



# **Oakland** International Airport

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A division of the Port of Oakland

## **Aircraft Over Flight and Noise Analysis**

### **Silverlock Neighborhood – Fremont, CA**

Prepared by

**Noise/Environmental Management Office  
Port of Oakland**

February 4, 2004

## **Aircraft Over Flight and Noise Analysis Silverlock Neighborhood – Fremont, CA**

Residents of the Silverlock Court neighborhood began registering their aircraft noise concerns with the airport during the fall of 2003. These residents expressed their belief that aircraft overflights and noise had increased dramatically over the past year or so. Some residents stated that there had not been aircraft overflights in the past. In response to these concerns, and to those of residents of other communities located southeast of Oakland International Airport, the Noise/Environmental Management Office performed a comprehensive aircraft over flight and noise study.

### **Aircraft Noise Terminology/Metrics**

Appendix A defines the aircraft noise terminology used in this report.

### **Community Location and Concerns**

The Silverlock Court neighborhood of Fremont is located approximately 13 miles southeast of Oakland International Airport. (See Figure 1.) This neighborhood lies generally below the straight-in final approach course for the main runway, Runway 29, at Oakland International Airport. This final approach course has been used since the runway opened in 1962.

### **Aircraft Flight Information**

Since Runway 29 is the primary commercial aircraft runway, mostly large turbojet aircraft are flown on the final approach flight path. The volume of aircraft arrivals has generally increased throughout the years as the demand for air transportation has increased with the exception of the economic downturn resulting from September 11th. Airport records show that the average daily total aircraft arrivals (both Runways 11 and 29) in November and December 2000 were 242 and 250, respectively. In November and December 2003, the average daily arrivals were 234 and 246, respectively.

Runway 29 is used for aircraft arrivals and departures when the Bay Area is being operated in the West Plan air traffic pattern. Air traffic patterns are a function of the wind conditions and the prevailing winds are blowing from the west and northwest in the Bay Area the majority of the time. The West Plan air traffic pattern is maintained by FAA Air Traffic Control about 90% of the time throughout the year; otherwise the Southeast Plan is in effect. When the Southeast Plan is in effect, Runway 11 is used and aircraft arrive from the north and northeast and depart to the south and southeast. Currently about 240 turbojet aircraft land on Runway 29 daily and about 40% of these aircraft fly in the vicinity (within one mile) of the Silverlock neighborhood.

**Fig. 1: Silverlock Neighborhood – Analysis Gate Location Map**

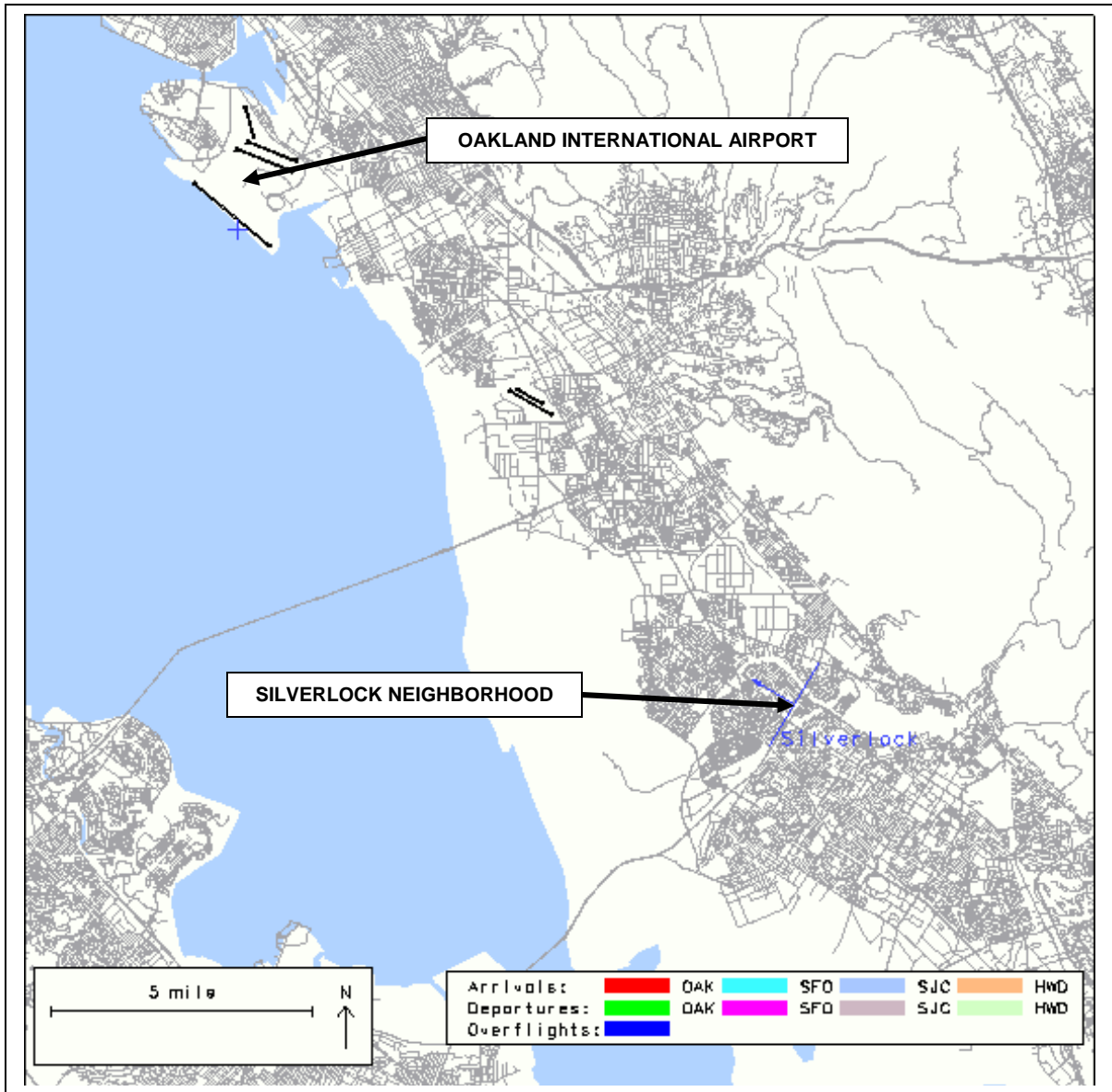
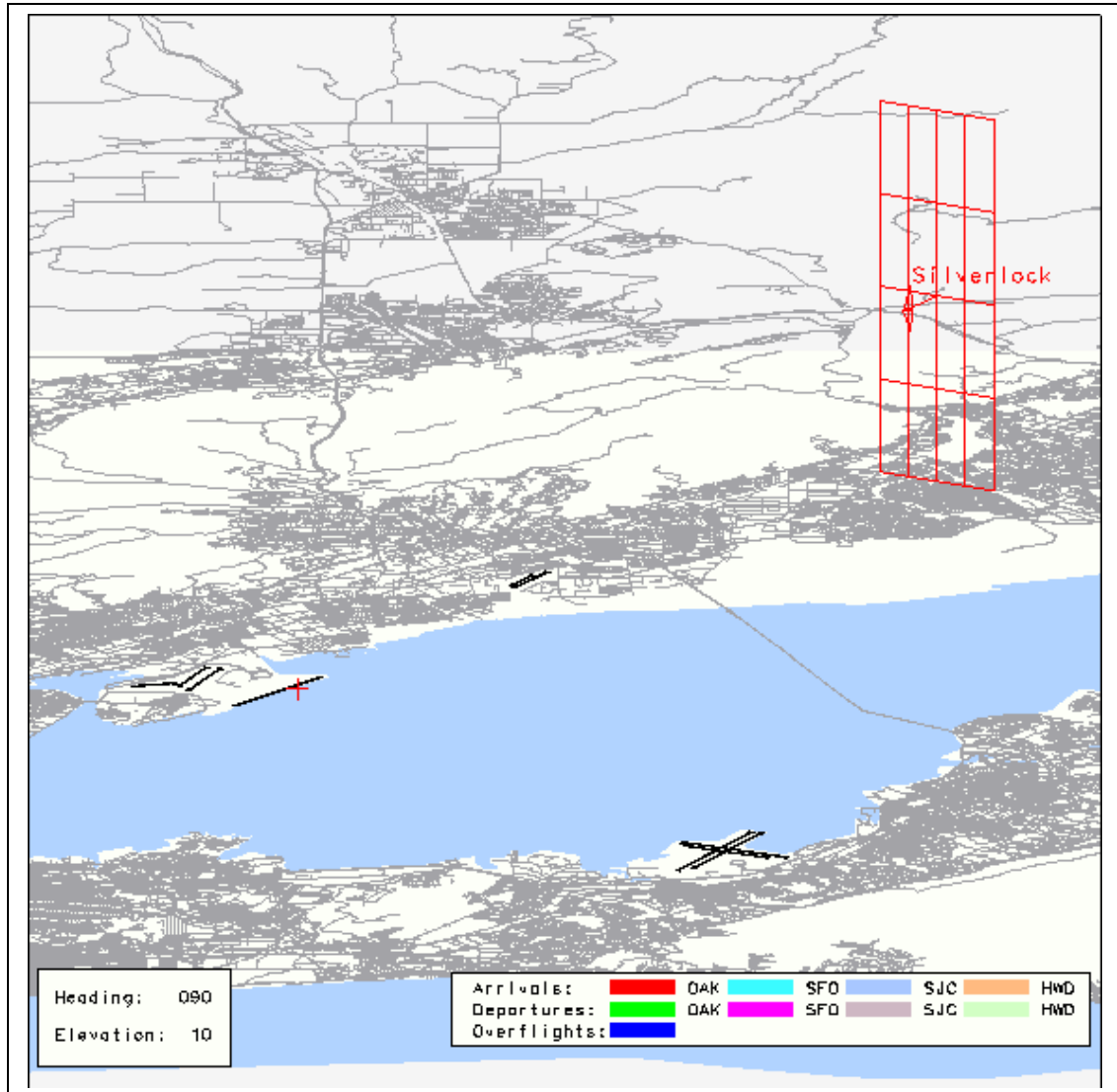


Fig. 2: Silverlock Analysis Gate – “Window-In-The-Sky”



The flight track maps provided in Figures 3a and 3b below present one-week of Runway 29 aircraft arrivals in a graphic form. Figure 3a presents flight tracks for all Runway 29 aircraft arrivals for the first week of August 2003 while Figure 3b presents flight tracks for Runway 29 aircraft arrivals that passed through the Silverlock analysis gate, over the Silverlock neighborhood. Figure 2 presents a three-dimensional graphic of the Silverlock analysis gate, which is two miles wide and 8,000 feet high. Figure 4 below presents a vertical plot of all aircraft that passed through the gate during the month of August 2003. The plot indicates that aircraft were clustered on the right side (northeast of Silverlock Court) and between 2,500 feet and 4,500 feet mean sea level.

## **Data Collection**

A permanent noise microphone (NMT #1) is located approximately four miles southeast of the airport, which is the closest permanent noise monitor to the Silverlock neighborhood. Since the neighborhood is about 13 miles away from the airport, a portable noise monitor was required. A Larson-Davis Type 870 portable noise monitor measured the noise environment at Silverlock Court for about three weeks. Based upon observations, a minimum threshold level for the neighborhood was established at 65 dBA with a minimum duration set at 5 seconds. That is, for a noise event to be recorded, it had to exceed the established threshold of 65 dBA for at least 5 seconds.

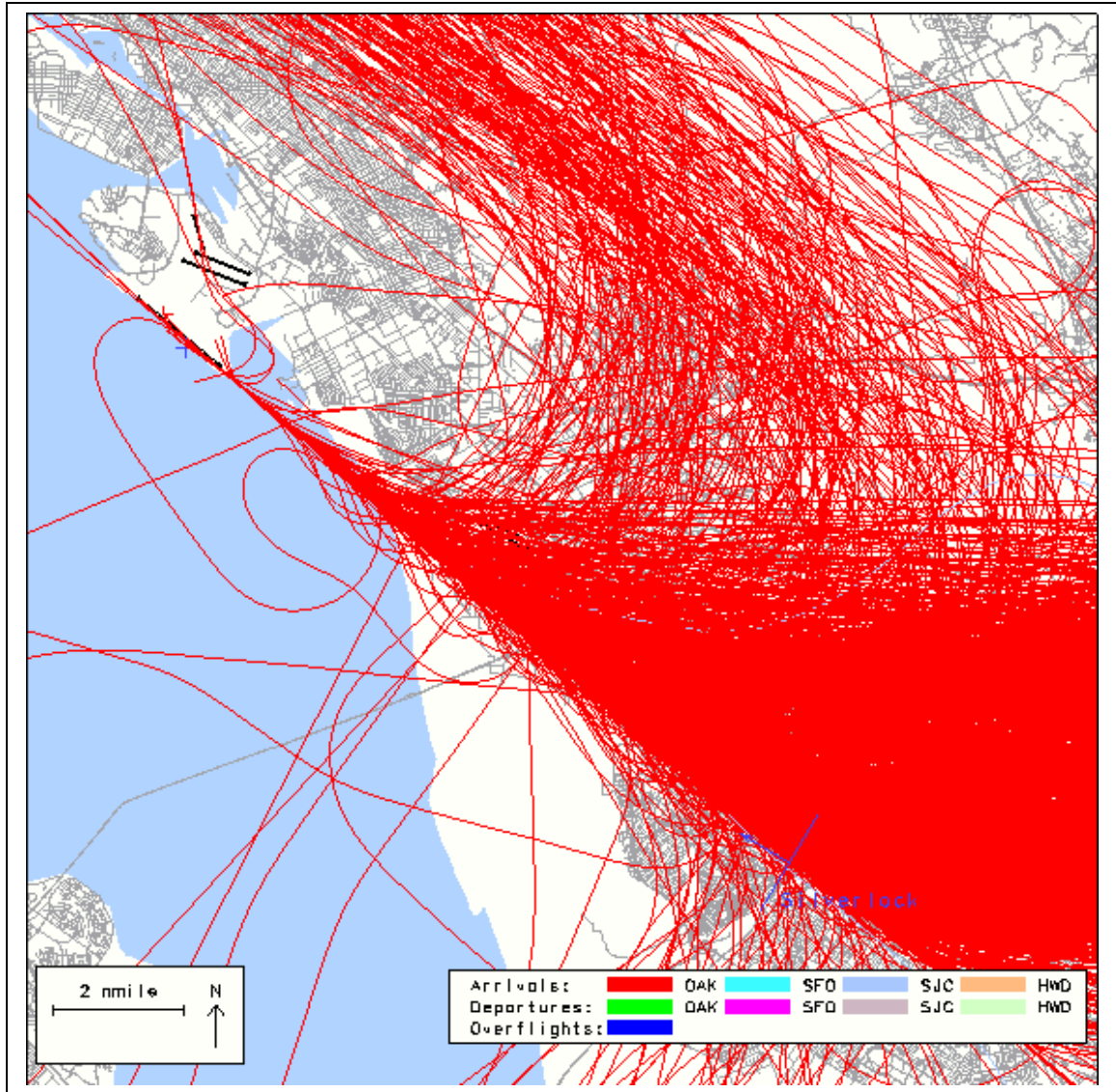
For each recorded event, the data collected by the Larson-Davis 870 consisted of event time, duration, Lmax, and calculated SEL. The monitor also stored the total CNEL value for each 24-hour day (midnight to midnight) during the monitoring period.

All the noise event data collected by the portable noise monitor were later stored in the Airport Noise and Operations Monitoring System (ANOMS) and correlated with aircraft flight tracks in order to identify aircraft noise events from community noise events above 65 dBA. CNEL values for aircraft and community measurements were also calculated using ANOMS.

ANOMS is a sophisticated computer system that integrates aircraft identification, aircraft flight track data and noise data, which is utilized to evaluate aircraft noise impacts on local communities. Data gathered by ANOMS was used to evaluate not only aircraft noise but also aircraft performance and operations statistics for this report.

