Southwest employees indicated to the National Transportation Safety Board investigator that, initially, the tug rolled about 30 feet until colliding into the hydrant fueling cart. Seconds earlier, N624SW had been located adjacent to the cart, but at the time of this first impact, the airplane had already been pushed out of gate 5 and was being turned into the alley for departure.</p> <p>The runaway tug veered off the side of the cart and continued rolling at what some employees stated was "full speed." After the tug travelled about 150 additional feet, it impacted N624SW's No. 1 engine. Then, the tug impacted and lacerated skin panels on the left, lower side of the airplane's fuselage and belly. The tug proceeded beneath the airplane and came to rest upon impacting the No. 2 engine. The captain shut down the operating No. 2 engine, and the airplane was towed back to the terminal gate.</p> <p>During the Safety Board investigator's subsequent examination of the tug's controls and operating system, its deadman electric power switch was found inoperative. The weight activated switch is located beneath the driver's seat.</p> <p>According to Southwest maintenance personnel, when weight is removed from the driver's seat, the switch is designed to open the electric circuit, thereby turning off the tug's motor. The initial Safety Board conducted survey of other tugs operated by Southwest Airlines revealed similar malfunctions of deadman switches in baggage tugs at LAX. Southwest Airlines is performing a fleet-wide survey of its tugs to ascertain whether similar anomalies exist at other airports it services.</p> <p>Updated on Apr 27 2010 8:06AM</p>					
PRELIMINARY INFORMATION - SUBJECT TO CHANGE					
Page 1					

<b>National Transportation Safety Board</b> <b>PRELIMINARY REPORT</b> <b>AVIATION</b>		NTSB ID: WPR10FA199 Occurrence Date: 04/09/2010 Occurrence Type: Accident	
(Continued from page 2)			
<b>Weather Information</b> Temperature: 14 °C Wind Speed: 10 Kts Dew Point: 10 °C Gusts: Kts Wind Direction: 240 Weather Conditions at Accident Site: Visual Conditions			
<b>Administration Data</b> Notification From: AWP-6 Operations Center		Date:	
FAA District Office/Coordinator Federal Aviation Administration Michael Marchand		Investigator-in-Charge (IIC) Wayne R. Pollack	
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			

<b>National Transportation Safety Board</b> <b>PRELIMINARY REPORT</b> <b>AVIATION</b>		NTSB ID: WPR10FA199 Occurrence Date: 04/09/2010 Occurrence Type: Accident	
(Continued from page 2)			
<b>Other Aircraft Involved</b> Registration Number:		Aircraft Manufacturer:	
<b>Accident Information</b> Aircraft Damage: Substantial		Accident Occurred During:	
Crew:			
Pilot	Name	Certificate No.	Injury
2	On File	On File	None
3	On File	On File	None
4			
5			
6			
<b>Operator Information</b>			
Name: SOUTHWEST AIRLINES CO		Operator Designator Code: SWAA	
Street Address: 2702 LOVE FIELD DR		City: DALLAS	
State: TX		Zip Code: 75235-1908	
-Type of 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 Operations Conducted: Scheduled; Domestic; Passenger Only			
<b>Flight Plan/Itinerary</b>			
Type of Flight Plan Filed: IFR			
Last Departure Point:		State:	
Same as Accident/Incident Location		Airport Identifier: LAX	
Destination:		State: AZ	
Tucson		Airport Identifier: TUS	
<b>Weather Information</b>			
Investigator's Source: Company		Facility ID: LAX	
Sky/Lowest Cloud Condition: Few		Observation Time (Local): 1853	
Lowest Ceiling: None		Visibility: 8	
FL AGL		SM	
Altitude: 29.88		*Hg	
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			

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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: OPS10/A538B		Aircraft Registration Number: N222AM	
Occurrence Date: 09/04/2010		Occurrence Date: 09/04/2010		Most Critical Injury: None	
Occurrence Type: Incident		Occurrence Type: Incident		Investigated By: NTSB	
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code	Local Time 1950	Time Zone UTC	
Airport Proximity Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer BELL		Model/Serial 222U		Type of Aircraft Helicopter	
Revenue Sighting Flight: No Air Medical Transport Flight:					
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident: History of Flight					
<p>Immediately before the incident, SWA1390 was preparing to depart LAX for a flight to Las Vegas, Nevada, and was in communication with the Local Control 2 (LC2) controller at LAX. The pilot was instructed to taxi into position and hold on runway 24L at 1245:41. SWA1390 was cleared for takeoff at 1249:42. At 1250:24, the LC2 controller instructed SWA1390 to contact Social Departure and the pilot acknowledged. At 1251:28, SWA1390 returned to the LC2 frequency, asking the LC2 controller, "...are you guys talking to the helicopter that was off the right-hand side when we departed?" The LC2 controller replied, "SWA1390 he had just come on frequency." The pilot continued, "...he was probably impinging on your airspace definitely passing through 1000 feet." The LC2 controller replied, "...actually he was south of the he was just south of the 25 left and they were talking to helicopters I'll let him know." There were no further communications with SWA1390.</p> <p>Mercury 19 departed the University of California Medical Center in Westwood at 1246, under visual flight rules. The helicopter traveled southbound past Santa Monica and LAX, and then continued south toward Mancho Palos Verdes, California. The route required the pilot to contact LAX ATCT for clearance through the class B airspace surrounding LAX. The pilot first contacted the LAX ATCT helicopter position (HC) at 1248:36, reporting altitude 1,500 feet. Mercury 19 was about 3.7 miles northwest of the airport. The HC controller asked the pilot to "identify" (activate the identification feature of his transponder) and state his request. The pilot replied, "just Shoreline and then we're going southbound toward San Diego." At 1248:54, the HC controller asked, "...would you like to go to the Shoreline or you can stay at 1,500 and transition over the airport midfield." The pilot replied, "We just couldn't get down to your 125 that's why we are this way but if you could turn me [toward] the Shoreline as soon as able that would be great." The controller then instructed the pilot to continue southbound on his present heading and expect a turn in about one mile. At 1249:21, the HC controller stated, "Mercury Air 19 you can start the right turn now to the Shoreline at your discretion at this point." The pilot responded, "Appreciate that sir and we have your takeoff traffic visual separation."</p> <p>At 1249:42, the HC controller transmitted, "Mercury Air 19 cleared through the class bravo airspace via the Shoreline route south and at the Shoreline at or below 150 feet please." The pilot asked, "...Mercury air 19 you want us to drop down now or wait until your departure end?" The HC controller replied, "You can start now or wait but we'll need you at 150 by the time you're crossing past our departure corridor." At 1250:03, the pilot transmitted, "starting down out of one-five for - say at altitude again you want me down to 500?" The controller responded, "at or below 150 feet Mercury air 19." At 1250:13, the pilot transmitted "Roger that we have your takeoff traffic do you want us to hold this way or do you want us down now?" At 1250:18, the controller instructed the pilot to, "...start descending now and if you are not able to make the altitude than stay north of the airport until you can." At 1250:24, the pilot replied, "okay Mercury air 19 we're starting down</p>					