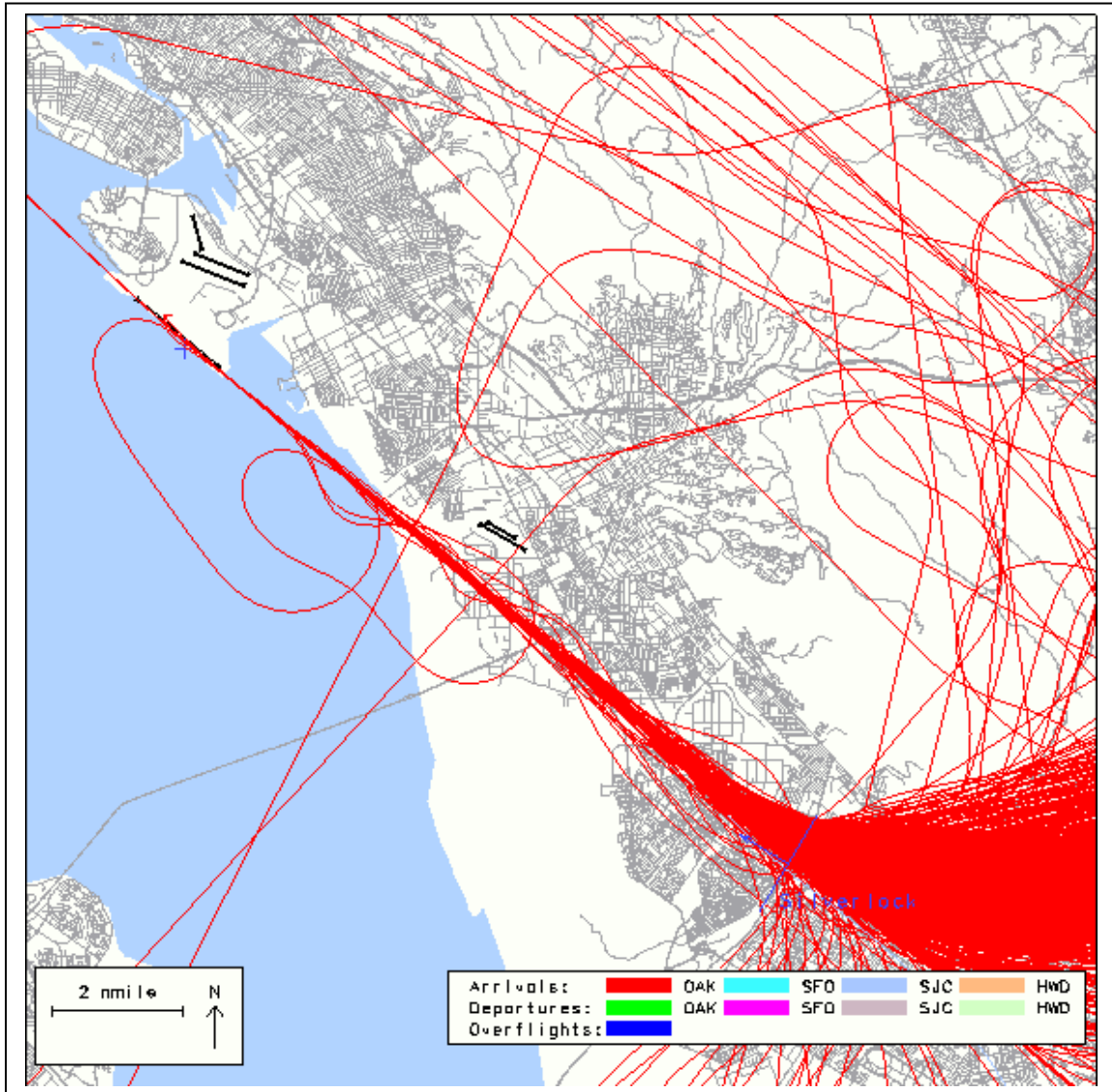
An aircraft penetration or analysis gate (identified as Silverlock) was established in ANOMS and centered over the Silverlock neighborhood. The gate analysis function in the ANOMS software program allows the user to evaluate any aircraft that penetrates the gate as the aircraft passes through this imaginary “window in the sky”. The two-mile wide gate, centered over Silverlock Court, is extended one mile from the gate’s center in both directions, to the northeast and to the southwest. (See Figure 2.) Every turbojet aircraft that passed through the gate and landed on Runway 29 was evaluated for noise events, altitude and air speed.

**Fig. 3a: Runway 29 Arrivals - One Week of Flight Tracks  
August 1-7, 2003**

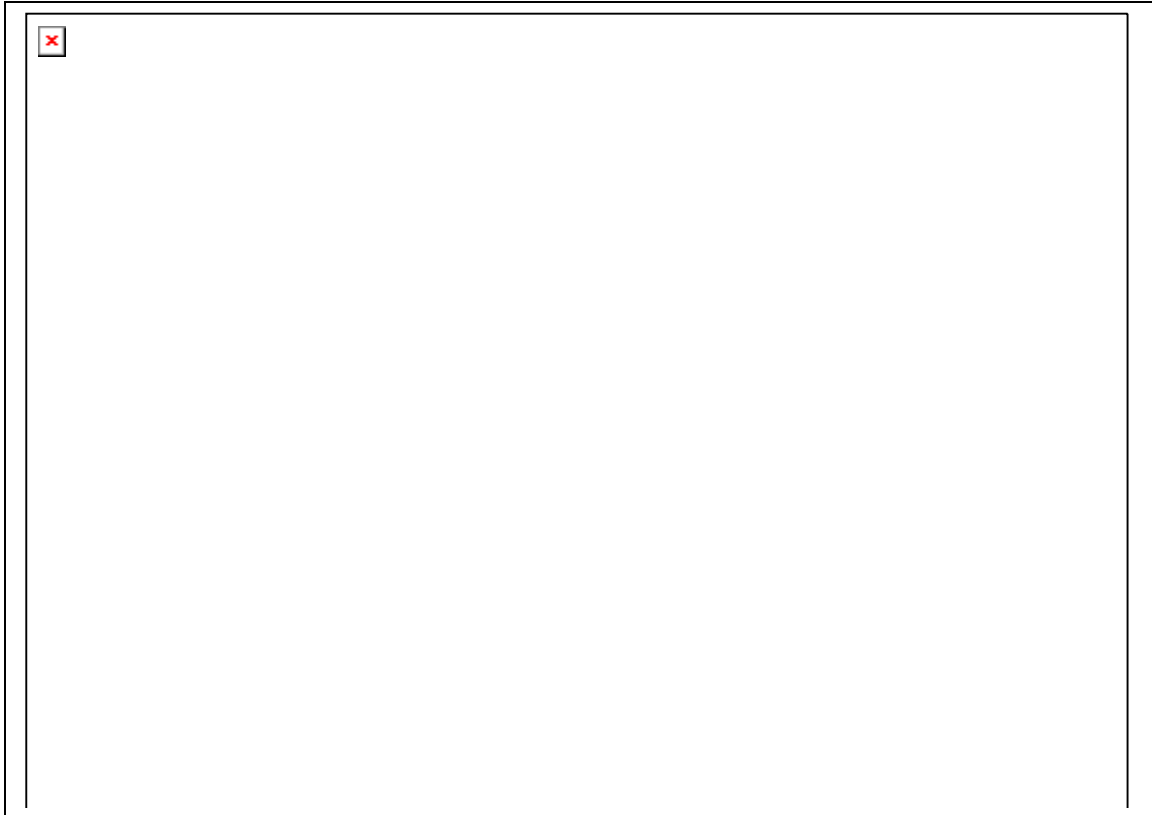




**Fig. 3b: Runway 29 Arrivals - One Week of Flight Tracks  
Passing Through Silverlock Gate  
August 1-7, 2003**



**Fig 4: Silverlock Analysis Gate  
One Month of Flight Tracks  
Runway 29 Arrivals**



### **Aircraft Noise Analysis**

Noise measurements were taken for 23 complete days in the Silverlock neighborhood between November 18<sup>th</sup> and December 16, 2003. Table 1 below provides a summary of the noise measurement study. There were 493 identified aircraft noise events associated with Runway 29 turbojet arrivals that were measured over the 23 days. There were 2,022 aircraft that passed over the Silverlock neighborhood during this period, which means that about 25% of these aircraft generated measurable noise events.

For the 493 aircraft noise events, the average aircraft generated L<sub>max</sub> was 66 dBA (decibels, A-weighted), the average SEL was 77 dBA, and the average aircraft noise event duration was 15 seconds. The computed levels for the average **aircraft CNEL** was 46 dBA, the average **community CNEL** was 57 dBA, and the average **total CNEL** was 57 dBA. For comparison purposes, the current cumulative aircraft noise level at the permanent microphone RMT# 1, which is located approximately nine miles closer to the airport, is CNEL 65 dBA.



**Table 1: Aircraft Noise Data Summary – Silverlock Neighborhood**  
November 18<sup>th</sup> – December 16<sup>th</sup> 2003

	<b>Total Flights</b>	<b>Sample No.</b>	<b>Lowest Value</b>	<b>Highest Value</b>	<b>Average Value</b>
<b>Aircraft Lmax</b>	2,022	493 Events	65 dBA	78 dBA	66 dBA
<b>Aircraft SEL</b>	2,022	493 Events	71 dBA	90 dBA	77 dBA
<b>Noise Event Duration</b>	2,022	493 Events	5 seconds	53 seconds	15 seconds
<b>Aircraft CNEL (daily)</b>	2,022	23 days	CNEL 38 dBA	CNEL 54 dBA	CNEL 46 dBA
<b>Community CNEL (daily)</b>	2,022	23 days	CNEL 54 dBA	CNEL 60 dBA	CNEL 57 dBA
<b>Total CNEL (daily)</b>	2,022	23 days	CNEL 54 dBA	CNEL 60 dBA	CNEL 57 dBA

A complete list of all single event aircraft noise data is provided in Appendix B. Figure 5 below presents all flight tracks associated with single aircraft noise events measured during the study period including aircraft associated with flights at other airports.

Since aircraft noise measurements were not recorded in the Silverlock neighborhood in year 2000, a comparative analysis could not be performed between the current noise measurements with historical noise measurements to determine if there were any changes in aircraft noise levels. Consequently, other aircraft flight information was used to evaluate the possibility of any change in noise levels, i.e. aircraft altitude and air speed. Since historical flight track data was available, this information was used in this study to research potential changes.

### **Frequency of Aircraft Arrivals**

First, the frequency of aircraft arrivals was evaluated for Runway 29. This information is important since the perceived changes in frequency, or the amount of flights, can be a factor in the level of annoyance that people experience. Table 2 below provides a summary of the daily aircraft arrival rates and the cumulative noise measurements for each day of the noise measurement study in the Silverlock neighborhood. In summary, the data indicate that approximately 41% of all Runway 29 aircraft arrivals passed through the analysis gate and within one-mile of the Silverlock neighborhood.

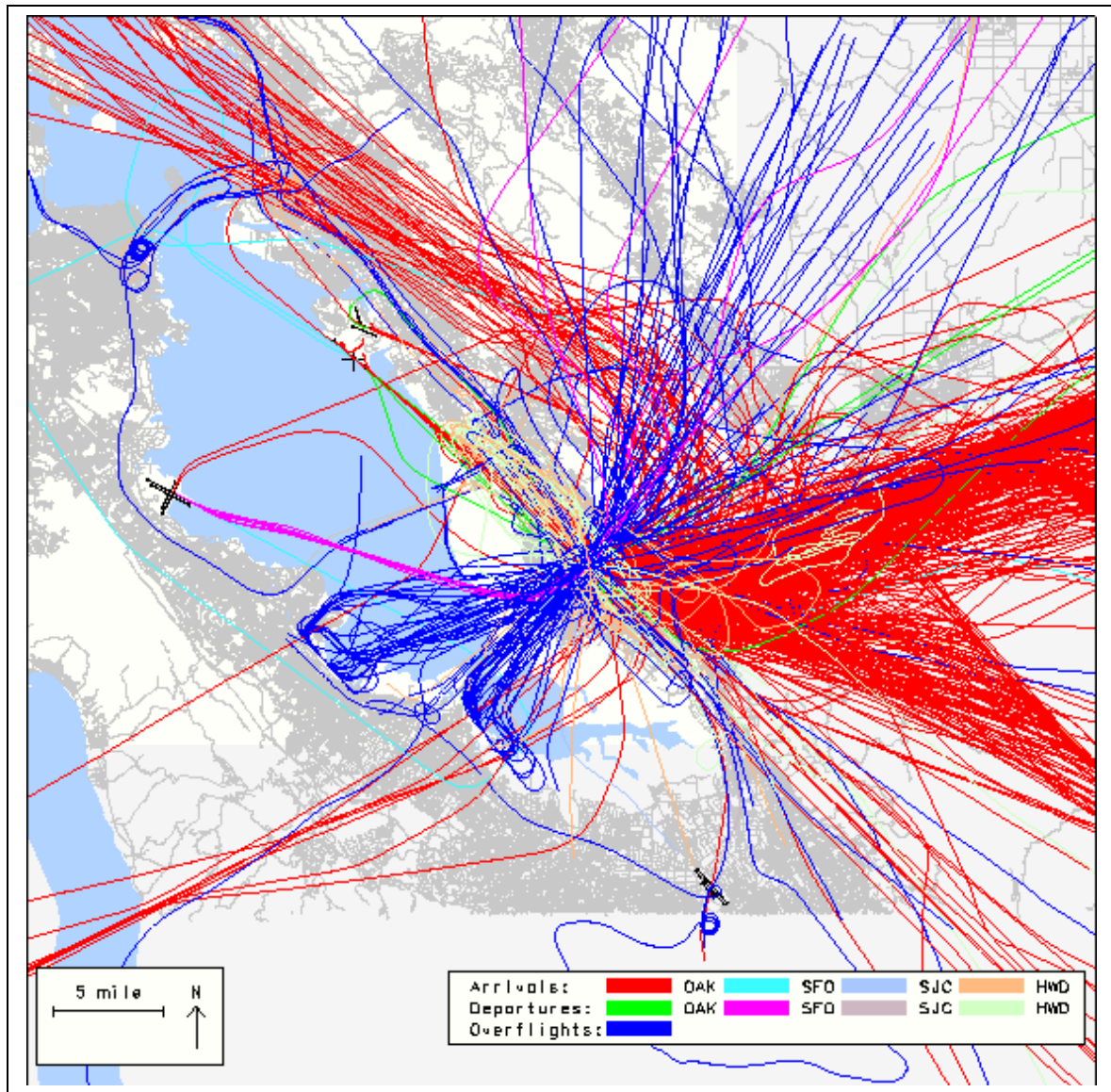
**Table 2: Daily Aircraft Arrival Values  
and Cumulative Noise Data<sup>1</sup>**

	Runway 29 Arrivals	Silverlock Gate Arrivals	Percentage Over Silverlock	Silverlock Aircraft Noise Events	Percentage of Aircraft Creating Noise	Silverlock Aircraft CNEL	Silverlock Community CNEL	Silverlock Total CNEL
11/18/2003	255	65	25%	16	25%	48	57	58
11/19/2003	253	107	42%	26	24%	47	58	58
11/20/2003	254	155	61%	40	26%	50	57	58
11/21/2003	249	103	41%	30	29%	49	58	59
11/22/2003	178	80	45%	9	11%	42	58	58
11/23/2003	203	40	20%	1	3%	39	54	54
11/24/2003	225	66	29%	8	12%	47	56	56
11/25/2003	251	99	39%	33	33%	52	58	59
11/26/2003	260	103	40%	39	38%	54	58	59
11/27/2003	145	19	13%	2	11%	40	54	55
11/28/2003	209	38	18%	3	8%	43	54	55
11/29/2003	120	22	18%	5	23%	38	55	55
11/30/2003	2	0	0%			32	55	55
12/1/2003	1	0	0%			27	57	57
12/2/2003	223	156	70%	38	24%	52	57	58
12/3/2003	254	173	68%	39	23%	50	56	57
12/4/2003 <sup>2</sup>	117	90	77%	N/A	N/A	N/A	57	57
12/5/2003	0	0	n/a			35	58	58
12/6/2003	27	13	48%	5	38%	44	56	56
12/7/2003	203	95	47%	33	35%	48	57	58
12/8/2003	230	66	29%	8	12%	45	57	57
12/9/2003	24	2	8%	1	50%	40	60	60
12/10/2003	253	161	64%	61	38%	54	57	58
12/11/2003	263	126	48%	42	33%	50	56	57
12/12/2003	118	83	70%	21	25%	44	55	55
12/13/2003	0	0	n/a			43	58	58
12/14/2003	199	55	28%	14	25%	45	57	57
12/15/2003	205	54	26%	10	19%	45	57	58
12/16/2003	249	51	20%	9	18%	46	58	58
<b>Total/Ave</b>	<b>4,970</b>	<b>2,022</b>	<b>41%</b>	<b>493</b>	<b>24%</b>	<b>46</b>	<b>57</b>	<b>57</b>

<sup>1</sup> Although the Airport Noise and Operations Monitoring System (ANOMS) is a very sophisticated computer program that provides a state-of-the-art solution for monitoring aircraft operations, problems with the system's data integration and analysis programs occasionally cause erroneous information or loss of data. Usually errors are minimal and are limited to such things as aircraft departure assignment to an inappropriate runway designation or providing incomplete aircraft identification information regarding a specific flight track.

<sup>2</sup> Aircraft noise levels were not measured on December 4, 2003 due to programming failure with the portable noise monitor.

**Fig. 5: All Flight Tracks for Single Aircraft Noise Events**



In Table 3a and 3b below, the daily number of total Runway 29 aircraft arrivals in the months of November and December during year 2000 is compared with the same time frame in year 2003. The total number of Runway 29 aircraft arrivals is further compared with the daily number that penetrated the Silverlock gate for each time period. The overall average rate of 40% was determined for year 2003 (meaning 40% of all Runway 29 aircraft arrivals passed over Silverlock) compared to 39% for year 2000. On an average day in year 2000 about 74 aircraft flew over Silverlock while in year 2003 there were about 70 aircraft. This suggests that there hasn't been any change in air traffic patterns, which might cause more aircraft to fly in the vicinity of the Silverlock

neighborhood. The decrease in average daily aircraft flights in 2003 may very well be attributable to increased poor weather conditions and the use of the Southeast Plan as compared with the same time period in year 2000. Essentially there has not been a change in the amount of turbojet aircraft arrivals to Runway 29 that pass over the Silverlock neighborhood in comparing the same two-month time period.

**Table 3a: Comparison of Runway 29 Aircraft Arrivals  
November 2000 vs. 2003**

	Runway 29 Arrivals	Silverlock Gate Arrivals	Percentage		Runway 29 Arrivals	Silverlock Gate Arrivals	Percentage
11/1/2000	160	80	50%	11/1/2003	190	51	27%
11/2/2000	151	65	43%	11/2/2003	151	65	43%
11/3/2000	141	48	34%	11/3/2003	228	78	34%
11/4/2000	96	52	54%	11/4/2003	265	58	22%
11/5/2000	171	95	56%	11/5/2003	247	187	76%
11/6/2000	182	78	43%	11/6/2003	174	60	34%
11/7/2000	229	99	43%	11/7/2003	87	35	40%
11/8/2000	224	115	51%	11/8/2003	0	0	n/a
11/9/2000	222	102	46%	11/9/2003	129	40	31%
11/10/2000	206	86	42%	11/10/2003	224	87	39%
11/11/2000	165	62	38%	11/11/2003	249	89	36%
11/12/2000	166	48	29%	11/12/2003	240	57	24%
11/13/2000	130	53	41%	11/13/2003	255	106	42%
11/14/2000	228	92	40%	11/14/2003	152	105	69%
11/15/2000	224	113	50%	11/15/2003	124	78	63%
11/16/2000	233	69	30%	11/16/2003	198	78	39%
11/17/2000	212	71	33%	11/17/2003	228	110	48%
11/18/2000	166	37	22%	11/18/2003	255	65	25%
11/19/2000	180	63	35%	11/19/2003	253	107	42%
11/20/2000	189	37	20%	11/20/2003	254	155	61%
11/21/2000	233	122	52%	11/21/2003	249	103	41%
11/22/2000	227	149	66%	11/22/2003	178	80	45%
11/23/2000	135	85	63%	11/23/2003	203	40	20%
11/24/2000	159	75	47%	11/24/2003	225	66	29%
11/25/2000	156	100	64%	11/25/2003	251	99	39%
11/26/2000	179	85	47%	11/26/2003	260	103	40%
11/27/2000	192	103	54%	11/27/2003	145	19	13%
11/28/2000	129	58	45%	11/28/2003	209	38	18%
11/29/2000	209	64	31%	11/29/2003	120	22	18%
11/30/2000	239	109	46%	11/30/2003	2	0	0%

**Table 3b: Comparison of Runway 29 Aircraft Arrivals  
December 2000 vs. 2003**

	<b>Runway 29 Arrivals</b>	<b>Silverlock Gate Arrivals</b>	<b>Percentage</b>		<b>Runway 29 Arrivals</b>	<b>Silverlock Gate Arrivals</b>	<b>Percentage</b>
12/1/2000	213	56	26%	12/1/2003	1	0	0%
12/2/2000	169	39	23%	12/2/2003	223	156	70%
12/3/2000	184	57	31%	12/3/2003	254	173	68%
12/4/2000	195	43	22%	12/4/2003	117	90	77%
12/5/2000	243	62	26%	12/5/2003	0	0	n/a
12/6/2000	245	47	19%	12/6/2003	27	13	48%
12/7/2000	237	70	30%	12/7/2003	203	95	47%
12/8/2000	221	53	24%	12/8/2003	230	66	29%
12/9/2000	177	105	59%	12/9/2003	24	2	8%
12/10/2000	183	126	69%	12/10/2003	253	161	64%
12/11/2000	197	120	61%	12/11/2003	263	126	48%
12/12/2000	243	138	57%	12/12/2003	118	83	70%
12/13/2000	34	12	35%	12/13/2003	0	0	n/a
12/14/2000	83	53	64%	12/14/2003	199	55	28%
12/15/2000	226	111	49%	12/15/2003	205	54	26%
12/16/2000	175	64	37%	12/16/2003	249	51	20%
12/17/2000	187	72	39%	12/17/2003	225	45	20%
12/18/2000	198	29	15%	12/18/2003	263	53	20%
12/19/2000	239	75	31%	12/19/2003	118	19	16%
12/20/2000	262	66	25%	12/20/2003	39	20	51%
12/21/2000	184	82	45%	12/21/2003	207	90	43%
12/22/2000	240	114	48%	12/22/2003	242	39	16%
12/23/2000	193	89	46%	12/23/2003	10	4	40%
12/24/2000	153	61	40%	12/24/2003	199	136	68%
12/25/2000	142	34	24%	12/25/2003	167	88	53%
12/26/2000	153	30	20%	12/26/2003	234	85	36%
12/27/2000	145	28	19%	12/27/2003	179	52	29%
12/28/2000	231	64	28%	12/28/2003	111	13	12%
12/29/2000	219	66	30%	12/29/2003	35	31	89%
12/30/2000	159	56	35%	12/30/2003	250	145	58%
12/31/2000	151	66	44%	12/31/2003	218	138	63%
<b>Nov/Dec Totals</b>	<b>11,414</b>	<b>4,503</b>	<b>39%</b>		<b>10,608</b>	<b>4,264</b>	<b>40%</b>

## Aircraft Altitude

Aircraft altitude and aircraft speed were also evaluated to compare data from August 2000 with data from August 2003. Table 4 below provides data on aircraft altitude for turbojet arrivals to Runway 29 comparing these two time periods. The average aircraft altitude in August 2000 is about 3,742 feet MSL (mean sea level) when passing over Silverlock. In August 2003, the average aircraft altitude is about 200 feet less, which is not a substantial difference. (In comparison, the average altitude of the aircraft identified for the 493 aircraft that created noise events was 3,180 feet MSL when passing over the Silverlock neighborhood.) A closer look indicates that approximately 71% of aircraft are below 4,000 feet MSL in August 2000 whereas in August 2003 about 83% of the aircraft are below 4,000 feet MSL.

**Table 4: Comparison of Aircraft Altitude**

	August 2000	Percentage	August 2003	Percentage
<b>OAK Runway 29 Arrivals Through Silverlock Gate</b>	<b>2,247</b>	<b>100%</b>	<b>2,499</b>	<b>100%</b>
<b>Altitude (below 2,500 ft.)</b>	22	1%	20	1%
<b>Altitude (below 3,000 ft.)</b>	240	11%	286	11%
<b>Altitude (below 3,500 ft.)</b>	852	38%	1,099	44%
<b>Altitude (below 4,000 ft.)</b>	1,602	71%	2,068	83%
<b>Altitude (below- 4,500 ft.)</b>	2,126	95%	2,376	95%
<b>Altitude (below 8,000 ft.)</b>	2,247	100%	2,499	100%
<b>Average Altitude (ft. MSL)</b>	<b>3,742</b>		<b>3,562</b>	

## Aircraft Air Speed

In Table 5 below, aircraft air speed is summarized and compared. The data indicates aircraft are flying on average at about 218 knots when passing over the Silverlock neighborhood in August 2000. In August 2003, average aircraft air speeds are about 196 knots, again not a substantial difference. In August 2000 though, about 28% of aircraft are flying at air speeds less than 200 knots whereas in August 2003 about 56% of aircraft are flying less than 200 knots. In August 2000, about 57% of aircraft are flying at air speeds less than 225 knots whereas in August 2003 about 83% of aircraft are flying under 225 knots. These lower air speeds could mean that aircraft are using flap settings and “air brakes” to lower aircraft air speeds, which could result in higher aircraft noise levels on the ground for some of the aircraft arrivals.

**Table 5: Comparison of Aircraft Air Speed**

	<b>August 2000</b>	<b>Percentage</b>	<b>August 2003</b>	<b>Percentage</b>
<b>OAK Runway 29 Arrivals Through Silverlock Gate</b>	<b>2,247</b>	<b>100%</b>	<b>2,499</b>	<b>100%</b>
<b>Speed (below 175 knots)</b>	144	6%	438	18%
<b>Speed (below 200 knots)</b>	635	28%	1,383	55%
<b>Speed (below 225 knots)</b>	1,286	57%	2,055	82%
<b>Speed (below 250 knots)</b>	1,923	86%	2,414	97%
<b>Speed (below 275 knots)</b>	2,223	99%	2,496	100%
<b>Speed (below 300 knots)</b>	2,247	100%	2,499	100%
<b>Average Speed (knots)</b>	<b>218</b>		<b>198</b>	

The comparative data for aircraft altitude and speed seem to indicate that aircraft are flying lower and at slower speeds in August 2003 than aircraft were flying in August 2000. This may suggest that aircraft noise levels could be higher in the Silverlock neighborhood for those aircraft that are flying at lower altitudes and at slower speeds. These theories were evaluated further through additional detailed review of flight track data and discussions were held with air traffic controllers at the FAA's Northern California TRACON facility.

Further flight track data review did not provide any definitive answers to questions regarding a possible connection between the changes in air traffic control procedures and the lower aircraft altitudes and aircraft air speeds identified in this research. The aircraft flight data in Tables 6a and 6b below indicate that peak flight activity for Runway 29 arrivals occurs in the evening hours to about 11:00 p.m.. Some of the data reviewed for this study suggests that there is small decline in average aircraft altitudes and air speeds during these busy times. However, a review of the noise measurements recorded in the Silverlock neighborhood does not indicate any correlation between aircraft noise levels and peak hours of activity.



**Table 6a: Runway 29 Aircraft Arrivals by the Hour of Day  
November 2000**

<b>Nov. 2000 Hour of Day</b>	<b>RWY 29 Total No. of Arrivals</b>	<b>RWY 29 Average Arrivals/hr.</b>	<b>Silverlock Gate Arrivals</b>	<b>Percentage of Silverlock Arrivals</b>	<b>Silverlock Gate Average Arrivals/hr.</b>	<b>Silverlock Gate Ave Altitude (ft. MSL)</b>	<b>Silverlock Gate Ave Speed (knots)</b>
0000 to 0100	40	1.3	22	55.0%	0.7	3,646	210
0100 to 0200	28	0.9	10	35.7%	0.3	3,323	209
0200 to 0300	49	1.6	27	55.1%	0.9	3,543	204
0300 to 0400	37	1.2	22	59.5%	0.7	3,461	208
0400 to 0500	89	3.0	40	44.9%	1.3	3,554	204
0500 to 0600	67	2.2	30	44.8%	1.0	3,473	202
0600 to 0700	49	1.6	25	51.0%	0.8	3,499	216
0700 to 0800	121	4.0	65	53.7%	2.2	3,555	202
0800 to 0900	351	11.7	171	48.7%	5.7	3,385	198
0900 to 1000	248	8.3	123	49.6%	4.1	3,591	213
1000 to 1100	229	7.6	125	54.6%	4.2	3,618	207
1100 to 1200	255	8.5	133	52.2%	4.4	3,670	211
1200 to 1300	263	8.8	145	55.1%	4.8	3,696	212
1300 to 1400	261	8.7	118	45.2%	3.9	3,789	216
1400 to 1500	168	5.6	66	39.3%	2.2	3,356	224
1500 to 1600	269	9.0	98	36.4%	3.3	3,547	219
1600 to 1700	300	10.0	149	49.7%	5.0	3,703	216
1700 to 1800	365	12.2	182	49.9%	6.1	3,662	204
1800 to 1900	427	14.2	147	34.4%	4.9	3,761	209
1900 to 2000	374	12.5	137	36.6%	4.6	3,623	210
2000 to 2100	354	11.8	110	31.1%	3.7	3,550	207
2100 to 2200	444	14.8	180	40.5%	6.0	3,566	200
2200 to 2300	439	14.6	163	37.1%	5.4	3,459	198
2300 to 0000	306	10.2	127	41.5%	4.2	3,522	197
<b>Totals</b>	<b>5,533</b>		<b>2,415</b>	<b>43.6%</b>		<b>3,565</b>	<b>208</b>

**Table 6b: Runway 29 Aircraft Arrivals by the Hour of Day  
November 2003**

<b>Nov. 2003 Hour of Day</b>	<b>RWY 29 Total No. of Arrivals</b>	<b>RWY 29 Average Arrivals/hr.</b>	<b>Silverlock Gate Arrivals</b>	<b>Percentage of Silverlock Arrivals</b>	<b>Silverlock Gate Average Arrivals/hr.</b>	<b>Silverlock Gate Ave Altitude (ft. MSL)</b>	<b>Silverlock Gate Ave Speed (knots)</b>
0000 to 0100	39	1.3	11	28.2%	0.4	3,675	191
0100 to 0200	36	1.2	17	47.2%	0.6	3,647	192
0200 to 0300	6	0.2	2	33.3%	0.1	3,508	186
0300 to 0400	28	0.9	15	53.6%	0.5	3,629	200
0400 to 0500	49	1.6	25	51.0%	0.8	3,505	192
0500 to 0600	62	2.1	23	37.1%	0.8	3,544	181
0600 to 0700	29	1.0	12	41.4%	0.4	3,258	188
0700 to 0800	113	3.8	51	45.1%	1.7	3,350	202
0800 to 0900	321	10.7	128	39.9%	4.3	3,456	191
0900 to 1000	291	9.7	105	36.1%	3.5	3,416	203
1000 to 1100	316	10.5	129	40.8%	4.3	3,523	202
1100 to 1200	379	12.6	177	46.7%	5.9	3,559	197
1200 to 1300	336	11.2	106	31.5%	3.5	3,583	207
1300 to 1400	295	9.8	76	25.8%	2.5	3,555	203
1400 to 1500	275	9.2	82	29.8%	2.7	3,378	208
1500 to 1600	256	8.5	81	31.6%	2.7	3,642	212
1600 to 1700	308	10.3	114	37.0%	3.8	3,502	203
1700 to 1800	384	12.8	116	30.2%	3.9	3,464	194
1800 to 1900	451	15.0	153	33.9%	5.1	3,577	189
1900 to 2000	316	10.5	97	30.7%	3.2	3,446	197
2000 to 2100	360	12.0	109	30.3%	3.6	3,341	190
2100 to 2200	449	15.0	159	35.4%	5.3	3,423	180
2200 to 2300	400	13.3	143	35.8%	4.8	3,557	177
2300 to 0000	246	8.2	77	31.3%	2.6	3,521	183
<b>Totals</b>	<b>5,745</b>		<b>2,008</b>	<b>35.0%</b>		<b>3,502</b>	<b>195</b>

## **Air Traffic Control Procedures**

FAA air traffic controllers have made at least two modifications to Oakland International Airport arrival procedures over the past couple years. Although these changes occurred more than one year prior to the vocalization of noise complaints from the Silverlock neighborhood residents, there appears to be a possible connection. Additional research was conducted to explore the possibility of a connection between air traffic control changes and the perceived increase in aircraft over flights and noise.

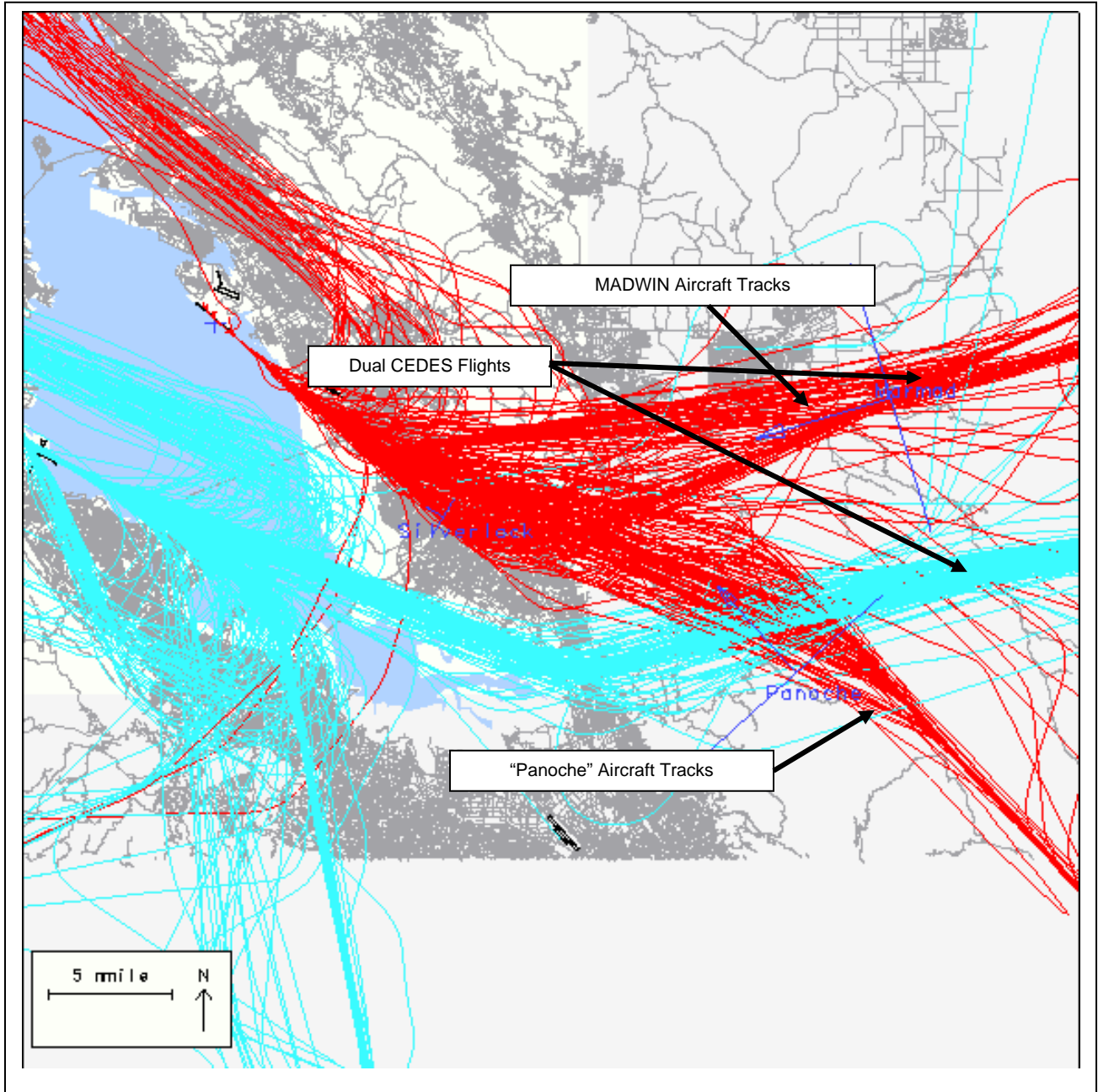
More than two years ago the Federal Aviation Administration initiated a test of a modified arrival procedure for San Francisco International Airport (SFO). The FAA refers to this procedure as the dual CEDES approach, which became established after a year or so of successful testing. The dual CEDES approach procedure was designed to provide safe separation of aircraft for the implementation of the Simultaneous Offset Instrument Approach procedure, or SOIA, at San Francisco International Airport (SFO). SOIA was developed to reduce delays in poor weather at SFO.