FACTUAL REPORT - AVIATION

Page 1

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National Transportation Safety Board FACTUAL REPORT AVIATION		NTSB ID: OPS10/A538B	
Occurrence Date: 09/04/2010		Occurrence Date: 09/04/2010	
Occurrence Type: Incident		Occurrence Type: Incident	
Narrative (Continued)			
<p>now." At 1250:30, the pilot transmitted, "yeah we got a 737 coming over too so we're going to move." At 1250:40, the pilot continued, "Mercury air 19 we would like to clear to the north and then come around the airport so as to go through the traffic area." The controller replied, "Mercury air 19 that's approved and like I said you can stay at the same altitude and transition over the middle of the airport at 1500 or if you want to stay at the Shoreline that it will be at it will have to be at or below 150 feet cause you're going to go below all departures." At 1250:58, the pilot replied, "okay Mercury air 19 we're climbing to past 1000, 1500 we'll clear and get out of your way." The helicopter continued eastbound to the east end of the airport before turning southbound and leaving the area.</p> <p>Radar data for this incident was obtained from the LAX-N ASR-9 sensor located on the north side of runway 24R. Review of the recorded information showed that the closest point of approach between the two aircraft occurred at approximately 1250:19 when they were separated by 750 feet laterally and 100-200 feet vertically. Graphics of the radar tracks for Mercury 19 and SWA1390 have been placed in the docket.</p> <p>Personnel Interviews</p> <p>The controller assigned to the Helicopter Control (HC) position responsible for handling Mercury 19 entered on duty with the FAA in May 2007 at LAX. He completed training in August 2008. Before coming to the FAA, he was a tower controller with four years experience in the United States Air Force.</p> <p>The HC position was responsible for controlling VFR helicopters and fixed wing aircraft passing through the class B airspace around LAX. According to the HC controller, the area around the airport was clear except for some low fog and haze along the beach to the west. When the pilot asked to turn toward the west side of the airport, the helicopter was still in Santa Monica tower's airspace so the HC controller could not immediately approve the turn. Once the helicopter cleared Santa Monica's airspace, the HC controller approved the turn and issued the pilot clearance into the LAX class B airspace. The HC controller stated that he expected the pilot to turn toward Marina Del Rey and enter the Shoreline route from there. However, the pilot did not do so, instead turning toward the departure end of runway 24L/24R. As Mercury Air 19 approached the airport, the HC controller walked to the northwest corner of the tower to visually monitor the progress of the helicopter. He saw SWA1390 take off and observed the helicopter nearby at 1000 feet. Based on his observations, the HC controller stated that the separation between the helicopter and SWA1390 appeared to be acceptable, and that he never saw SWA1390 turning or making other maneuvers besides taking off. When the helicopter pilot stated that he was turning toward the north to clear the area, the HC controller returned to his normal location in the tower and began doing coordination with the LC1 and LC2 controllers for the helicopter to proceed south across the airport via the Sepulveda route.</p> <p>When handling Class B transitions, the HC controller stated that the facility practice was to radar identify aircraft operating above 1000 feet. This did not include helicopters proceeding via the Shoreline route because they descend too low to reliably track with radar. He did not follow the full radar identification procedure with Mercury 19, only instructing the pilot to identify rather than issuing aircraft position and advising the pilot of radar contact.</p> <p>Asked if he would handle the situation differently now, the HC controller stated that he would possibly instruct the pilot to report over the Marina before issuing class B clearance, or offer the Sepulveda transition at 1500 feet. He stated that the pilot of Mercury 19 sounded confident and knowledgeable, which made him think that the pilot was familiar with the Shoreline route. The HC controller also noted that the pilot's report of "...departure traffic in sight" was somewhat ambiguous because there was more than one departing aircraft at the time, and he could have clarified what the pilot was looking at.</p>			

FACTUAL REPORT - AVIATION

Page 1a



National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: OPS10IA538B	Page 1c
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
Narrative (Continued)		
<p>the helicopter pilots in the area are familiar with the operation, and most pilots who ask for the Shoreline route are already on or near it. Overflights entering the airspace at 1500 feet as Mercy 19 did usually continued at 1500 feet along the Sepulveda transition.</p> <p>Asked about the applicability of simulation to taxi operations, the supervisor noted that simulation capabilities are available in a tower simulator at the regional office, but that simulation has its pluses and minuses. It is sometimes difficult to train on unusual situations.</p> <p>When the supervisor reviewed the radar replay of the situation, he found the separation between the aircraft to be approximately .13 nautical miles and 100 feet. The lateral separation exceeded the 500 foot standard usually applied for near midair collisions. However, when the Southwest pilot called the tower back, the supervisor asked the LC2 controller to determine if the pilot wished to file a near midair collision report. The controller may not have heard the request and did not do so. The SWA pilot did not report receiving a warning from the aircraft's anti-collision system resulting from the incident.</p> <p>Updated on Dec 19 2011 9:20AM</p>		

National Transportation Safety Board FACTUAL REPORT AVIATION	NTSB ID: OPS10IA538B	Page 1b
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
Narrative (Continued)		
<p>The local controller responsible for SWA1390 (LC2) first became aware of the incident when SWA1390 called him on the radio from about 1 1/2 miles offshore, after having been off the right side of his control. The pilot asked questions about a helicopter that had been off the right side of his aircraft during departure. The LC2 controller stated that he did not see the helicopter at any time during the incident, or later when it flew by the tower. The radio call from SWA1390 was the first time he became aware that anything had happened. He responded to the pilot's question by stating that the helicopter must have just entered the airspace. He checked with the Local Asst controller to see if he knew anything about the helicopter, and also asked the Local Asst controller about it. The helicopter controller stated that he was in communication with the helicopter, and the LC2 controller noted that the supervisor was talking to the helicopter controller.</p> <p>The LC2 controller stated that his normal procedure when clearing an aircraft for takeoff was to scan the runway, the ground radar, and the departure route right off the end of the runway. Aircraft on the Shoreline route were typically restricted to operate at or below 150 feet.</p> <p>The LC2 controller noted that if he had been handling Mercy 19, his expectation would have been that the pilot would turn straight to the beach, and then enter the class B airspace at or below 150 feet in the area of Marina del Rey. Asked how often he assigned specific headings to aircraft in the class B area, the LC2 controller responded, "not often." If an aircraft was not turning as directed, he might suggest a heading, and then if necessary, assign a specific heading.</p> <p>The supervisor on duty stated that when the incident occurred he was monitoring the local control 1 (LC1) position with a wireless headset. It was a normal day with no unusual circumstances except for a small fog bank just offshore. Asked if it was affecting the use of the Shoreline route, the supervisor replied, "I'm not sure I would've used [the route], but it was hard to tell exactly where the fog was," and noted that the Sepulveda transition would have been a viable alternative.</p> <p>The supervisor first found out about the incident when he received a phone call from the supervisor at Southern California TRACON stating that SWA1390 had reported "some kind of an issue with a helicopter." The supervisor spoke with the HC controller, who stated that the helicopter pilot had not followed instructions. The supervisor began collecting information including voice and radar recordings, and reviewed the incident with the HC controller after both of them had been relieved from their positions in the cab. Radar review showed that the helicopter had overflown both runways 24L and 24R. After discussing the sequence of events, the supervisor released the HC controller to go home. The supervisor then deferred further review of the incident to the operations manager and the air traffic manager. Based on the preliminary information available, the air traffic manager determined that there had been no loss of separation between Mercy Air 19 and SWA1390, but directed that the incident receive comprehensive review on Monday, September 6, the next business day. On September 7, the supervisor was notified via telephone that the incident had been classified as an operational error.</p> <p>The supervisor noted that the required coordination between the helicopter controller and the local control position had not occurred. He believed this was likely because the HC controller was waiting until the helicopter got closer to the Shoreline route entry point before engaging in the coordination. Asked how he would handle the situation himself if he had been working the helicopter position, the supervisor stated that he would have either turned Mercy 19 hard right toward the beach or brought the helicopter over the airport at 1500 feet via the Sepulveda transition. Asked for some examples of phraseology he might use, the supervisor replied, "turn right proceed direct to the Shoreline, follow the Shoreline route southbound at or below 150 feet."</p> <p>The supervisor stated that, in his opinion, the coordination between the helicopter position and the local control position should have occurred sooner than it did because of the pilot's seeming confusion over what was expected. He noted that the HC controller generally does a very good job, but he is somewhat low on experience and may have been caught out by the unusual situation. 98% of</p>		