In order to accommodate the establishment of the dual CEDES approach, the FAA implemented a new Standard Terminal Arrival Route (STAR) for Oakland International called the MARVIN1 STAR. Prior to this new procedure, the MADWIN4 and the “Panoche” or PXN2 STARs were the procedures used to bring aircraft into Oakland International that were flying from eastern and southern points of origin, respectively. Aircraft that originally flew the Panoche procedure were relocated to the new MARVIN1 procedure and these aircraft intersected with the MADWIN4 aircraft east of the Livermore area.

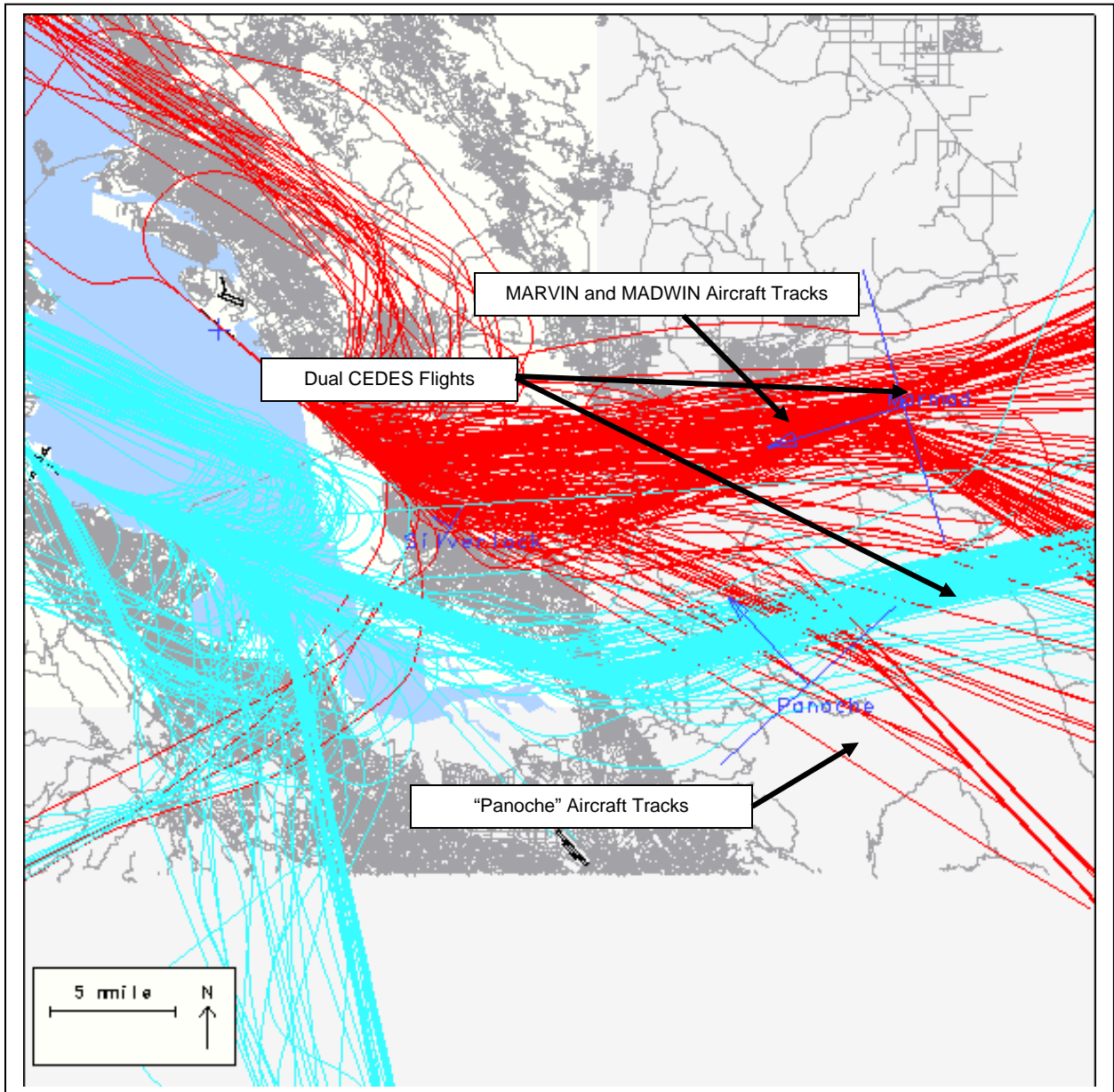
Generally speaking, this action essentially relocated aircraft over flights from the Mt. Hamilton/San Jose area further north to the Livermore/Sunol area, in effect reducing the amount of aircraft flying over the Silverlock neighborhood. In simple terms, the reduced use of the “Panoche” procedure would generally result in a decrease in the frequency of aircraft flights over the Silverlock neighborhood. Flight track maps in Figures 6a and 6b below graphically present this information.

In addition to the changes cited above, the FAA relocated the Final Approach “FIX” to a location approximately three miles southeast of the former location. This change requires air traffic to turn onto the final approach course further southeast and closer to the Silverlock neighborhood. This may also have an effect on the lowering of aircraft altitudes. Although no specific date is known, this change was probably implemented within the past two years.

**Fig. 6a: Air Traffic Control Arrival Procedures  
"Panoche" STAR Utilized**



**Fig. 6b: Air Traffic Control Arrival Procedures  
“Panoche” STAR Not Utilized**



## Conclusions

Aircraft noise levels in the Silverlock neighborhood are at levels expected in a community that is 13 miles away from the airport but lies below the final approach course of a main commercial use runway at an airport the size of Oakland International. Actual aircraft noise measurements did not contribute any additional noise to the total cumulative average total noise levels (CNEL). The average community CNEL was 57 dBA (23 days of measurements) and the aircraft CNEL was 46 CNEL dBA. When the aircraft noise was added to the community noise the total CNEL remained at 57 dBA.

The State of California airport noise regulations state: “The standard for the acceptable level of aircraft noise for persons living in the vicinity of airports is hereby established to be a community noise equivalent level of 65 decibels.” Since the average aircraft community noise equivalent level (CNEL) was measured at 46 dBA for the Silverlock neighborhood, this residential area has an acceptable level of aircraft noise as defined by State law. Figure 7 below presents a current airport noise contour map that shows the extent of the 65 dBA CNEL noise contour at Oakland International Airport.

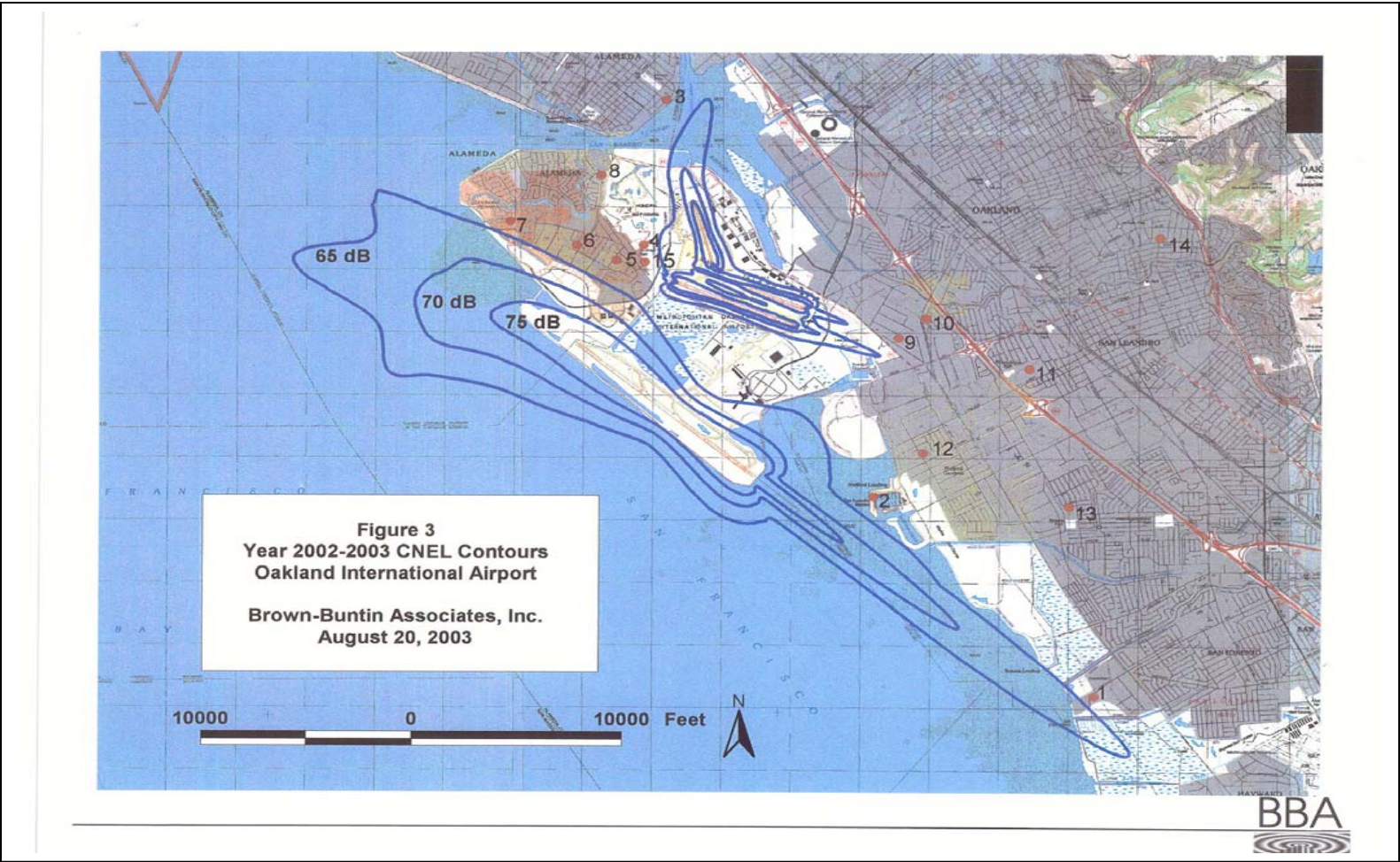
The amount of aircraft flight levels over the Silverlock neighborhood in Fremont has changed very little, if not at all, over the past few years. There was a drop in flight levels for several months after September 11, 2001 but air traffic has continued to increase since then and is expected to increase about 1-2% per year in the future as passenger demands increase.

In November 2000, there were slightly more aircraft flying over the Silverlock neighborhood than there were in November 2003. On an average day in year 2000 about 74 aircraft flew over Silverlock while in year 2003 there were about 70 aircraft. This may be due to the fact that the “Panoche” arrival procedure was being used only in a limited manner in November 2003. Comparisons of data using different time frames may produce different results, but the fact remains that there do not appear to be any increases in aircraft flights over Silverlock.

There appears to be a decrease in aircraft altitudes and aircraft air speeds for some aircraft arrivals when comparing current flight track data with data from previous time periods. This could result in abnormally loud aircraft noise events. The timing of these changes seem to correlate with the timing of air traffic control modifications implemented by the Federal Aviation Administration. However, there is no obvious connection between these altitude and air speed decreases and any specific modifications made to aircraft arrival procedures. There is a possible connection between the higher levels of aircraft activity during the evening hours and the lower aircraft altitudes and air speed. Although it was impossible to discern in this study, there could also be some connection between the volume of air traffic, air traffic control procedures and pilot technique that, in combination, may result in periodic and infrequent louder than normal aircraft noise events.



**Fig. 7: Oakland International Airport Noise Contours**





## Appendix 1: Aircraft Noise Terminology/Metrics

To assist in understanding the noise measurements and noise metrics used in evaluating airport noise, this fact sheet provides a brief introduction to noise terminology used in this report. Specifically, the noise metrics discussed are the decibel (dB), the A-weighted sound level, the maximum noise level (Lmax), the sound exposure level (SEL), and the Community Noise Equivalent Level (CNEL).

The decibel or dB is the unit of measure used to represent the change in sound pressure, which is detected by the human ear. Since the range between the slightest and greatest sounds that we hear is extremely large, the decibel uses the logarithmic scale to compress this range to a more meaningful scale with 0 dB representing the slightest sound we can hear. Most sounds we experience in our day-to-day lives vary somewhere between 30 dB and 100 dB. Figure 2 presents typical sound levels of several common transportation sources.

Aircraft sound measurements generally use the metric known as A-weighted sound level. This is the sound level that has been filtered or weighted to reduce the influence of high and low frequency extremes. This closely replicates the sensitivity of the human ear in the frequency range of 500 – 10,000 Hz and correlates well with perceptions of the loudness of sounds. Thus, an aircraft noise event with a higher A-weighted sound level is perceived to be louder than an aircraft noise event with a lower A-weighted sound level. This correlation with human's perception of loudness is the primary reason that A-weighted sound levels are used to evaluate environmental noise sources.

The sound level heard during an arrival or departure of an aircraft varies as a function of the distance from the aircraft to the person hearing the noise (or "receiver"), and as a function of the direction of the aircraft noise source. As the aircraft approaches the receiver, the sound level increases and, as the aircraft moves away from the receiver, the sound level decreases. The effect of noise exposure during such an event can be described in terms of either the maximum sound level (Lmax) or the sound exposure level (SEL) of individual aircraft noise events.

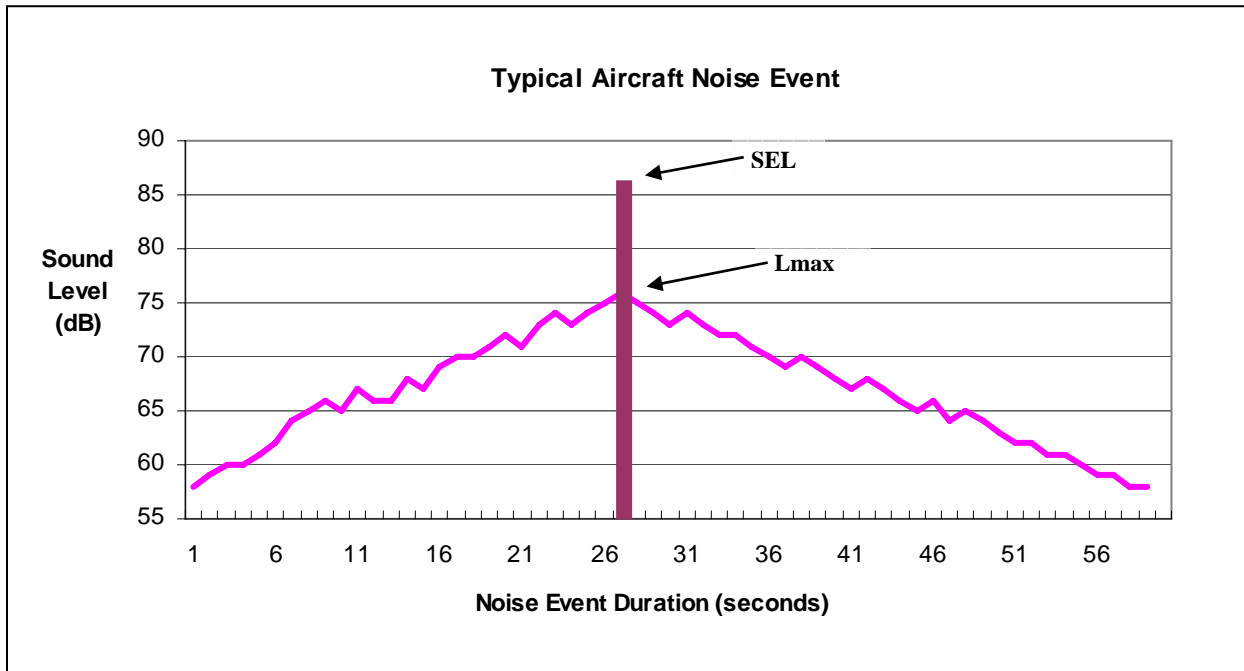
### Noise Event Metrics

The **maximum sound level (Lmax)** metric represents the highest instantaneous noise level heard at a receiver site during a single aircraft event (arrival or departure). However, since this metric describes only the instantaneous maximum noise value, it provides no information on the duration of noise exposure. Human response to noise is not only a function of the maximum level, but also of the duration of the event. Therefore, a term or metric is needed that accounts for both intensity and duration and provides a uniform assessment of noise events with differing intensities and durations. This metric is the sound exposure level or SEL.

The **sound exposure level (SEL)** represents the cumulative sound energy detected above an established threshold for a single event considering both intensity and duration of the sound. The SEL represents the acoustical energy of the event once it surpasses a specified noise level, but as though it had occurred within one second. Thus, for example, two events with the same intensity but different durations can be differentiated with the longer duration event having a higher SEL. For locations relatively close to an

airport, the SEL for most aircraft departures will usually be about 10 decibels higher than the corresponding Lmax. For example, an aircraft departure producing a maximum sound level of 70 dB at a particular location would be expected to produce an SEL value of about 80 dB at the same location. Figure 1 is a graphic representation of a typical aircraft noise event. Thus, SEL gives us a common basis for comparing noise events that matches our instinctive impression – the higher the SEL, the more annoying it is likely to be.

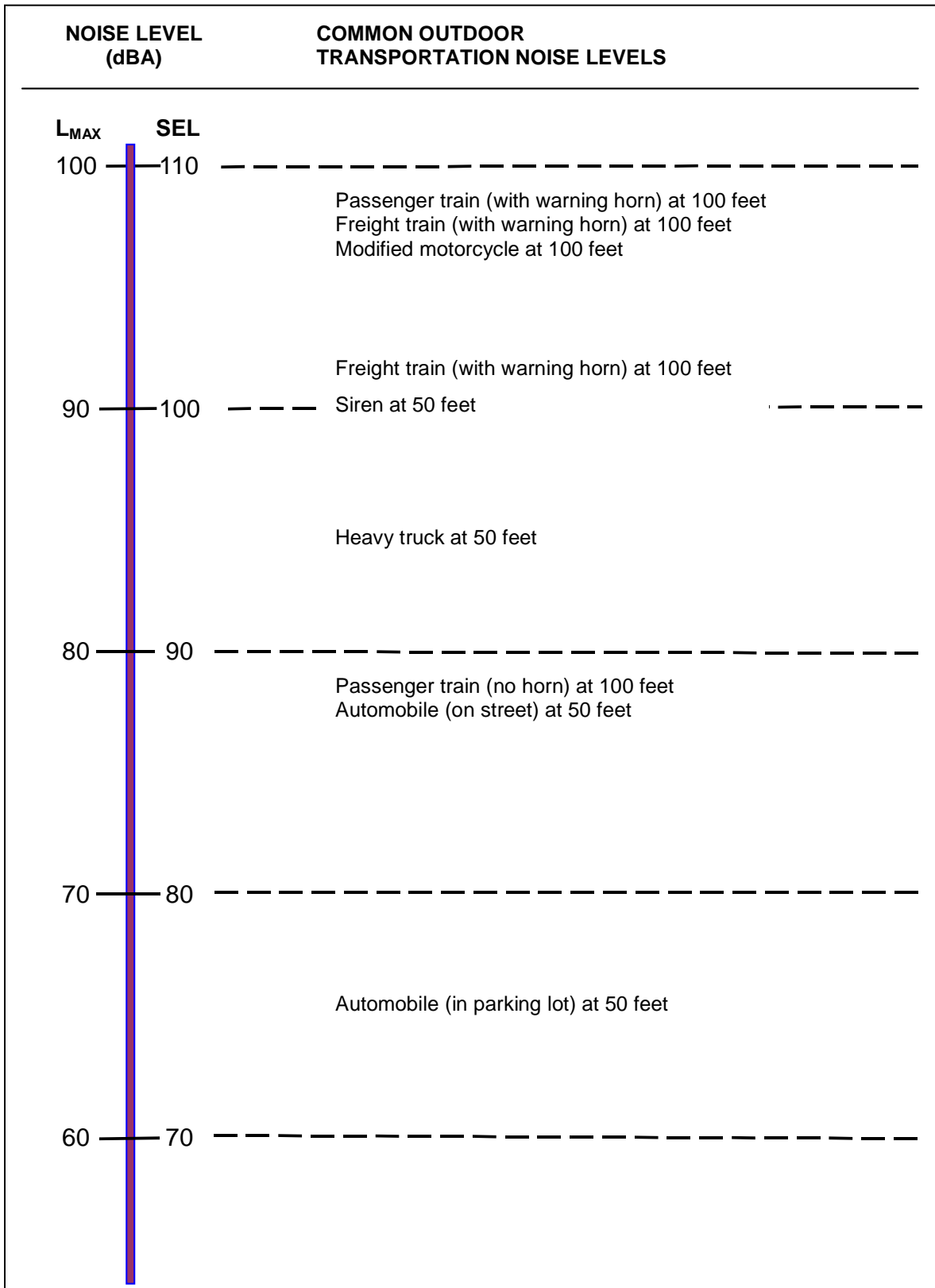
**Fig. 1: Time History of a Typical Aircraft Noise Event**



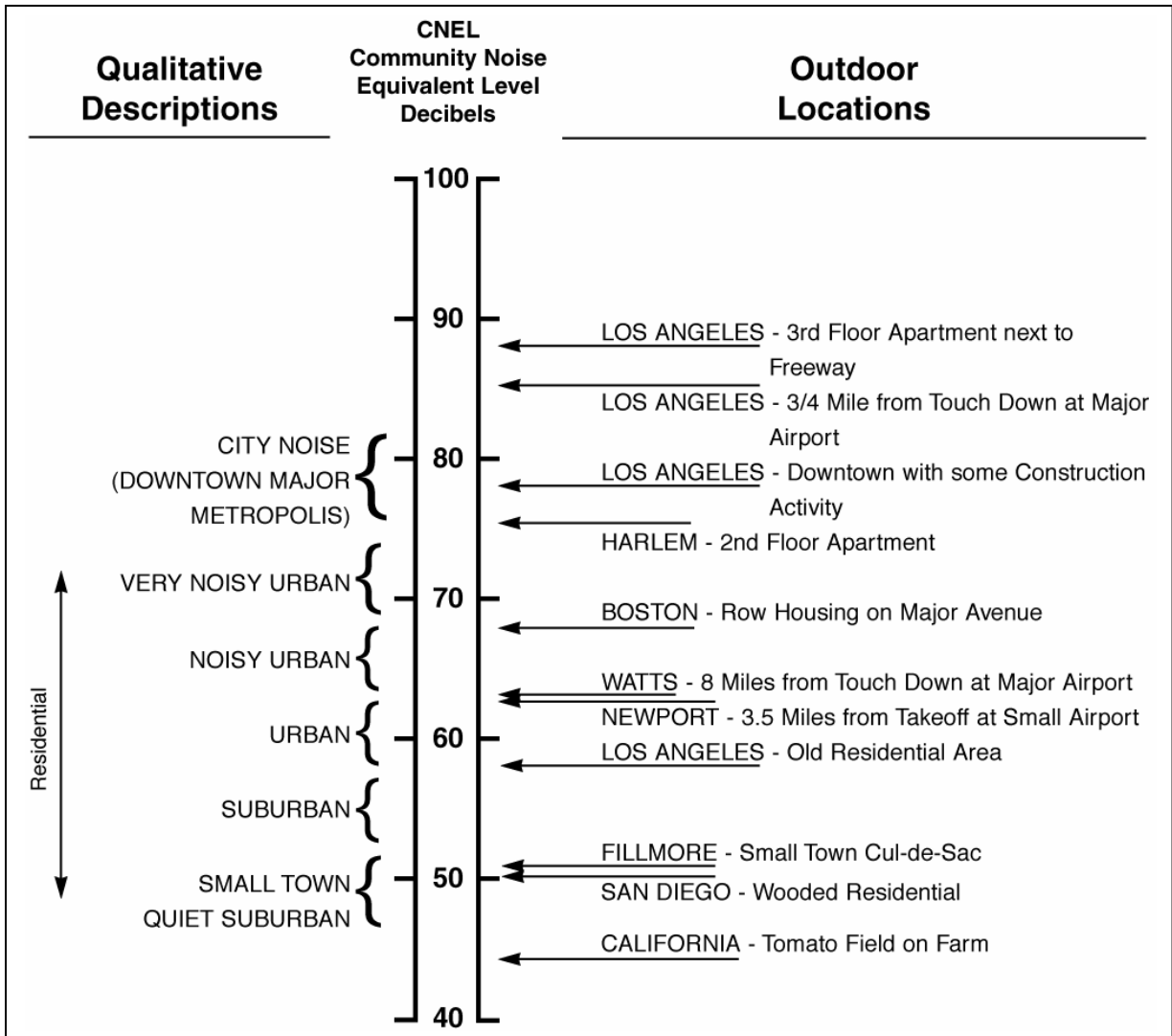
The **Community Noise Equivalent Level (CNEL)** is a method of predicting, by a single number rating, cumulative aircraft noise that affects communities in airport environs. As defined in the California Airport Noise Standards, CNEL represents the average daytime noise level during a 24-hour day, adjusted to an equivalent level to account for the lower tolerance of people to noise during evening and nighttime periods relative to the daytime period. CNEL applies a weighting to aircraft events occurring during the evening and nighttime time periods. For evening (7:00 PM – 9:59 PM) and nighttime (10:00 PM – 6:59 AM) aircraft noise events, CNEL logarithmically multiplies each operation by 3 and 10, respectively. This effectively adds 4.8 dB to evening event SELs and 10 dB to nighttime event SELs.

The aircraft CNEL is then derived using the SELs from all aircraft generated events for the period. A total CNEL will include the aircraft generated events as well as other noise events generated in the community during the corresponding time period. Typically, total CNEL in our environment ranges from a low of 40-45 dB in very quiet locations to 80-85 dB immediately adjacent to an active noise source – busy traffic route or active airport. Figure 3 shows representative values of CNEL in typically different environments. Aircraft CNEL is also used to depict noise contours of equal exposure levels around an airport to reflect long-term operations, usually one year.

**Fig. 2: Common Transportation Sound Levels in dB**



**Figure 3: Representative Cumulative Sound Levels**



## Appendix 2: Single Event Aircraft Flight and Noise Data Silverlock Neighborhood

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
11/18/03	1:03:33	AWE631	A319	0:59:07	3005	334	228	0:59:05	69.1	78.2	15
11/18/03	3:05:22	UPS962	B763	3:00:57	3822	291	198	3:00:56	65.6	75.4	14
11/18/03	3:54:16	FDX1020	DC10	3:50:16	3697	311	212	3:50:15	65.5	75.2	13
11/18/03	4:05:16	UPS944	B763	4:00:49	3001	285	194	4:00:52	65.4	72.6	6
11/18/03	4:57:40	FDX1705	DC10	4:53:35	3159	314	214	4:53:33	66.1	76.8	15
11/18/03	5:50:17	FDX1468	MD11	5:46:05	3622	314	214	5:46:08	68.2	79.3	19
11/18/03	7:48:30	ATN834	DC87	7:44:15	3625	311	212	7:44:21	65	73	9
11/18/03	8:30:04	JBU111	A320	8:25:48	2985	301	205	8:25:47	67.4	77.6	15
11/18/03	8:40:31	FDX3807	MD10	8:36:30	3513	305	208	8:36:31	66.2	76.5	14
11/18/03	10:30:29	JBU315	A320	10:26:52	3697	364	248	10:26:52	65.2	73.6	10
11/18/03	11:21:09	FDX3814	A306	11:17:00	2995	314	214	11:16:46	69	79.6	21
11/18/03	11:25:50	FDX3805	A306	11:21:24	3543	298	203	11:21:18	68.8	79.5	20
11/18/03	17:08:52	FDX979	MD11	17:04:50	3782	334	228	17:05:01	66.9	72.4	6
11/18/03	21:35:09	UPS4958	A306	21:31:14	3546	314	214	21:31:16	67.6	79.9	23
11/18/03	21:51:40	FDX1816	A306	21:47:38	3884	364	248	21:47:43	70.2	80.3	23
11/18/03	23:00:15	FDX1800	DC10	22:55:59	2926	337	230	22:56:00	67.2	78.1	17
11/19/03	5:28:40	FDX1468	MD11	5:24:35	3582	341	233	5:24:31	65.6	76.1	16
11/19/03	7:53:31	JBU242	A320	7:49:52	3704	390	266	7:49:50	65.1	73.1	8
11/19/03	8:33:48	FDX3801	B72Q	8:29:27	3759	331	226	8:29:26	65.8	74.8	11
11/19/03	8:35:16	UAL596	A320	8:31:04	3772	337	230	8:31:01	66.4	73.7	9
11/19/03	8:40:12	FDX3807	MD10	8:36:15	3904	318	217	8:36:15	65.3	75.9	15
11/19/03	8:51:07	ASA355	B737	8:47:45	3933	400	273	8:47:41	66.8	75.5	11
11/19/03	9:46:56	SWA297	B733	9:43:10	2654	426	290	9:43:10	66.2	73.1	7
11/19/03	10:10:18	FDX3813	MD10	10:06:42	3444	400	273	10:06:42	69.3	79.5	19
11/19/03	10:27:55	FDX3015	DC10	10:23:53	3110	328	224	10:23:57	65.7	73.4	10
11/19/03	10:31:04	DAL1925	B738	10:27:12	3743	393	268	10:27:09	66.8	76.3	13
11/19/03	10:48:22	SWA342	B735	10:44:38	3031	413	282	10:44:45	68.1	80.4	34
11/19/03	10:53:03	SWA754	B735	10:48:23	2972	383	261	10:48:25	66.5	74.3	9
11/19/03	10:57:49	SWA415	B737	10:53:53	3090	419	286	10:53:54	66	75.2	13
11/19/03	10:59:17	SWA1609	B733	10:55:21	2319	390	266	10:55:20	69.5	82.8	51
11/19/03	11:00:58	SWA801	B733	10:57:10	2818	370	252	10:57:14	66.6	73.8	7
11/19/03	11:29:53	FDX3806	MD11	11:26:09	3179	377	257	11:26:08	72.1	82.4	21
11/19/03	12:19:01	JBU101	A320	12:14:39	3707	367	250	12:14:34	66.9	74.6	9
11/19/03	12:42:43	FDX3840	A310	12:38:05	3533	364	248	12:38:06	67	75.7	12
11/19/03	17:52:02	FDX979	MD11	17:47:58	3861	305	208	17:48:09	68.3	80.7	25
11/19/03	19:46:03	UPS4958	DC8Q	19:41:38	3113	331	226	19:41:37	68.3	79.8	21
11/19/03	20:05:44	SWA206	B733	20:01:24	1971	380	259	20:01:22	66.2	75.6	11
11/19/03	21:35:18	SWA1122	B735	21:30:57	2542	285	194	21:31:04	68.2	77.9	14
11/19/03	21:40:55	AAL1997	MD82	21:36:28	3858	269	183	21:36:34	66	74.3	9
11/19/03	21:42:55	UAL569	A320	21:37:58	3582	265	181	21:37:52	65.2	74.8	12
11/19/03	21:45:55	FDX1810	A310	21:40:39	2536	262	179	21:40:45	67.8	78.1	23
11/19/03	23:14:49	UAL8271	A320	23:10:42	2979	314	214	23:10:42	68.4	79.5	21
11/20/03	5:03:24	UPS946	B763	4:58:43	3786	272	185	4:58:42	65.5	73.5	8
11/20/03	7:58:40	UAL596	A319	7:53:35	2877	295	201	7:53:30	66.5	76.3	15