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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538B Occurrence Date: 09/04/2010 Occurrence Type: Incident																																																																																											
<b>First Pilot Information</b>																																																																																													
Name:	City:	State:	Date of Birth:																																																																																										
Age:																																																																																													
Sex:	Seat Occupied:	Occupational Pilot?	Certificate Number:																																																																																										
Certificate(s):																																																																																													
Airplane Rating(s):																																																																																													
Rotorcraft/Glider/LTA:																																																																																													
Instrument Rating(s):																																																																																													
Instructor Rating(s):																																																																																													
Current Biennial Flight Review?																																																																																													
Medical Cert.:	Medical Cert. Status:	Date of Last Medical Exam:																																																																																											
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Destination	State	CA	Airport Identifier																																																																																										
Palomar	CA	CRQ																																																																																											
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FACTUAL REPORT - AVIATION																																																																																													


Page 3

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538B Occurrence Date: 09/04/2010 Occurrence Type: Incident	
<b>Landing Facility/Approach Information</b>			
Airport Name	Airport ID:	Airport Elevation Ft. MSL	Runway Used
Runway Surface Type:			Runway Length
Runway Surface Condition:			Runway Width
Approach/Arrival Flow:			
VFR Approach/Landing:			
<b>Aircraft Information</b>			
Aircraft Manufacturer	Model/Series	Serial Number	
BELL	222U	47547	
Airworthiness Certificate(s): Normal			
<b>Landing Gear Type: Tricycle</b>			
Amateur Built A/C? No	Number of Seats: 10	Certified Max Gross Wt.	Number of Engines: 2
Engine Type	Engine Manufacturer:	Model/Series	Rated Power:
Turbo Shaft	LYCOMING	LTS 101 600A	552 HP
- Aircraft Inspection Information			
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection	Airframe Total Time Hours
- Emergency Locator Transmitter (ELT) Information			
ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?	
<b>Owner/Operator Information</b>			
Registered Aircraft Owner	Street Address		
WELLS FARGO BANK NORTHWEST NA TRUSTEE	299 S MAIN ST MAC U1228-120		
	City	SALT LAKE CITY	State UT
Operator of Aircraft	Street Address		
	299 S MAIN ST MAC U1228-120		
	City	SALT LAKE CITY	State UT
Operator Does Business As:	Operator Designator Code: QMLA		
- Type of U.S. Certificate(s) Held:			
Air Carrier Operating Certificate(s): On-demand Air Taxi			
Operating Certificate:			
Operator Certificate:			
Regulation Flight Conducted Under: Part 91: General Aviation			
Type of Flight Operation Conducted: Positioning			
FACTUAL REPORT - AVIATION			

Page 2

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: OPS10/A538B	
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
Administrative Information Investigator-In-Charge (IC) Scott J. Dunham		
Additional Persons Participating in This Accident/Incident Investigation:		
<div style="text-align: right;">Page 5</div>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION	NTSB ID: OPS10/A538B																																																																															
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	Occurrence Type: Incident																																																																															
Weather Information WOF ID    Observation Time    Time Zone    WOF Elevation    WOF Distance From Accident Site    Direction From Accident Site kfax: 1953    PDT    10 FL MSL    0 NM    0 Deg. Mag. Sky/Lowest Cloud Condition: Few    200 FL AGL    Condition of Light: Day Lowest Ceiling:    FL AGL    Visibility: 7    SM    Allimeter: 29.88    "Hg Temperature: 21 °C    Dew Point: 13 °C    Weather Conditions at Accident Site: Visual Conditions Wind Direction: 270    Wind Speed: 9    Wind Gusts: Visibility (RVB): FL    Visibility (RVV)    SM Precip and/or Obscuration:																																																																																
Accident Information Aircraft Damage: None    Aircraft Fier: None    Aircraft Explosion: None																																																																																
- Injury Summary Matrix <table border="1"> <thead> <tr> <th></th> <th>Fatal</th> <th>Serious</th> <th>Minor</th> <th>None</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>First Pilot</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>Second Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Student Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Check Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Engineer</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cabin Attendants</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Other Crew</td> <td></td> <td></td> <td></td> <td>3</td> <td>3</td> </tr> <tr> <td>Passengers</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>- TOTAL ABOARD -</td> <td></td> <td></td> <td></td> <td>4</td> <td>4</td> </tr> <tr> <td>Other Ground</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>- GRAND TOTAL -</td> <td></td> <td></td> <td></td> <td>4</td> <td>4</td> </tr> </tbody> </table>				Fatal	Serious	Minor	None	TOTAL	First Pilot				1	1	Second Pilot						Student Pilot						Flight Instructor						Check Pilot						Flight Engineer						Cabin Attendants						Other Crew				3	3	Passengers						- TOTAL ABOARD -				4	4	Other Ground						- GRAND TOTAL -				4	4
	Fatal	Serious	Minor	None	TOTAL																																																																											
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<div style="text-align: right;">Page 4</div>																																																																																