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
11/20/03	8:17:40	FDX3801	B72Q	8:12:53	3992	278	190	8:13:02	65.6	75.8	13
11/20/03	8:28:41	FDX3805	A306	8:23:36	4379	282	192	8:23:37	66.6	76.8	15
11/20/03	8:32:40	SWA1700	B737	8:27:22	2641	242	165	8:27:29	67.3	72.8	6
11/20/03	8:36:27	ASA355	B737	8:31:07	3894	206	140	8:31:11	66.5	75.8	13
11/20/03	8:44:40	FDX3806	MD11	8:40:32	3353	301	205	8:40:30	67.1	79.2	22
11/20/03	8:56:13	UPS2387	A306	8:50:54	3346	275	188	8:50:53	66.1	76.2	15
11/20/03	9:05:59	SWA530	B733	9:01:10	3008	252	172	9:01:14	67	75.3	10
11/20/03	9:16:40	FDX3809	A306	9:11:39	3018	278	190	9:11:39	65.9	74.6	10
11/20/03	9:41:54	ASA406	MD80	9:37:35	3028	301	205	9:37:42	68.5	79.3	19
11/20/03	9:50:31	FDX3802	MD10	9:46:03	3116	308	210	9:46:02	67.1	77	15
11/20/03	10:48:32	FDX3810	A306	10:43:39	3129	269	183	10:43:39	66	76.9	16
11/20/03	11:17:18	COA340	B739	11:13:11	2539	318	217	11:13:15	67	76.4	11
11/20/03	11:30:18	FDX3814	A306	11:26:04	3047	367	250	11:26:07	67.4	77	15
11/20/03	12:03:04	MXA968	A320	11:58:32	3005	298	203	11:58:29	67	76.6	16
11/20/03	12:07:09	ASA339	B734	12:02:56	3001	295	201	12:03:03	68.2	77.6	15
11/20/03	12:53:51	UAL639	A320	12:49:38	3267	321	219	12:49:33	67.4	75.7	12
11/20/03	17:37:17	FDX3702	MD10	17:32:58	3339	331	226	17:32:53	66.1	76.1	13
11/20/03	17:44:55	FDX350	DC10	17:39:36	2972	255	174	17:39:42	65.1	71.9	7
11/20/03	18:13:04	AWE623	B733	18:08:47	3146	295	201	18:08:53	67	73.5	7
11/20/03	19:08:54	SWA247	B733	19:04:39	2434	295	201	19:04:43	67.5	76.8	12
11/20/03	19:38:54	SWA2020	B733	19:34:41	1981	367	250	19:34:44	67.1	76.5	12
11/20/03	19:45:26	ASA366	B734	19:41:27	2801	295	201	19:41:34	69.8	78.2	13
11/20/03	20:07:07	SWA1073	B737	20:02:44	1981	301	205	20:02:46	68.9	79.3	17
11/20/03	20:09:58	SWA2346	B733	20:05:31	2204	295	201	20:05:33	66.9	77.3	13
11/20/03	20:11:53	UAL1127	A320	20:07:21	2854	285	194	20:07:18	66.3	76.4	15
11/20/03	20:13:16	SWA206	B733	20:08:58	3034	295	201	20:09:04	65.6	73.7	9
11/20/03	20:20:44	SWA1987	B735	20:15:51	2801	288	196	20:15:57	66.6	75.4	10
11/20/03	20:29:07	JBU91	A320	20:24:48	3083	318	217	20:24:46	68.1	78.7	21
11/20/03	20:51:24	MXA146	A320	20:45:52	3441	242	165	20:46:12	69.7	75.8	7
11/20/03	20:53:24	SWA1028	B733	20:48:37	3562	255	174	20:48:41	68.7	79.4	18
11/20/03	20:58:05	SWA2311	B733	20:53:32	2267	301	205	20:53:36	68.7	78.2	14
11/20/03	20:59:51	FDX86	MD10	20:55:20	2493	285	194	20:55:24	69.6	79	15
11/20/03	21:02:56	AWE627	B733	20:58:25	2982	272	185	20:58:29	69.6	79.6	17
11/20/03	21:05:33	SWA1670	B735	21:00:42	2404	278	190	21:00:44	70.8	81	18
11/20/03	21:37:41	JBU107	A320	21:32:18	3969	246	168	21:32:19	65.5	73.8	9
11/20/03	22:13:58	FDX1809	A306	22:09:12	3428	311	212	22:09:19	71.3	81.6	24
11/20/03	23:03:33	NAO408	B752	22:58:21	2509	219	149	22:58:20	68.3	78.9	18
11/20/03	23:30:23	FDX1801	MD11	23:25:49	2959	242	165	23:25:59	71.6	81.8	24
11/21/03	8:35:23	FDX3805	A306	8:30:24	3815	278	190	8:30:28	67.5	78	17
11/21/03	8:56:10	FDX3807	MD10	8:51:57	4055	341	233	8:52:02	66	75.9	14
11/21/03	9:28:57	FDX3802	MD10	9:24:08	3602	272	185	9:24:13	65.9	72.9	7
11/21/03	9:37:12	FDX3809	A306	9:32:06	3162	305	208	9:32:11	73.5	83.6	29
11/21/03	9:42:35	AWE620	A320	9:37:59	2480	331	226	9:37:59	68.6	78.4	16
11/21/03	10:30:13	FDX3810	A306	10:25:41	4652	328	224	10:25:38	65.4	72.5	7
11/21/03	10:30:13	FDX3810	A306	10:25:41	4652	328	224	10:25:42	66.2	75.3	11
11/21/03	10:43:08	FDX3015	DC10	10:38:46	3956	272	185	10:38:45	67.1	76.2	13
11/21/03	10:50:03	JBU93	A320	10:45:20	2017	357	243	10:45:18	70.9	79.6	14
11/21/03	11:17:21	JBU315	A320	11:13:02	3825	291	198	11:12:59	67.2	75.1	13

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
11/21/03	11:33:25	HAL9912	B763	11:28:40	3766	265	181	11:28:37	66.3	77.9	19
11/21/03	11:39:35	FDX3814	A306	11:34:38	2273	272	185	11:34:42	68.6	78.7	18
11/21/03	14:54:04	SWA1809	B735	14:49:39	2614	400	273	14:49:37	67.9	75.3	10
11/21/03	16:53:46	JBU248	A320	16:49:05	2237	360	245	16:49:04	67.8	78.3	18
11/21/03	18:12:49	FDX1817	B722	18:06:30	3776	255	174	18:06:42	69.1	74.9	6
11/21/03	18:26:55	UAL187	A320	18:21:58	3904	298	203	18:21:56	67.3	79.1	24
11/21/03	18:36:37	FDX3861	B72Q	18:29:38	2975	252	172	18:29:35	69.9	81.5	27
11/21/03	18:40:38	MXA966	A320	18:35:47	3871	298	203	18:35:46	67.1	77.3	16
11/21/03	19:58:20	SWA1627	B733	19:53:08	1968	314	214	19:53:11	67	74.5	8
11/21/03	20:15:16	SWA1073	B737	20:10:06	2791	301	205	20:10:04	65.9	73.7	8
11/21/03	20:28:03	JBU91	A320	20:23:25	3284	308	210	20:23:26	66.2	72.5	7
11/21/03	21:24:48	AWE627	B733	21:20:01	2949	301	205	21:20:03	65.6	72.9	7
11/21/03	21:38:07	FDX1803	B722	21:33:00	3874	236	161	21:33:07	68	76.5	13
11/21/03	21:56:41	SWA1122	B735	21:51:18	2654	259	177	21:51:25	68.6	78.5	15
11/21/03	22:00:27	FDX1810	A310	21:54:20	3090	203	138	21:54:28	71	82	24
11/21/03	22:13:09	FDX1809	A306	22:08:02	3618	318	217	22:08:14	72.7	80.6	19
11/21/03	22:29:33	FDX1808	B722	22:24:15	3877	246	168	22:24:25	67.4	79.1	21
11/21/03	22:36:33	FDX1818	B722	22:31:07	4091	239	163	22:31:11	71.4	80.1	17
11/21/03	23:00:06	FDX1802	MD10	22:55:13	3369	255	174	22:55:14	67.6	78.2	20
11/21/03	23:42:08	FDX1801	MD11	23:37:29	3809	321	219	23:37:38	66.4	72.6	6
11/22/03	6:01:54	FDX2419	DC10	5:56:51	3392	262	179	5:56:57	66.6	76.2	13
11/22/03	9:25:15	SWA2337	B737	9:21:18	2831	403	275	9:21:15	65.5	71.7	6
11/22/03	9:32:52	AWE620	B733	9:28:29	3323	301	205	9:28:30	67.4	73.3	8
11/22/03	11:04:01	FDX3015	DC10	10:59:44	2854	331	226	10:59:46	68	78.1	17
11/22/03	11:53:40	SWA692	B733	11:48:43	3822	285	194	11:48:42	68.1	77.2	16
11/22/03	13:29:40	UAL1519	A319	13:24:59	3116	265	181	13:24:57	65.7	72.8	7
11/22/03	19:03:35	FDX979	MD11	18:59:23	4192	344	235	18:59:34	65.4	75.1	12
11/22/03	20:17:43	SWA926	B735	20:13:19	2162	390	266	20:13:08	67.2	72.1	5
11/22/03	21:41:31	UAL569	A320	21:36:30	3195	337	230	21:36:33	65.5	72.8	7
11/23/03	17:48:30	FDX9020	MD10	17:44:00	4048	360	245	17:44:04	66.2	76.9	15
11/24/03	13:18:18	AWE621	B733	13:14:12	2683	354	241	13:14:16	66.7	75.5	10
11/24/03	18:51:13	UAL269	A320	18:46:50	3782	318	217	18:46:46	65.3	73.7	10
11/24/03	20:40:23	JBU91	A320	20:35:40	2234	288	196	20:35:38	70	79.7	17
11/24/03	21:12:08	FDX1803	B72Q	21:07:47	2454	288	196	21:07:51	78	87.5	25
11/24/03	21:28:45	JBU256	A320	21:24:18	3038	308	210	21:24:18	67.7	77.3	15
11/24/03	21:42:03	UAL569	A320	21:37:36	3907	318	217	21:37:37	66.2	73.7	9
11/24/03	23:22:53	AAL1463	MD82	23:18:30	3100	341	233	23:18:35	66.1	73.4	7
11/24/03	23:32:57	FDX1801	MD11	23:29:25	3730	374	255	23:29:27	70.3	80.8	22
11/25/03	3:25:29	UPS3964	B741	3:21:19	3851	321	219	3:21:20	69.7	82.4	31
11/25/03	4:37:39	FDX1020	DC10	4:33:10	3047	285	194	4:33:14	69.6	80.9	24
11/25/03	7:02:14	AAH473	B737	6:56:38	3001	193	132	6:56:42	66.7	79.5	25
11/25/03	7:04:51	SWA1070	B733	7:00:06	3293	298	203	7:00:12	65.5	72.8	8
11/25/03	8:00:51	UAL596	A319	7:56:09	3891	311	212	7:56:08	66.4	74.6	12
11/25/03	8:02:37	JBU242	A320	7:57:53	3871	275	188	7:57:51	65.8	76.6	16
11/25/03	8:48:18	FDX3806	MD11	8:44:06	3018	298	203	8:44:11	70	81.2	24
11/25/03	8:53:04	FDX3807	MD10	8:48:45	3018	301	205	8:48:51	70.3	81	20
11/25/03	9:29:45	FDX3809	A306	9:25:22	4028	324	221	9:25:25	68.4	80.3	26
11/25/03	10:37:46	FDX3810	A306	10:33:21	3759	298	203	10:33:23	66.1	76.1	15



Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
11/25/03	10:46:19	FDX3015	DC10	10:41:55	2979	318	217	10:41:58	67.9	77.3	13
11/25/03	10:50:14	DAL1925	B738	10:46:13	3704	354	241	10:46:14	65.1	72.2	7
11/25/03	10:55:14	JBU93	A320	10:50:52	3523	318	217	10:50:51	66.7	75.5	12
11/25/03	11:00:28	SWA342	B735	10:56:22	2224	390	266	10:56:24	65.4	72.3	7
11/25/03	11:43:04	JBU244	A320	11:39:00	3326	354	241	11:39:00	68.2	76.3	11
11/25/03	13:09:15	JBU101	A320	13:05:08	3389	308	210	13:05:02	67.2	77.1	16
11/25/03	18:15:15	FDX1817	B72Q	18:10:06	2933	249	170	18:10:10	70.7	80.4	20
11/25/03	18:24:30	UPS2940	B763	18:19:08	2004	272	185	18:19:06	70.5	79.8	18
11/25/03	20:18:22	FDX979	MD11	20:13:43	3822	288	196	20:13:43	67.5	79.8	25
11/25/03	20:51:35	AAH442	B737	20:46:32	3605	239	163	20:46:57	66	72.7	8
11/25/03	20:51:35	AAH442	B737	20:46:32	3605	239	163	20:46:40	67.9	76.3	12
11/25/03	21:48:18	FDX1810	A310	21:42:59	3841	252	172	21:43:02	66	76.5	16
11/25/03	21:51:41	FDX26	MD11	21:47:07	3884	252	172	21:47:20	66.7	79.8	30
11/25/03	22:22:37	SWA886	B733	22:17:35	3559	236	161	22:17:44	67.6	77	14
11/25/03	22:25:50	FDX1808	B72Q	22:21:06	3038	265	181	22:21:10	72	81.9	22
11/25/03	22:41:19	SWA2706	B737	22:36:11	2549	236	161	22:36:15	67.5	79.1	21
11/25/03	22:48:14	FDX2814	B72Q	22:40:52	3156	239	163	22:41:08	65.6	77.9	23
11/25/03	23:02:37	SWA2340	B737	22:57:54	2673	308	210	22:57:53	67.1	76.5	12
11/25/03	23:04:05	FDX1802	MD10	22:59:35	3159	278	190	22:59:43	66.1	75.1	11
11/25/03	23:13:38	AWE629	B73Q	23:09:09	3959	360	245	23:09:12	67.3	76.3	13
11/25/03	23:19:56	FDX1383	B72Q	23:13:52	3779	298	203	23:13:53	68	77.9	18
11/25/03	23:41:28	FDX990	DC10	23:36:15	2965	262	179	23:36:15	65.4	76.1	15
11/25/03	23:47:41	FDX1801	MD11	23:43:19	3320	311	212	23:43:23	69.1	80.5	21
11/26/03	0:27:26	FDX1840	B72Q	0:21:38	3881	170	116	0:21:43	75	86.7	47
11/26/03	1:27:57	FDX1816	A306	1:23:00	3769	291	198	1:23:01	68.9	81	26
11/26/03	4:13:47	UPS944	B763	4:09:11	3454	354	241	4:09:07	66.8	76.6	15
11/26/03	4:27:01	FDX1020	DC10	4:22:29	3871	334	228	4:22:42	65.8	74.5	10
11/26/03	5:12:51	UPS946	B763	5:07:33	4173	246	168	5:07:23	66	77.9	20
11/26/03	5:23:32	FDX1705	DC10	5:18:54	3202	301	205	5:18:52	68.8	80.9	24
11/26/03	6:11:59	FDX1468	MD10	6:07:12	2992	246	168	6:07:17	70.7	81.6	24
11/26/03	8:16:25	JBU242	A320	8:11:36	3359	298	203	8:11:37	69.4	78.7	17
11/26/03	8:46:46	FDX3801	B72Q	8:40:17	3379	255	174	8:40:17	67.1	78.7	22
11/26/03	9:21:13	SWA2166	B737	9:16:12	2080	357	243	9:16:15	74.9	82.5	17
11/26/03	10:34:03	FDX3810	A306	10:29:20	4461	311	212	10:29:23	67.9	75.8	12
11/26/03	10:41:21	JBU93	A320	10:37:11	4143	377	257	10:37:16	65.9	73.8	10
11/26/03	11:04:03	JBU315	A320	10:59:26	3513	324	221	10:59:27	66.8	75.8	15
11/26/03	11:17:03	COA340	B739	11:13:03	3126	344	235	11:12:59	66.8	77.1	15
11/26/03	11:38:41	FDX3814	A306	11:33:37	2906	295	201	11:33:39	69.6	80.1	23
11/26/03	11:56:40	FDX3806	MD11	11:52:35	3208	328	224	11:52:40	75.1	82.4	25
11/26/03	12:34:46	MXA968	A320	12:30:56	3832	347	237	12:30:53	68.9	75.4	11
11/26/03	16:31:57	JBU248	A320	16:27:46	2601	370	252	16:27:47	68.7	77.1	13
11/26/03	17:06:29	FDX3852	MD11	17:01:34	3907	311	212	17:01:44	67.2	74.7	10
11/26/03	18:00:01	FDX3702	MD10	17:55:20	3838	308	210	17:55:21	65.9	77.6	19
11/26/03	18:18:33	JBU300	A320	18:13:44	2303	252	172	18:13:46	66.9	77.5	16
11/26/03	18:27:19	UAL269	A320	18:23:16	3651	357	243	18:23:14	66.1	73	7
11/26/03	18:34:01	FDX350	DC10	18:28:01	3881	272	185	18:28:03	65.2	75.8	16
11/26/03	18:58:19	FDX1817	B72Q	18:53:53	3464	324	221	18:53:58	70.3	80.7	19
11/26/03	19:02:33	SWA1221		18:58:19	2893	314	214	18:58:25	66.3	75.3	10