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538A		Aircraft Registration Number: N907WN	
Occurrence Date: 09/04/2010		Most Critical Injury: None			
Occurrence Type: Incident		Investigated By: NTSB			
Location/Time					
Nearest City/Place Los Angeles	State CA	Zip Code	Local Time 1950	Time Zone UTC	
Airport Proximity: Distance From Landing Facility:					
Aircraft Information Summary					
Aircraft Manufacturer BOEING		Model/Series 737-7H4		Type of Aircraft Airplane	
Revenue Sightseeing Flight: No					
Air Medical Transport Flight: No					
Narrative					
Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:					
History of Flight					
<p>Immediately before the incident, SWA1390 was preparing to depart LAX for a flight to Las Vegas, Nevada, and was in communication with the Local Control 2 (LC2) controller at LAX. The pilot was instructed to taxi into position and hold on runway 24L at 1245:41. SWA1390 was cleared for takeoff at 1249:42. At 1250:24, the LC2 controller instructed SWA1390 to contact Social departure and the pilot acknowledged. At 1251:28, SWA1390 returned to the LC2 frequency, asking the LC2 controller, "... are you guys talking to the helicopter that was off the right-hand side when we departed?" The LC2 controller replied, "SWA1390 he had just come on frequency." The pilot continued, "... he was probably impinging on your airspace definitely passing through 1000 feet." The LC2 controller replied, "... actually he was south of the he was just south of the 25 left and they were talking to helicopters I'll let him know." There were no further communications with SWA1390.</p> <p>Mercy 19 departed the University of California Medical Center in Westwood at 1246, under visual flight rules. The helicopter traveled southbound past Santa Monica and LAX, and then continued south toward Rancho Palos Verdes, California. The route required the pilot to contact LAX ATIS for clearance through the class B airspace surrounding LAX. The pilot first contacted the LAX ATIS helicopter position (HC) at 1248:36, reporting altitude 1,500 feet. Mercy 19 was about 3.7 miles northwest of the airport. The HC controller asked the pilot to "ident" (activate the identification feature of his transponder) and state his request. The pilot replied, "... just Shoreline and then we're going southeastbound toward San Diego." At 1248:54, the HC controller asked, "...would you like to go to the Shoreline or you can stay at 1,500 and transition over the airport midfield." The pilot replied, "We just couldn't get down to your 125 that's why we are this way but if you could turn me [toward] the Shoreline as soon as able that would be great." The controller then instructed the pilot to continue southeastbound on his present heading and expect a turn in about one mile. At 1249:21, the HC controller stated, "Mercy Air 19 you can start the right turn now to the Shoreline at your discretion at this point." The pilot responded, "... appreciate that sir and we have your takeoff traffic visual separation."</p> <p>At 1249:42, the HC controller transmitted, "Mercy Air 19 cleared through the class bravo airspace via the Shoreline route south and at the Shoreline at or below 150 feet please." The pilot asked, "... Mercy air 19 you want us to drop down now or wait until your departure end?" The HC controller replied, "You can start now or wait but we'll need you at 150 by the time you're crossing past our departure corridor." At 1250:03, the pilot transmitted, "Starting down out of one-five for - say altitude again you want me down to 500?" The controller responded, "at or below 150 feet Mercy air 19." At 1250:13, the pilot transmitted "Roger that we have your takeoff traffic do you want us to hold this way or do you want me down now?" At 1250:18, the controller instructed the pilot to, "... start descending now and if you are not able to make the altitude then stay north of the airport until you can." At 1250:24, the pilot replied, "Okay Mercy air 19 we're starting down</p>					

National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538A	
Occurrence Date: 09/04/2010			
Occurrence Type: Incident			
Narrative (Continued)			
<p>now." At 1250:30, the pilot transmitted, "yeah we got a 737 coming over too so we're going to move." At 1250:40, the pilot continued, "Mercy air 19 we would like to clear to the north and then come around the airport so as to go through the traffic area." The controller replied, "Mercy air 19 that's approved and like I said you can stay at the same altitude and transition over the middle of the airport at 1500 or if you want to stay at the Shoreline that it will be at it will have to be at or below 150 feet cause you're going to go below all departures." At 1250:58, the pilot replied, "okay Mercy air 19 we're climbing to past 1000, 1500 we'll clear and get out of your way." The helicopter continued eastbound to the east end of the airport before turning southbound and leaving the area.</p> <p>Radar data for this incident was obtained from the LAX-N ASR-9 sensor located on the north side of runway 24R. Review of the recorded information showed that the closest point of approach between the two aircraft occurred at approximately 1250:39 when they were separated by 750 feet laterally and 100-200 feet vertically. Graphics of the radar tracks for Mercy 19 and SWA1390 have been placed in the docket.</p> <p>Personeel Interview</p> <p>The controller assigned to the Helicopter Control (HC) position responsible for handling Mercy 19 entered on duty with the FAA in May 2007 at LAX. He completed training in August 2008. Before coming to the FAA, he was a tower controller with four years experience in the United States Air Force.</p> <p>The HC position was responsible for controlling VFR helicopters and fixed wing aircraft passing through the class B airspace around LAX. According to the HC controller, the area around the airport was clear except for some low fog and haze along the beach to the west. When the pilot asked to turn toward the west side of the airport, the helicopter was still in Santa Monica tower's airspace so the HC controller could not immediately approve the turn. Once the helicopter cleared Santa Monica's airspace, the HC controller approved the turn and issued the pilot clearance into the LAX class B airspace. The HC controller stated that he expected the pilot to turn toward Marina Del Rey and enter the Shoreline route from there. However, the pilot did not do so, instead turning toward the departure end of runway 24L/24R. As Mercy Air 19 approached the airport, the HC controller walked to the northwest corner of the tower to visually monitor the progress of the helicopter. He saw SWA1390 take off and observed the helicopter nearby at 1000 feet. Based on his observations, the HC controller stated that the separation between the helicopter and SWA1390 appeared to be acceptable, and that he never saw SWA1390 turning or making other maneuvers besides taking off. When the helicopter pilot stated that he was turning toward the north to clear the area, the HC controller returned to his normal location in the tower and began doing coordination with the ICI and LC2 controllers for the helicopter to proceed south across the airport via the Sepulveda route.</p> <p>When handling Class B transitions, the HC controller stated that the facility practice was to radar identify aircraft operating above 1000 feet. This did not include helicopters proceeding via the Shoreline route because they descend too low to reliably track with radar. He did not follow the full radar identification procedure with Mercy 19, only instructing the pilot to ident rather than issuing aircraft position and advising the pilot of radar contact.</p> <p>Asked if he would handle the situation differently now, the HC controller stated that he would possibly instruct the pilot to report over the Marina before issuing class B clearance, or offer the Sepulveda transition at 1500 feet. He stated that the pilot of Mercy 19 sounded confident and knowledgeable, which made him think that the pilot was familiar with the Shoreline route. The HC controller also noted that the pilot's report of "... departure traffic in sight" was somewhat ambiguous because there was more than one departing aircraft at the time, and he could have clarified what the pilot was looking at.</p>			

National Transportation Safety Board FACTUAL REPORT AVIATION SMALL AIRCRAFT	NTSB ID: OPS10/A538A	
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
Narrative (Continued)		
<p>the helicopter pilots in the area are familiar with the operation, and most pilots who ask for the Shoreline route are already on or near it. Overflights entering the airspace at 1500 feet as Mercy 19 did usually continued at 1500 feet along the Sepulveda transition.</p> <p>Asked about the applicability of simulation to LAX operations, the supervisor noted that simulation capabilities are available in a tower simulator at the regional office, but that simulation has its pluses and minuses. It is sometimes difficult to train on unusual situations.</p> <p>When the supervisor reviewed the radar replay of the situation, he found the separation between the aircraft to be approximately 113 nautical miles and 100 feet. The lateral separation exceeded the 500 foot standard usually applied for near midair collisions. However, when the Southwest pilot called the tower back, the supervisor asked the LC2 controller to determine if the pilot wished to file a near midair collision report. The controller may not have heard the request and did not do so. The SMA pilot did not report receiving a warning from the aircraft's anti-collision system resulting from the incident.</p> <p>Updated on Dec 19 2011 9:20AM</p>		
FACTUAL REPORT - AVIATION		Page 1c