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
11/26/03	19:28:42	UAL774	B733	19:24:29	3339	314	214	19:24:33	66.5	77.2	15
11/26/03	21:03:41	AWE627	B733	20:59:48	3293	351	239	20:59:52	65	70.8	5
11/26/03	21:22:03	AAH442	B737	21:17:26	1807	255	174	21:17:32	68.8	78	13
11/26/03	21:32:44	SWA2057	B733	21:28:34	2910	298	203	21:28:32	67.3	77.6	16
11/26/03	21:35:35	FDX983	DC10	21:30:49	3372	272	185	21:30:59	65.2	71.5	6
11/26/03	21:41:07	UAL569	A320	21:36:55	3615	321	219	21:36:59	65.5	75.7	14
11/26/03	21:49:11	FDX1810	A310	21:44:41	3284	357	243	21:44:44	68.8	77.7	14
11/26/03	22:13:48	FDX1808	B72Q	22:09:34	3973	298	203	22:09:35	65.4	75.8	16
11/26/03	22:59:28	MXA146	A320	22:54:59	3809	347	237	22:54:58	66.1	74.7	10
11/26/03	23:18:46	AWE629	B73Q	23:14:02	2985	262	179	23:14:09	69.4	79.1	17
11/26/03	23:35:41	FDX1801	MD11	23:18:03	3641	301	205	23:18:11	70.1	81.6	28
11/26/03	23:35:41	FDX1801	MD11	23:18:03	3641	301	205	23:31:41	74.4	85.6	30
11/26/03	23:35:41	FDX1801	MD11	23:31:32	2493	331	226	23:18:11	70.1	81.6	28
11/26/03	23:35:41	FDX1801	MD11	23:31:32	2493	331	226	23:31:41	74.4	85.6	30
11/27/03	1:04:26	AWE631	A319	0:59:58	3185	324	221	0:59:54	68.8	78.3	16
11/27/03	8:35:00	SWA3143	B733	8:29:44	3448	314	214	8:29:49	65.9	72.3	6
11/28/03	22:02:35	FDX1809	A306	21:58:15	3772	341	233	21:58:17	65.2	73.6	9
11/28/03	22:09:26	FDX1816	A306	22:05:13	3011	374	255	22:05:14	69.7	79.4	18
11/28/03	22:18:48	JBU256	A320	22:14:40	2565	328	224	22:14:40	68.3	77.6	16
11/29/03	0:47:40	PCE510	B752	0:43:31	3861	364	248	0:43:34	65.2	71.8	6
11/29/03	12:38:51	AWE632	A320	12:34:55	3287	331	226	12:34:59	65.3	72.3	7
11/29/03	13:38:27	JBU85	A320	13:34:46	3356	360	245	13:34:40	67.7	76.4	15
11/29/03	15:26:57	AWE625	B73Q	15:22:36	3001	301	205	15:22:43	68.3	76.8	12
11/29/03	16:27:21	JBU248	A320	16:23:31	3333	423	288	16:23:33	66.1	72.8	7
12/02/03	4:50:55	UPS944	B763	4:46:30	3674	269	183	4:46:38	65.4	71.9	7
12/02/03	4:54:23	FDX1151	MD10	4:50:10	3031	282	192	4:50:19	67.9	78.6	18
12/02/03	5:18:55	FDX1468	DC10	5:15:03	3815	357	243	5:15:09	67.1	78.5	19
12/02/03	9:08:45	FDX3807	MD11	9:04:35	3681	357	243	9:04:40	69.2	80.8	25
12/02/03	10:19:02	UAL389	B733	10:14:55	3877	324	221	10:15:02	66.4	73.9	9
12/02/03	10:29:25	FDX3810	A306	10:25:09	3799	341	233	10:25:12	68.8	79.2	20
12/02/03	10:31:25	FDX3015	DC10	10:27:05	3083	341	233	10:27:09	67.1	78.2	19
12/02/03	10:52:10	JBU93	A320	10:47:55	3914	354	241	10:48:00	66.4	75	11
12/02/03	11:33:05	AAL1705	MD82	11:29:07	2516	367	250	11:29:11	67	75.9	11
12/02/03	11:36:32	JBU315	A320	11:32:29	3136	344	235	11:32:33	68.2	76.6	12
12/02/03	11:43:50	FDX3814	A306	11:39:15	3435	308	210	11:39:26	69	79.3	21
12/02/03	11:52:54	CAA908	CRJ7	11:47:27	3205	314	214	11:47:25	65.4	71.5	6
12/02/03	11:54:41	JBU244	A320	11:50:39	4025	390	266	11:50:43	65.8	72.2	7
12/02/03	12:08:26	SWA1755	B733	12:04:07	2959	374	255	12:04:14	68.3	74.9	9
12/02/03	15:32:46	SWA866	B735	15:27:49	3047	255	174	15:27:55	69.8	78.6	16
12/02/03	16:32:26	SWA246	B737	16:28:44	2739	423	288	16:28:47	65.1	70.6	5
12/02/03	17:23:40	FDX3702	MD10	17:19:04	3211	265	181	17:19:08	66.9	78.3	20
12/02/03	17:37:03	FDX979	DC10	17:32:31	3166	282	192	17:32:30	69	82	29
12/02/03	17:47:54	UPS2956	B741	17:43:06	3195	295	201	17:43:11	67.3	78.1	17
12/02/03	19:35:14	UAL774	B733	19:30:24	3018	285	194	19:30:35	67	75	9
12/02/03	20:23:12	UAL269	A320	20:19:02	3431	364	248	20:19:06	66.5	75.6	12
12/02/03	20:29:16	FDX350	DC10	20:25:08	3812	344	235	20:25:12	67.1	78.3	19
12/02/03	20:36:48	JBU91	A320	20:32:28	3031	354	241	20:32:29	69.1	77.8	15
12/02/03	20:38:53	SWA555	B733	20:34:34	3031	328	224	20:34:41	65.9	73.6	8

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/02/03	21:08:47	AWE627	B73Q	21:04:22	2933	351	239	21:04:30	66.8	75.3	9
12/02/03	21:14:24	FDX1803	A306	21:09:56	3963	354	241	21:10:02	66.6	77	15
12/02/03	21:18:56	FDX1818	B722	21:14:34	2824	282	192	21:14:49	65.7	71.8	6
12/02/03	21:29:32	FDX86	MD10	21:24:55	2887	305	208	21:24:58	72.1	83.4	27
12/02/03	21:31:46	SWA1122	B735	21:27:16	3385	275	188	21:27:30	71.4	77.1	7
12/02/03	21:39:36	SWA1872	B733	21:33:58	2939	229	156	21:34:12	65.1	70.8	5
12/02/03	21:45:04	FDX1810	A310	21:39:53	3133	301	205	21:40:05	66.5	76.8	14
12/02/03	21:51:31	JBU107	A320	21:46:44	3198	318	217	21:46:46	66.1	73.7	8
12/02/03	21:52:49	FDX26	MD11	21:48:34	3051	272	185	21:48:52	68.8	80.1	21
12/02/03	22:04:03	FDX1809	A306	21:59:08	3490	285	194	21:59:19	69.3	79.1	20
12/02/03	22:11:30	FDX1816	MD10	22:07:02	3887	282	192	22:07:10	66.5	75.6	12
12/02/03	22:56:33	FDX1807	A306	22:52:10	3041	298	203	22:52:14	68.7	80.7	24
12/02/03	23:20:55	FDX1804	DC10	23:16:40	3041	337	230	23:16:45	70.5	82.1	23
12/02/03	23:22:50	FDX1801	MD11	23:18:25	3041	269	183	23:18:32	71.2	83.8	32
12/03/03	5:16:52	FDX1705	DC10	5:12:19	3359	328	224	5:12:21	65.8	77	18
12/03/03	5:22:57	FDX1468	DC10	5:18:38	3310	370	252	5:18:46	68.9	79.9	19
12/03/03	5:25:52	UPS946	B763	5:21:20	3057	337	230	5:21:26	65.8	74.4	9
12/03/03	7:02:27	FDX1020	DC10	6:57:46	3001	298	203	6:57:47	70.7	81	20
12/03/03	7:02:27	FDX1020	DC10	6:57:37	3038	305	208	6:57:47	70.7	81	20
12/03/03	7:54:49	FDX1151	MD10	7:50:00	2985	242	165	7:50:09	67.4	77	13
12/03/03	8:11:02	FDX3813	A306	8:06:25	3061	291	198	8:06:28	68.3	79	18
12/03/03	8:18:52	FDX3832	A310	8:14:18	3015	308	210	8:14:26	68.2	79.1	21
12/03/03	8:23:06	SWA1742	B737	8:18:33	3106	337	230	8:18:35	65.7	73.4	8
12/03/03	8:34:20	SWA1700	B733	8:29:36	2985	305	208	8:29:42	66	75	11
12/03/03	8:42:24	FDX3807	MD11	8:37:58	3582	262	179	8:38:11	65.3	74.8	11
12/03/03	8:45:29	SWA2675	B735	8:41:00	2483	370	252	8:41:08	68.8	76.5	10
12/03/03	9:07:15	SWA229	B733	9:02:17	2985	351	239	9:02:26	66.7	74.3	8
12/03/03	9:19:37	FDX3809	A306	9:14:54	2703	314	214	9:14:57	71.1	82.3	24
12/03/03	9:22:00	AWE620	A320	9:17:10	2746	291	198	9:17:14	66.6	75.9	12
12/03/03	9:33:00	SWA2166	B737	9:27:49	2545	216	147	9:27:57	68.8	77.5	13
12/03/03	10:28:53	FDX3015	DC10	10:24:25	3038	354	241	10:24:27	68.2	78.9	17
12/03/03	11:16:42	FDX3814	A300	11:12:07	2923	354	241	11:12:16	71.6	82.4	22
12/03/03	11:44:37	ASA339	B734	11:39:54	2998	311	212	11:40:07	65.6	73.6	8
12/03/03	13:01:04	UAL1519	A319	12:56:14	3779	324	221	12:56:23	65.1	72.6	7
12/03/03	14:31:39	ASA365	B734	14:26:45	3812	291	198	14:26:50	66.3	75.2	12
12/03/03	14:47:39	FDX3851	B72Q	14:42:33	2982	216	147	14:42:42	74.8	85.9	32
12/03/03	14:50:16	SWA1864	B735	14:44:57	2483	246	168	14:45:04	70.8	79.9	17
12/03/03	14:53:43	SWA525	B735	14:48:37	3868	223	152	14:48:43	68	78.8	19
12/03/03	15:01:02	SWA2536	B733	14:56:31	2985	347	237	14:56:38	67.1	73.8	8
12/03/03	15:43:33	SWA1973	B733	15:39:29	2870	416	284	15:39:30	66	74.8	10
12/03/03	17:22:44	ASA94	B734	17:18:06	3133	308	210	17:18:16	65.2	72.2	6
12/03/03	18:12:10	JBU300	A320	18:07:50	3136	305	208	18:07:51	65.7	75.5	13
12/03/03	18:20:56	SWA2275	B735	18:16:28	2486	308	210	18:16:35	69	78.3	13
12/03/03	18:22:01	UAL187	A320	18:17:47	2982	305	208	18:17:46	66	75.5	13
12/03/03	18:24:14	SWA2162	B733	18:19:53	2601	314	214	18:19:59	67.6	76.3	11
12/03/03	18:34:28	UAL269	A320	18:29:58	3989	331	226	18:30:02	65.3	72.2	7
12/03/03	20:12:53	FDX350	DC10	20:08:33	3270	334	228	20:08:36	70.7	80.2	21
12/03/03	21:00:51	FDX3702	MD10	20:56:39	3421	374	255	20:56:44	67.7	77.8	16

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/03/03	21:15:23	FDX1803	A306	21:11:10	3562	390	266	21:11:11	70.3	82.2	26
12/03/03	21:45:58	UAL569	A320	21:42:08	2250	344	235	21:42:11	72.1	81.8	19
12/03/03	22:11:07	FDX1816	MD10	22:07:35	3832	416	284	22:07:42	68.1	78.3	16
12/03/03	23:17:23	FDX1801	MD11	23:13:18	3129	357	243	23:13:35	68.1	80	24
12/03/03	23:32:23	JBU95	A320	23:28:30	3510	377	257	23:28:36	66.2	75.8	13
12/06/03	21:14:08	JBU91	A320	21:09:51	2988	291	198	21:09:46	67.7	77.3	16
12/06/03	21:17:13	UAL569	A320	21:12:05	2988	311	212	21:12:07	67.6	77.7	15
12/06/03	21:29:27	AWE627	B733	21:24:59	3290	305	208	21:25:06	67.4	72.7	5
12/06/03	22:01:35	MXA148	A320	21:57:32	2949	334	228	21:57:30	69.2	76.8	11
12/06/03	23:10:18	JBU256	A320	23:05:31	3024	341	233	23:05:33	68.6	79.2	21
12/07/03	0:20:15			0:15:28	3270	291	198	0:15:31	68	77.4	14
12/07/03	1:05:29	FFT8506		1:00:53	3264	308	210	1:00:48	65.8	77.3	19
12/07/03	1:36:15	FDX1812	DC10	1:31:48	3159	295	201	1:31:51	67.8	77.8	14
12/07/03	8:26:05	SWA939	B735	8:21:28	2867	331	226	8:21:33	69.6	76.2	8
12/07/03	9:16:07	SWA2166	B733	9:11:40	3011	341	233	9:11:46	69.2	74.2	7
12/07/03	9:28:26	AWE620	A320	9:23:45	3231	311	212	9:23:46	67.7	77.3	17
12/07/03	9:38:08	SWA1210	B733	9:33:28	3018	321	219	9:33:33	67.8	73.7	6
12/07/03	10:21:36	SWA1112	B735	10:17:10	3323	288	196	10:17:14	66.7	75.2	10
12/07/03	11:54:53	SWA135	B737	11:50:27	2870	285	194	11:50:23	66.2	74.1	10
12/07/03	12:07:25	ASA326	MD80	12:03:03	2828	275	188	12:03:14	71.1	81	20
12/07/03	12:40:42	AWE621	B733	12:36:20	3444	275	188	12:36:26	66.1	73.2	8
12/07/03	13:03:37	SWA2673	B733	12:59:34	2355	416	284	12:59:33	67.2	74.9	9
12/07/03	13:12:55	JBU101	A320	13:08:23	3330	314	214	13:08:22	69.6	76.5	13
12/07/03	13:52:32	COA1465	B737	13:48:11	2601	308	210	13:48:12	67.4	76.5	13
12/07/03	16:12:31	SWA485	B735	16:08:05	2119	387	264	16:08:03	67.2	76.1	11
12/07/03	16:36:43	MXA968	A320	16:32:08	3264	314	214	16:32:04	68.9	77.6	17
12/07/03	17:07:12	SWA1216	B737	17:03:10	2821	380	259	17:03:08	65.6	72.1	6
12/07/03	17:27:23	SWA2040	B735	17:22:26	2096	367	250	17:22:26	65.6	75.4	12
12/07/03	17:30:18	CAA855	CRJ7	17:24:33	2057	278	190	17:24:33	68.3	79	20
12/07/03	17:34:19	SWA751	B735	17:29:06	2030	275	188	17:29:12	70	79.7	18
12/07/03	17:36:00	SWA445	B733	17:30:29	2847	275	188	17:30:31	69.7	78.9	16
12/07/03	17:38:10	UPS950	B763	17:32:54	2122	252	172	17:32:52	68.9	77.7	16
12/07/03	18:19:01	ASA94	B734	18:14:21	3054	288	196	18:14:28	67	74.2	8
12/07/03	18:32:02	SWA2275	B735	18:27:25	2457	341	233	18:27:34	66.3	75.1	9
12/07/03	19:43:47	AAL1573	MD82	19:38:58	3385	282	192	19:39:06	65.6	73.4	8
12/07/03	20:06:43	JBU91	A320	20:02:08	3103	278	190	20:02:04	67.2	77.9	20
12/07/03	21:03:48	SWA2311	B733	20:59:18	2860	305	208	20:59:20	67.1	77.4	14
12/07/03	21:28:44	MXA148	A320	21:24:07	3054	291	198	21:24:05	68.4	78.9	25
12/07/03	21:35:02	JBU256	A320	21:30:12	2493	321	219	21:30:10	68	77.2	15
12/07/03	21:44:20	UAL569	A320	21:39:49	3799	295	201	21:39:48	66.6	76.1	13
12/07/03	21:49:30	FDX3707	MD10	21:44:31	3185	301	205	21:44:27	69.6	81.2	24
12/07/03	22:28:24	SWA375	B733	22:23:13	3763	269	183	22:23:17	67	76.2	13
12/07/03	23:29:42	SWA1320	B733	23:24:43	2011	354	241	23:24:43	66.4	76.1	12
12/08/03	7:40:54	SWA811	B737	7:36:52	2582	400	273	7:36:51	66.6	75	9
12/08/03	8:05:08	UAL596	A319	8:01:16	3871	337	230	8:01:11	65.2	74	10
12/08/03	8:12:26	JBU242	A320	8:07:57	3854	311	212	8:07:58	65.4	73.8	9
12/08/03	12:47:53	UAL639	A320	12:44:09	3346	393	268	12:44:05	65.2	71.8	6
12/08/03	18:30:31	SWA511	B737	18:26:46	2526	426	290	18:26:44	68.8	76.9	11