National Transportation Safety Board FACTUAL REPORT AVIATION SMALL AIRCRAFT	NTSB ID: OPS10/A538A	
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
Narrative (Continued)		
<p>The local controller responsible for SWA1390 (LC2) first became aware of the incident when SWA1390 called him on the radio from about 1 1/2 miles offshore, after having been transferred to departure control. The pilot asked questions about a helicopter that had been off the right side of his aircraft during the incident. The LC2 controller stated that he did not see the helicopter at any time during the incident, or later when it flew by the tower. The radio call from SWA1390 was the first time he became aware that anything had happened. He responded to the pilot's question by stating that the helicopter must have just entered the airspace. He checked with the Local Assistant controller to see if he knew anything about the helicopter, and also asked the helicopter controller about it. The helicopter controller stated that he was in communication with the helicopter, and the LC2 controller noted that the supervisor was talking to the helicopter controller.</p> <p>The LC2 controller stated that his normal procedure when clearing an aircraft for takeoff was to scan the runway, the ground radar, and the departure route right off the end of the runway. Aircraft on the Shoreline route were typically restricted to operate at or below 150 feet.</p> <p>The LC2 controller noted that if he had been handling Mercy 19, his expectation would have been that the pilot would turn straight to the beach, and then enter the class B airspace at or below 150 feet in the area of Marina del Rey. Asked how often he assigned specific headings to aircraft in the class B area, the LC2 controller responded, "not often." If an aircraft was not turning as directed, he might suggest a heading, and then if necessary, assign a specific heading.</p> <p>The supervisor on duty stated that when the incident occurred he was monitoring the local control 1 (LC1) position with a wireless headset. It was a normal day with no unusual circumstances except for a small fog bank just offshore. Asked if it was affecting the use of the Shoreline route, the supervisor replied, "I'm not sure I would've used [the route], but it was hard to tell exactly where the fog was," and noted that the Sepulveda transition would have been a viable alternative.</p> <p>The supervisor first found out about the incident when he received a phone call from the supervisor at Southern California TRACON stating that SWA1390 had reported "some kind of an issue with a helicopter." The supervisor spoke with the RC controller, who stated that the helicopter pilot had not followed instructions. The supervisor began collecting information including voice and radar recordings, and reviewed the incident with the RC controller after both of them had been relieved from their positions in the cab. Radar review showed that the helicopter had overflown both runways 24L and 24R. After discussing the sequence of events, the supervisor released the RC controller to go home. The supervisor then deferred further review of the incident to the operations manager and the air traffic manager. Based on the preliminary information available, the air traffic manager determined that there had been no loss of separation between Mercy Air 19 and SWA1390, but directed that the incident receive comprehensive review on Monday, September 6, the next business day. On September 7, the supervisor was notified via telephone that the incident had been classified as an operational error.</p> <p>The supervisor noted that the required coordination between the helicopter controller and the local control position had not occurred. He believed this was likely because the RC controller was waiting until the helicopter got closer to the Shoreline route entry point before engaging in the coordination. Asked how he would handle the situation himself if he had been working the helicopter position, the supervisor stated that he would have either turned Mercy 19 hard right toward the beach or brought the helicopter over the airport at 1500 feet via the Sepulveda transition. Asked for some examples of phraseology he might use, the supervisor replied, "turn right proceed direct to the Shoreline, follow the Shoreline route southbound at or below 150 feet."</p> <p>The supervisor stated that, in his opinion, the coordination between the helicopter position and the local control position should have occurred sooner than it did because of the pilot's seeming confusion over what was expected. He noted that the RC controller generally does a very good job, but he is somewhat low on experience and may have been caught out by the unusual situation. 98% of</p>		
FACTUAL REPORT - AVIATION		Page 1b

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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538A Occurrence Date: 09/04/2010 Occurrence Type: Incident																																																																																																				
First Pilot Information																																																																																																						
Name	City	State	Date of Birth																																																																																																			
Sex	Seat Occupied:	Occupational Pilot?	Certificate Number:																																																																																																			
Certificate(s):																																																																																																						
Airplane Rating(s):																																																																																																						
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Las Vegas	NV	LAS	PDT																																																																																																			
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FACTUAL REPORT - AVIATION


Page 2


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National Transportation Safety Board <b>FACTUAL REPORT</b> AVIATION		NTSB ID: OPS10IA538A Occurrence Date: 09/04/2010 Occurrence Type: Incident	
Landing Facility/Approach Information			
Airport Name	Airport ID:	Airport Elevation FL MSL	Runway Used
Runway Surface Type:			Runway Length
Runway Surface Condition:			Runway Width
Approach/Arrival Flow:			
VFR Approach/Landing:			
Aircraft Information			
Aircraft Manufacturer BOEING	Model/Serial 737-7H4	Serial Number 36619	
Airworthiness Certificate(s): Transport			
Landing Gear Type: Tricycle			
Amateur Built Act? No	Number of Seats: 140	Certified Max Gross Wt.	Number of Engines: 2
Engine Type: Turbo Fan	Engine Manufacturer: CFM INTL	Model/Serial: CFM56-7B24	Rated Power: 24200 LBS
- Aircraft Inspection Information			
Type of Last Inspection	Date of Last Inspection	Time Since Last Inspection Hours	Airframe Total Time Hours
- Emergency Locator Transmitter (ELT) Information			
ELT Installed?/Type	ELT Operated?	ELT Aided in Locating Accident Site?	
Owner/Operator Information			
Registered Aircraft Owner SOUTHWEST AIRLINES CO	Street Address PO BOX 36611	City DALLAS	State TX
Operator of Aircraft	Street Address	City	State TX
Operator Does Business As:	Operator Designator Code: SWAA		
- Type of U.S. Certificate(s) Held: Air Carrier Operating Certificate(s); Flag Carrier/Domestic			
Operating Certificate:			
Regulation Flight Conducted Under: Part 121; Air Carrier			
Type of Flight Operation Conducted: Scheduled; Domestic; Passenger Only			

FACTUAL REPORT - AVIATION

Page 2

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: OPS10IA538A	
	Occurrence Date: 09/04/2010	
	Occurrence Type: Incident	
<b>Administrative Information</b> Investigator-in-Charge (IIC) Scott J. Dunham Additional Persons Participating in This Accident/Incident Investigation:		
<div style="text-align: center;"> <b>FACTUAL REPORT - AVIATION</b> </div>		

 National Transportation Safety Board <b>FACTUAL REPORT</b> <b>AVIATION</b>	NTSB ID: OPS10IA538A																																																																																		
	Occurrence Date: 09/04/2010																																																																																		
	Occurrence Type: Incident																																																																																		
<b>Weather Information</b> WOF ID:      Observation Time:      Time Zone:      WOF Elevation:      WOF Distance From Accident Site:      Direction From Accident Site: Kias: 1553      PDT      10 Ft. MSL      0 NM      0 Deg. Mag. Sky/Lowest Cloud Condition: Few      200 Ft. AGL      Condition of Light: Day Lowest Ceiling:      Ft. AGL      Visibility:      7      SM      Altimeter:      29.88      Hg Temperature:      21 °C      Dew Point:      13 °C      Weather Conditions at Accident Site: Visual Conditions Wind Direction: 270      Wind Speed: 9      Wind Gusts: Visibility (RVR):      FL      Visibility (RVV)      SM Predict and/or Obscuration:																																																																																			
<b>Accident Information</b> Aircraft Damage: None      Aircraft Fire: None      Aircraft Explosion: None																																																																																			
<table border="1"> <thead> <tr> <th>- Injury Summary Matrix</th> <th>Fatal</th> <th>Serious</th> <th>Minor</th> <th>None</th> <th>TOTAL</th> </tr> </thead> <tbody> <tr> <td>First Pilot</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>Second Pilot</td> <td></td> <td></td> <td></td> <td>1</td> <td>1</td> </tr> <tr> <td>Student Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Instructor</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Check Pilot</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Flight Engineer</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Cabin Attendants</td> <td></td> <td></td> <td></td> <td>3</td> <td>3</td> </tr> <tr> <td>Other Crew</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>Passenger</td> <td></td> <td></td> <td></td> <td>124</td> <td>124</td> </tr> <tr> <td>- TOTAL ABOARD -</td> <td></td> <td></td> <td></td> <td>129</td> <td>129</td> </tr> <tr> <td>Other Ground</td> <td></td> <td></td> <td></td> <td></td> <td></td> </tr> <tr> <td>- GRAND TOTAL -</td> <td></td> <td></td> <td></td> <td>129</td> <td>129</td> </tr> </tbody> </table>						- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL	First Pilot				1	1	Second Pilot				1	1	Student Pilot						Flight Instructor						Check Pilot						Flight Engineer						Cabin Attendants				3	3	Other Crew						Passenger				124	124	- TOTAL ABOARD -				129	129	Other Ground						- GRAND TOTAL -				129	129
- Injury Summary Matrix	Fatal	Serious	Minor	None	TOTAL																																																																														
First Pilot				1	1																																																																														
Second Pilot				1	1																																																																														
Student Pilot																																																																																			
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Check Pilot																																																																																			
Flight Engineer																																																																																			
Cabin Attendants				3	3																																																																														
Other Crew																																																																																			
Passenger				124	124																																																																														
- TOTAL ABOARD -				129	129																																																																														
Other Ground																																																																																			
- GRAND TOTAL -				129	129																																																																														
<div style="text-align: center;"> <b>FACTUAL REPORT - AVIATION</b> </div>																																																																																			



**National Transportation Safety Board  
Washington, DC 20594**

Printed on : 1/10/2012 5:10:31 PM

**Brief of Incident**

**Adopted 12/19/2011**

OPS10IA538B		09/04/2010	Los Angeles, CA	Aircraft Reg No. N222AM	Time (Local): 19:50 UTC
File No. 29193					
Make/Model: Bell / 222U					
Engine Make/Model: Lycoming / LTS 101 600A				Crew	Fatal
Aircraft Damage: None				Pass	Serious
Number of Engines: 2					Minor/None
Operating Certificate(s): On-demand Air Taxi					
Type of Flight Operation: Positioning: Air Medical (Unspecified)					
Reg. Flight Conducted Under: Part 91: General Aviation					
Last Depart. Point: Westwood, CA				Condition of Light: Day	
Destination: Palomar, CA				Weather Info Src: Weather Observation Facility	
Airport Proximity:				Basic Weather: Visual Conditions	
Airport Name: Unk/Nr				Lowest Ceiling:	
Runway Identification: Unk/Nr				Visibility: 7.00 SM	
Runway Length/Width (Ft): Unk/Nr				Wind Dir/Speed: 270 / 009 Kts	
Runway Surface:				Temperature (°C): 21	
Runway Surface Condition:				Precip/Obscuration:	
Pilot-in-Command		Age:		Flight Time (Hours)	
Certificate(s)/Rating(s)				Total All Aircraft: Unk/Nr	
				Last 90 Days: Unk/Nr	
				Total Make/Model: Unk/Nr	
Instrument Ratings				Total Instrument Time: Unk/Nr	

A departing Boeing 737-700 passed within 750 feet laterally and 200 feet vertically of a helicopter operating under visual flight rules. Both aircraft were receiving air traffic control services from the airport's air traffic control tower and were operating in Class B airspace. Postincident investigation determined that the controller handling the helicopter did not exercise positive control of the situation by issuing clear and timely control instructions and that the helicopter pilot did not react quickly to instructions issued by the controller.

Updated at Dec 19 2011 9:20AM

**Brief of Incident (Continued)**

OPS10IA538B		09/04/2010	Los Angeles, CA	Aircraft Reg No. N222AM	Time (Local): 19:50 UTC
File No. 29193					
<b>OCCURRENCES</b>					
Enroute-cruise - Air traffic event					
<b>FINDINGS</b>					
Personnel issues-Action/decision-Action-Delayed action-Pilot - F					
Personnel issues-Action/decision-Action-Incorrect action performance-ATC personnel - C					
Personnel issues-Action/decision-Action-Delayed action-ATC personnel - C					
Findings Legend: (C) = Cause, (F) = Factor					

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
Failure of the air traffic controller to exercise positive control of the situation by issuing clear and timely control instructions to the helicopter pilot. Contributing to the incident was delay by the helicopter pilot in responding to instructions issued by the controller.



## Brief of Incident

Adopted 12/19/2011

OPS10IA536A File No. 29193	09/04/2010	Los Angeles, CA	Aircraft Reg No. N907WN	Time (Local): 19:50 UTC
Make/Model: Boeing / 737-7H4	Engine Make/Model: Cfm Intl / CFM56-7B24	Aircraft Damage: None	Number of Engines: 2	Operating Certificate(s): Flag Carrier/Domestic
Type of Flight Operation: Scheduled; Domestic; Passenger Only	Reg. Flight Conducted Under: Part 121: Air Carrier	Crew Pass	Fatal 0 Serious 0 Minor/None 5 124	
Last Depart. Point: Same as Accident/Incident Location	Destination: Las Vegas, NV	Condition of Light: Day	Weather Info Src: Weather Observation Facility	
Airport Proximity: Unk/Nr	Airport Name: Unk/Nr	Basic Weather: Visual Conditions	Lowest Ceiling: 7.00 SM	
Runway Identification: Unk/Nr	Runway Length/Width (Ft): Unk/Nr	Wind Dir/Speed: 270 / 009 Kts	Temperature (°C): 21	
Runway Surface: Unk/Nr	Runway Surface Condition: Unk/Nr	Precip/Obscuration: Unk/Nr		
Pilot-in-Command	Age:	Flight Time (Hours)	Total All Aircraft: Unk/Nr	
Certificate(s)/Rating(s)			Last 90 Days: Unk/Nr	
Instrument Ratings			Total Make/Model: Unk/Nr	
			Total Instrument Time: Unk/Nr	

A departing Boeing 737-700 passed within 750 feet laterally and 200 feet vertically of a helicopter operating under visual flight rules. Both aircraft were receiving air traffic control services from the airport's air traffic control tower and were operating in Class B airspace. Postincident investigation determined that the controller handling the helicopter did not exercise positive control of the situation by issuing clear and timely control instructions and that the helicopter pilot did not react quickly to instructions issued by the controller.

Updated at Dec 19 2011 9:20AM

## Brief of Incident (Continued)

OPS10IA538A File No. 29193	09/04/2010	Los Angeles, CA	Aircraft Reg No. N907WN	Time (Local): 19:50 UTC
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## OCCURRENCES

Initial climb - Air traffic event

## FINDINGS

Personnel issues-Action/decision-Action-Delayed action-Pilot of other aircraft - F  
Personnel issues-Action/decision-Action-Incorrect action performance-ATC personnel - C  
Personnel issues-Action/decision-Action-Delayed action-ATC personnel - C

Findings Legend: (C) = Cause, (F) = Factor

The National Transportation Safety Board determines the probable cause(s) of this incident as follows.  
Failure of the air traffic controller to exercise positive control of the situation by issuing clear and timely control instructions to the helicopter pilot. Contributing to the incident was delay by the helicopter pilot in responding to instructions issued by the controller.

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National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION 11/19/2010		NTSB ID: WPR11LA042		Occurrence Date: 11/08/2010		Occurrence Type: Accident	
Other Aircraft Involved		Aircraft Manufacturer		Model/Series Number			
Registration Number							
Accident Information		Aircraft Damage: Substantial		Accident Occurred During:			
Crew		Name		Certificate No.		Injury	
Pilot		On File		On File		None	
2		On File		On File		None	
3							
4							
5							
6							
Operator Information		Name		Operator Designator Code		Doing Business As	
HORIZON AIR INDUSTRIES INC		QXEA					
Street Address		City		State		Zip Code	
PO BOX 68977		SEATTLE		WA		98188	
-Type of 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 Operations Conducted:		Scheduled; Domestic; Passenger Only					
Flight Plan/Itinerary							
Type of Flight Plan Filed: IFR							
Last Departure Point		State		Airport Identifier			
Redding		CA		RDD			
Destination		State		Airport Identifier			
Same as Accident/Incident Location		LAX					
Weather Information							
Investigator's Source: Company		Facility ID: LAX		Observation Time (Local): 1353			
Sky/Lowest Cloud Condition: Scattered		10000 Ft. AGL					
Lowest Ceiling: None		Ft. AGL		Visibility: 10 SM		Altitude: 29.97 Hg	
PRELIMINARY INFORMATION - SUBJECT TO CHANGE							

Page 2

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National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION 11/19/2010		NTSB ID: WPR11LA042		Most Critical Injury: None	
Occurrence Date: 11/08/2010		Investigated By: NTSB			
Occurrence Type: Accident					
Location/Time		State		Time Zone	
Nearest City/Place Los Angeles		CA		PST	
Zip Code		90031		Local Time	
				1407	
Aircraft Information		Aircraft Manufacturer		Model/Series Number	
Registration Number N422QX		BOMBARDIER INC		DHC-8-402	
Type of Aircraft: Airplane		Amateur Built Aircraft? No			
Injury Summary:		Fatal		Minor	
Revenue Sightseeing Flight: No		Air Medical Transport Flight: No		None	
Narrative				77	
<p>Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:</p> <p>On November 8, 2010, at 1407 Pacific standard time (PST), Horizon Airlines flight 2306, a Bombardier DHC-8-402, N422QX, encountered a bird strike near Los Angeles, California. Horizon Air Industries, Inc., was operating the airplane as a scheduled domestic passenger flight under the provisions of 14 Code of Federal Regulations (CFR) Part 121. The certificated airline transport pilot captain, first officer, 2 flight attendants, and 73 passengers were not injured. The flight departed Redding (RDD), California, about 1247, as a non-stop to Los Angeles (LAX). Visual meteorological (VWC) conditions prevailed, and an instrument flight rules (IFR) flight plan had been filed.</p> <p>The captain reported that at about 6,600 feet msl and an airspeed of about 220 knots while on the downwind for landing at LAX, they encountered a bird strike to the right wing leading edge.</p> <p>The crew declared an emergency and made an uneventful landing and taxied to the passenger terminal. An examination of the damage revealed a 12-inch hole in the leading edge, and internal structural damage to the right wing. The damage area was covered in blood and what appeared to be bird remains.</p> <p>Samples of the remains were recovered and are being sent to the Smithsonian Institution, Feather Identification Lab, in Washington, DC, to determine the species of the bird.</p> <p>Updated on Nov 19 2010 2:39PM</p>					
PRELIMINARY INFORMATION - SUBJECT TO CHANGE					

Page 1

Printed on : 1/10/2012 5:09:02 PM

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION NTSB ID: DCA11FA050		Most Critical Injury:	
Occurrence Date: 01/03/2011		Investigated By: NTSB	
Occurrence Type: Accident			
Location/Time			
Nearest City/Place Los Angeles		State CA	Zip Code 90045
		Local Time	Time Zone
Aircraft Information		Model/Serial Number 737/800	
Registration Number BOEING		Aircraft Manufacturer BOEING	
Type of Aircraft: Airplane		Amateur Built Aircraft?	
Injury Summary		Fatal	Minor
Revenue Flightseeing Flight: No		Air Medical Transport Flight: No	
Narrative			
<p>On January 3, 2011, a Boeing 737-800, experienced a tailstrike upon takeoff from Los Angeles International Airport (LAX), Los Angeles, California. The flight landed uneventfully at Lester Pearson International Airport (YYZ), Toronto, Canada, where damage to the tail skid was discovered. Further damage to the aft pressure bulkhead was later discovered qualifying as substantial damage to the airplane. No injuries occurred during the flight. The airplane was registered to and operated by American Airlines, Inc. under the provisions of 14 Code of Federal Regulations Part 121, as a passenger-carrying flight. The flight was operated on an instrument flight rules (IFR) flight plan.</p> <p>Updated on May 12 2011 9:46AM</p>			
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			
Page 1			

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION NTSB ID: WPR11LA042		Occurrence Date: 11/08/2010	
Occurrence Type: Accident			
Weather Information (Continued from page 2)			
Temperature: 19 °C	Dew Point: 7 °C	Wind Direction: 290	
Wind Speed: 11 Kts	Gusts: 19 Kts	Weather Conditions at Accident Site: Visual Conditions	
Administration Data			
Notification From WP Operations Center		Date	
FAA District Office/Coordinator Federal Aviation Administration Michael Levina		Investigator-In-Charge (IIC) Patrick H. Jones	
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			
Page 3			

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National Transportation Safety Board <b>PRELIMINARY REPORT</b> <small>TRANSPORTATION SAFETY BOARD AVIATION U.S. DEPARTMENT OF TRANSPORTATION</small>		NTSB ID: DCA11FA050 Occurrence Date: 01/03/2011 Occurrence Type: Accident	
(Continued from page 2)			
<b>Weather Information</b> Temperature: °C    Dew Point: °C    Wind Direction: Wind Speed: Kts.    Gusts: Kts.    Weather Conditions at Accident Site:			
<b>Administration Data</b> Notification From: American Airlines FAA District Office/Coordinator:		Investigator-In-Charge (IIC) Robert P. Benzon	
Date:			

Page 3

This space for testing

National Transportation Safety Board <b>PRELIMINARY REPORT</b> <small>TRANSPORTATION SAFETY BOARD AVIATION U.S. DEPARTMENT OF TRANSPORTATION</small>		NTSB ID: DCA11FA050 Occurrence Date: 01/03/2011 Occurrence Type: Accident	
Other Aircraft Involved Registration Number:    Aircraft Manufacturer:    Model/Serial Number:			
<b>Accident Information</b> Aircraft Damage: Substantial Accident Occurred During:			
Crew	Name	Certificate No.	Injury
Pilot			
2			
3			
4			
5			
6			
<b>Operator Information</b> Name: American Airlines    Operator Designator Code: AALA    Doing Business As:			
Street Address: 4333 Amon Carter Blvd. City: Fort Worth    State: TX    Zip Code: 76155			
-Type of Certificate(s) Held: Flag Carrier/Domestic			
Air Carrier Operating Certificate(s):			
Operating Certificate:		Operator Certificate:	
Regulation Flight Conducted Under: Part 121: Air Carrier			
Type of Flight Operations Conducted: Scheduled; International; Passenger Only			
<b>Flight Plan/Itinerary</b> Type of Flight Plan Filled: Unknown			
Last Departure Point: Los Angeles		State: CA	Airport Identifier: LAX
Destination: Toronto		State:	Airport Identifier: YYZ
<b>Weather Information</b> Investigator's Source:    Facility ID:    Observation Time (Local): Sky/Lowest Cloud Condition:    Ft. AGL    Ft. AGL Lowest Ceiling:    Visibility:    SM    Altimeter:    *Hg			
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			

Page 2

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION		NTSB ID: WPRI11LA300 Occurrence Date: 05/31/2011 Occurrence Type: Accident																													
Other Aircraft Involved Registration Number:      Aircraft Manufacturer:      Model/Serial Number:																															
Accident Information Aircraft Damage: None      Accident Occurred During:																															
<table border="1"> <thead> <tr> <th>Crew</th> <th>Name</th> <th>Certificate No.</th> <th>Injury</th> </tr> </thead> <tbody> <tr> <td>Pilot</td> <td></td> <td>On File</td> <td>None</td> </tr> <tr> <td>2</td> <td></td> <td>On File</td> <td>None</td> </tr> <tr> <td>3</td> <td></td> <td></td> <td></td> </tr> <tr> <td>4</td> <td></td> <td></td> <td></td> </tr> <tr> <td>5</td> <td></td> <td></td> <td></td> </tr> <tr> <td>6</td> <td></td> <td></td> <td></td> </tr> </tbody> </table>				Crew	Name	Certificate No.	Injury	Pilot		On File	None	2		On File	None	3				4				5				6			
Crew	Name	Certificate No.	Injury																												
Pilot		On File	None																												
2		On File	None																												
3																															
4																															
5																															
6																															
Operator Information Name: United Airlines      Operator Designator Code: LUAL      Doing Business As:																															
Street Address:		City: Elk Grove	State: IL      Zip Code: 60666																												
-Type of 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 Operations Conducted: Scheduled; Domestic; Passenger Only																															
Flight Plan/Itinerary																															
Type of Flight Plan Filed: IFR																															
Last Departure Point:		State:	Airport Identifier: LAX																												
Same as Accident/Incident Location																															
Destination: Chicago	State: IL	Airport Identifier: ORD																													
Weather Information																															
Investigator's Source: Company		Facility ID:	Observation Time (Local):																												
Sky/Lowest Cloud Condition: Clear		FL AGL:																													
Lowest Ceiling: None	FL AGL:	Visibility: 10 SM	Altimeter: "Hg																												
PRELIMINARY INFORMATION - SUBJECT TO CHANGE																															

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION		NTSB ID: WPRI11LA300 Occurrence Date: 05/31/2011 Occurrence Type: Accident		Most Critical Injury: Serious Investigated By: NTSB	
Location/Time Nearest City/Place: Los Angeles		State: CA	Zip Code: 90009	Local Time: 1215	Time Zone: PDT
Aircraft Information Registration Number: N528UA		Aircraft Manufacturer: BOEING		Model/Serial Number: 757-222	
Type of Aircraft: Airplane		Amateur Built Aircraft? No		None	
Injury Summary:		Fatal:	Serious:	Minor:	None: 190
Revenue Sighting Flight No:		Air Medical Transport Flight No:			
Narrative <p>             Brief narrative statement of facts, conditions and circumstances pertinent to the accident/incident:              On May 31, 2011, about 1215 Pacific daylight time, a Boeing 757-222, N528UA, operating as flight number 840, was being pushed back for takeoff when one of its nose wheel tires rolled over a ground crewmember's foot. The accident occurred at Los Angeles International Airport, Los Angeles, California, prior to the airplane's engines being started, and while the airplane was in the process of being disconnected from a tractor. The ground crewmember sustained a serious foot injury. The airplane's nose gear tire sustained minor damage, as did the tow bar. United Airlines was operating the domestic passenger flight from Los Angeles to Chicago, Illinois, under the provisions of 14 Code of Federal Regulations Part 121. There were 182 passengers on board, along with 6 cabin crewmembers and two airline transport certificated pilots.           </p> <p>             United Airlines personnel initially reported to the National Transportation Safety Board investigator that a preliminary examination of the ground crewmember's injury did not show evidence of a fractured bone. However, a subsequent more detailed examination was performed during which a fractured heel bone (calcaneal fracture) was found.           </p> <p>             Preliminary information reported by United Airlines indicates that the accident occurred as the airplane was being turned to a nose out position in the alley, adjacent to dispatch gate 70A. The tow bar's shear pins broke during the turn, and maintenance personnel arrived on scene to assist in removing the stuck tow bar. During this process, the airplane rolled forward, and it overran the tow bar and one of the assisting maintenance personnel's feet.           </p> <p>             Updated on Jul 7 2011 5:33PM           </p>					
PRELIMINARY INFORMATION - SUBJECT TO CHANGE					

File Again for clarity

National Transportation Safety Board <b>PRELIMINARY REPORT</b> AVIATION		NTSB ID: WPR11LA300 Occurrence Date: 05/31/2011 Occurrence Type: Accident	
(Continued from page 2)			
Weather Information		Dew Point: °C      Wind Direction: Wind Speed: Kts.      Gusts: Kts.      Weather Conditions at Accident Site: Visual Conditions	
Administration Data			
Notification From		Date	
United Airlines Flight Safety			
FAA District Office/Coordinator Federal Aviation Administration Richard Falcon		Investigator-In-Charge (IIC) Wayne R. Pollack	
PRELIMINARY INFORMATION - SUBJECT TO CHANGE			