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/08/03	21:37:07	JBU107	A320	21:33:03	3077	311	212	21:33:05	65.3	72.4	7
12/08/03	22:18:01	SWA2028	B733	22:13:09	3041	331	226	22:13:09	65.7	72.6	7
12/08/03	22:25:01	FDX1816	MD10	22:20:54	2959	311	212	22:20:52	71.4	83.2	29
12/09/03	8:18:20	FDX3813	A306	8:13:56	3750	351	239	8:13:53	67.7	78.4	19
12/10/03	3:15:15	UPS962	B763	3:09:51	4012	265	181	3:09:49	66.3	71.4	5
12/10/03	4:59:59	UPS946	B763	4:54:56	3313	255	174	4:54:56	66.1	75.4	11
12/10/03	5:52:21	ABX406	B762	5:47:48	3418	364	248	5:47:49	68.6	78.7	17
12/10/03	5:54:26	FDX1468	DC10	5:49:59	3316	288	196	5:50:01	66.8	77.9	18
12/10/03	7:07:53	AAH473	B737	7:03:32	3126	354	241	7:03:33	67.4	76.7	15
12/10/03	7:15:08	SWA1070	B733	7:10:52	2565	318	217	7:10:59	69.6	76.2	8
12/10/03	7:36:32	FDX3832	A310	7:31:38	3001	265	181	7:31:26	68.9	81.3	31
12/10/03	7:57:05	UAL596	A319	7:52:21	2883	357	243	7:52:22	66.6	73.9	8
12/10/03	8:04:47	SWA850	B735	8:00:44	2473	360	245	8:00:50	67.3	76.1	12
12/10/03	8:09:05	JBU242	A320	8:04:13	2582	288	196	8:04:10	72	80.8	22
12/10/03	8:20:24	FDX3813	A306	8:15:16	2483	259	177	8:15:19	69.2	81.4	26
12/10/03	8:22:47	SWA1821	B733	8:17:53	2221	265	181	8:18:00	69.8	79.5	15
12/10/03	9:09:58	FDX3807	MD11	9:05:30	3001	242	165	9:05:36	69.8	81	27
12/10/03	9:16:26	FDX3831	B72Q	9:11:44	3310	318	217	9:11:44	68	77.5	14
12/10/03	9:18:26	SWA229	B733	9:13:37	2657	246	168	9:13:47	66.9	76.5	14
12/10/03	9:42:35	SWA720	B733	9:38:23	3395	295	201	9:38:27	65.2	74	10
12/10/03	9:56:17	FDX3802	MD10	9:51:28	2588	269	183	9:51:38	67.5	77.3	12
12/10/03	10:37:40	JBU93	A320	10:33:24	2988	314	214	10:33:15	66.4	71.1	5
12/10/03	10:37:40	JBU93	A320	10:33:24	2988	314	214	10:33:25	67.5	76	10
12/10/03	10:39:50	SWA801	B733	10:35:21	3608	285	194	10:35:26	66.8	75.4	10
12/10/03	10:42:36	DAL1925	B738	10:38:19	3031	367	250	10:38:16	70.8	80	18
12/10/03	11:04:08	FDX3810	A306	10:59:27	2627	360	245	10:59:32	73.8	82.7	20
12/10/03	11:07:40	FDX3818	B72Q	11:02:55	2713	301	205	11:02:58	70.6	79.6	18
12/10/03	11:19:27	FDX3814	A306	11:15:18	3070	331	226	11:15:19	69.8	81	23
12/10/03	11:51:18	MXA968	A320	11:47:14	3848	305	208	11:47:09	66.9	73.4	8
12/10/03	11:54:36	ASA326	MD80	11:50:04	3008	288	196	11:50:11	65.5	74.2	9
12/10/03	12:02:36	SWA692	B737	11:58:18	3031	314	214	11:58:19	67.7	77.5	16
12/10/03	12:20:59	SWA1547	B735	12:16:15	3008	314	214	12:16:22	70.2	77	12
12/10/03	13:16:40	UAL1519	A319	13:12:21	3320	291	198	13:12:19	65.9	76.1	15
12/10/03	13:23:35	FDX3075	A306	13:18:58	3018	282	192	13:19:02	68.5	79.9	24
12/10/03	13:53:09	JBU85	A320	13:48:42	3651	318	217	13:48:41	66.7	76.2	14
12/10/03	14:01:50	JBU250	A320	13:57:36	3323	311	212	13:57:36	67	76.8	17
12/10/03	14:03:41	UAL639	A320	13:59:12	3812	351	239	13:59:11	67.3	75.8	12
12/10/03	14:27:46	SWA1105	B735	14:23:33	3369	324	221	14:23:35	66.3	76.7	16
12/10/03	14:44:19	SWA525	B735	14:40:10	2513	406	277	14:40:08	67.1	74.7	10
12/10/03	15:01:15	SWA2536	B737	14:57:02	2290	403	275	14:57:01	67.6	74.9	8
12/10/03	16:00:11	SWA359	B733	15:56:01	2014	370	252	15:55:59	66.8	76.7	13
12/10/03	16:16:16	UAL765	B735	16:11:40	3454	298	203	16:11:43	66	76.6	14
12/10/03	16:41:21	JBU248	A320	16:37:21	3490	390	266	16:37:22	65.3	70.6	5
12/10/03	17:11:58	SWA1216	B737	17:07:42	3175	311	212	17:07:39	65.2	73.4	10
12/10/03	17:41:31	FDX3702	MD10	17:37:05	3005	337	230	17:37:07	66.7	77.6	16
12/10/03	17:43:44	UPS2956	B741	17:39:26	3812	305	208	17:39:26	68.2	80.9	26
12/10/03	17:51:54	CAA855	CRJ7	17:47:11	3300	295	201	17:47:09	66	72.2	6
12/10/03	18:11:08	FDX3728	B72Q	18:06:26	3854	265	181	18:06:31	68.9	81	27

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/10/03	18:21:26	FDX715	MD10	18:17:00	3467	298	203	18:17:05	66.5	78.3	22
12/10/03	20:16:09	SWA206	B733	20:11:32	2765	308	210	20:11:37	68.5	77.9	15
12/10/03	20:35:37	FDX350	DC10	20:31:10	2788	314	214	20:31:15	66.3	74.1	9
12/10/03	21:02:29	SWA2218	B737	20:58:43	2969	364	248	20:58:48	65.3	72.5	7
12/10/03	21:34:31	SWA886	B737	21:30:15	2529	278	190	21:30:22	66.5	72	6
12/10/03	21:36:08	FDX26	MD11	21:32:09	2811	282	192	21:32:24	66.3	75.3	12
12/10/03	21:46:27	MXA148	A320	21:41:57	3375	269	183	21:41:55	68.1	76.2	14
12/10/03	21:57:51	FDX1810	A310	21:53:10	3001	285	194	21:53:11	68.5	79.3	20
12/10/03	22:05:05	UAL569	A320	22:00:39	3047	285	194	22:00:37	68.5	77.6	16
12/10/03	22:08:06	FDX1809	A306	22:03:41	3123	328	224	22:03:45	73	82.1	24
12/10/03	22:25:34	FDX1814	B722	22:20:40	3300	282	192	22:20:42	65.1	71.1	6
12/10/03	22:38:13	SWA278	B737	22:32:28	3228	232	158	22:32:29	65.9	73.3	8
12/10/03	23:13:44	FDX1802	MD10	23:08:22	3382	200	136	23:08:32	70.5	80.7	22
12/10/03	23:29:45	FDX1801	MD11	23:24:26	3887	206	140	23:24:16	68.1	82.2	44
12/10/03	23:32:41	SWA1320	B737	23:27:09	2946	223	152	23:27:15	65.8	71.8	6
12/10/03	23:37:18	FDX1804	DC10	23:32:14	3838	252	172	23:32:21	66.3	77.9	22
12/10/03	23:40:09	FDX1800	DC10	23:34:45	3074	200	136	23:34:46	76.2	89.8	53
12/11/03	3:18:06	UPS962	B763	3:13:31	3897	272	185	3:13:31	66.4	77	18
12/11/03	4:00:03	FDX1020	DC10	3:55:39	3904	311	212	3:55:45	65.4	72.5	7
12/11/03	4:42:27	FDX1151	MD10	4:36:56	3517	242	165	4:37:05	67.7	75.1	11
12/11/03	5:27:52	FDX1468	DC10	5:22:48	3100	282	192	5:22:51	68.3	79.4	20
12/11/03	7:33:57	FDX3832	A310	7:28:58	3028	305	208	7:29:01	71.9	83.4	27
12/11/03	7:58:31	UAL596	A320	7:53:32	3845	298	203	7:53:30	67.2	75.2	10
12/11/03	8:01:22	JBU242	A320	7:56:33	3467	305	208	7:56:34	66.6	77.3	18
12/11/03	8:41:28	FDX3831	B72Q	8:36:20	3927	246	168	8:36:28	69.6	79.8	22
12/11/03	8:43:47	SWA2185	B733	8:38:24	2746	255	174	8:38:28	70.3	77.8	13
12/11/03	8:45:38	FDX3807	MD11	8:40:38	4032	259	177	8:40:41	66.9	78.1	20
12/11/03	9:01:30	FDX3809	A306	8:56:06	2923	265	181	8:56:11	68.5	80.2	25
12/11/03	9:11:40	SWA229	B733	9:06:42	2713	265	181	9:06:52	66.9	72.7	6
12/11/03	10:22:08	SWA1053	B733	10:17:27	2732	337	230	10:17:33	66.7	74.3	9
12/11/03	10:31:41	SWA393	B735	10:26:58	2752	308	210	10:27:03	66	74.5	11
12/11/03	12:04:14	FDX3814	A306	11:59:13	2585	321	219	11:59:19	73.9	83.8	24
12/11/03	12:15:52	JBU101	A320	12:10:46	3664	301	205	12:10:44	67.1	77.5	19
12/11/03	12:37:07	AWE621	B733	12:32:18	3011	282	192	12:32:17	65.4	73.8	11
12/11/03	12:54:16	FDX3806	MD11	12:48:52	2772	232	158	12:48:57	69.1	80	24
12/11/03	13:25:45	FDX3075	A306	13:21:01	2992	334	228	13:21:05	70.7	80.8	23
12/11/03	14:08:36	JBU250	A320	14:04:01	3802	351	239	14:04:02	66.5	71.8	6
12/11/03	14:56:31	SWA2536	B733	14:52:46	4032	370	252	14:52:49	67.3	75.4	10
12/11/03	17:19:09	UPS2946	B763	17:15:07	3917	413	282	17:15:07	65.5	73	7
12/11/03	17:25:18	FDX979	DC10	17:20:47	3297	282	192	17:20:48	65.8	75.8	13
12/11/03	18:25:10	PCM7702	C208	18:19:58	2870	236	161	18:19:56	67	73.8	7
12/11/03	18:29:37	JBU300	A320	18:24:41	2522	331	226	18:24:41	72.5	81.7	20
12/11/03	18:41:23	FDX350	DC10	18:36:42	3011	308	210	18:36:46	67.1	78	16
12/11/03	18:43:10	PCM7680	C208	18:38:08	3425	272	185	18:38:07	65.7	72.1	6
12/11/03	19:39:04	SWA1942	B733	19:34:37	2372	377	257	19:34:38	65.2	73.4	9
12/11/03	19:41:41	JBU91	A320	19:37:50	2998	351	239	19:37:50	68	79.2	22
12/11/03	20:08:16	UAL8233	A319	20:03:31	3677	318	217	20:03:30	67.7	77.5	17
12/11/03	20:17:02	SWA2346	B733	20:13:02	2047	374	255	20:13:03	67.1	76.5	12

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/11/03	21:17:55	SWA389	B735	21:13:17	2959	305	208	21:13:20	69.1	77	12
12/11/03	21:20:05	JBU107	A320	21:15:48	3008	328	224	21:15:47	67.4	76.5	14
12/11/03	21:28:23	FDX1803	A306	21:23:27	4507	295	201	21:23:33	66	78	23
12/11/03	21:32:22	FDX26	MD11	21:28:13	2578	295	201	21:28:25	67.1	77.5	16
12/11/03	21:38:27	SWA2218	B737	21:33:56	2513	295	201	21:34:01	65.8	76.2	13
12/11/03	21:49:13	SWA1872	B733	21:44:32	3444	272	185	21:44:39	66	74.1	9
12/11/03	21:51:45	JBU256	A320	21:47:09	3832	295	201	21:47:13	65.1	71.1	6
12/11/03	23:29:07	JBU95	A320	23:24:48	2979	321	219	23:24:42	67.9	79.5	23
12/11/03	23:30:58	FDX1800	DC10	23:26:32	2998	298	203	23:26:39	67.7	79.4	21
12/11/03	23:40:26	ASA476	MD80	23:35:40	3257	262	179	23:35:41	67.1	77.8	16
12/11/03	23:51:58	FDX1801	MD11	23:47:34	3900	259	177	23:47:40	68	80.1	24
12/12/03	7:09:25	FDX3832	A310	7:05:13	2972	318	217	7:05:17	68.4	79.9	21
12/12/03	7:14:52	SWA1070	B733	7:10:45	2001	351	239	7:10:49	66.9	75	9
12/12/03	8:24:25	FDX3813	A306	8:19:43	3087	311	212	8:19:46	69.4	81.5	25
12/12/03	8:34:49	FDX3831	B72Q	8:30:16	3070	255	174	8:30:22	71	83.1	34
12/12/03	8:36:07	FDX3837	A306	8:32:04	3812	298	203	8:32:02	66	74.4	11
12/12/03	8:38:30	SWA1700	B733	8:33:59	3083	265	181	8:34:03	65.6	74.4	10
12/12/03	8:43:58	FDX3805	A306	8:39:32	2985	278	190	8:39:34	65.5	75.7	13
12/12/03	9:06:03	FDX3809	A306	9:01:23	3041	308	210	9:01:22	70.2	81.5	23
12/12/03	9:25:08	SWA786	B737	9:21:04	3822	364	248	9:21:05	68.5	78	18
12/12/03	9:29:03	FDX3802	MD10	9:24:50	3786	331	226	9:24:50	68.2	78.3	18
12/12/03	9:50:31	FDX3810	A306	9:46:16	3910	305	208	9:46:18	66.1	74.2	10
12/12/03	10:29:36	FDX3818	B722	10:25:26	2995	298	203	10:25:36	67.6	78.2	18
12/12/03	11:01:51	SWA1609	B733	10:57:26	2995	328	224	10:57:30	66.5	72.8	6
12/12/03	11:06:28	SWA342	B735	11:01:56	2513	308	210	11:01:56	70	79.1	13
12/12/03	11:07:56	FDX3814	A306	11:03:39	2496	291	198	11:03:43	68.2	79.4	19
12/12/03	12:01:33	SWA1121	B733	11:57:34	2539	291	198	11:57:39	70.1	77	9
12/12/03	12:03:38	FDX3015	DC10	11:59:27	3041	314	214	11:59:25	68.5	79.3	19
12/12/03	12:20:47	AWE621	B733	12:16:12	3809	347	237	12:16:13	65.1	72.1	7
12/12/03	12:47:38	UAL639	A319	12:43:36	3001	334	228	12:43:37	67.3	75.5	11
12/12/03	13:39:37	FDX3075	A306	13:35:08	3599	298	203	13:35:15	71.1	78.8	21
12/12/03	14:36:09	SWA1809	B733	14:32:00	2221	367	250	14:32:06	71.3	77.1	7
12/14/03	7:08:15	AAH473	B737	7:03:07	2503	269	183	7:03:13	66.1	75	10
12/14/03	7:57:16	JBU242	A320	7:52:17	2211	269	183	7:52:19	69.4	80.1	21
12/14/03	8:48:26	SWA2675	B735	8:43:36	2047	337	230	8:43:40	70.9	78.9	13
12/14/03	12:19:49	SWA432	B733	12:15:22	2778	301	205	12:15:30	69.3	77.9	16
12/14/03	12:50:44	AWE632	A320	12:46:32	3562	341	233	12:46:35	67.7	78	19
12/14/03	13:14:03	UAL1519	A320	13:09:24	3149	278	190	13:09:24	67.3	75.8	11
12/14/03	14:49:38	DAL9860	B763	14:44:56	3533	285	194	14:44:59	70.5	74.5	6
12/14/03	17:34:37	FDX3707	MD10	17:30:01	3028	262	179	17:30:02	67.8	78.8	20
12/14/03	18:51:19	JBU300	A320	18:46:36	2040	360	245	18:46:42	67.4	76.8	13
12/14/03	20:08:23	UPS3952	B752	20:03:35	3129	298	203	20:03:40	68.4	73	6
12/14/03	21:49:29	SWA1872	B733	21:45:11	2411	314	214	21:45:19	70.9	80.7	16
12/14/03	22:18:56	JBU256	A320	22:14:46	2496	396	270	22:14:45	66.3	74.3	9
12/14/03	22:21:52	UAL371	A319	22:17:01	3070	282	192	22:16:58	65.3	74.2	11
12/14/03	23:31:36	JBU319	A320	23:27:19	2769	308	210	23:27:18	68.4	78.1	15
12/15/03	8:44:27	JBU242	A320	8:40:20	3011	341	233	8:40:22	69.7	78.9	16
12/15/03	14:05:01	JBU250	A320	14:00:55	3208	314	214	14:00:55	65.9	72.4	7

Date	Time	Flight#	Aircraft	GatePen	Altitude (msl)	Speed (f/s)	Speed (m/h)	Lmax Time	Lmax	SEL	Duration
12/15/03	17:31:23	UAL379	A319	17:26:54	2992	337	230	17:26:55	66.3	74.1	9
12/15/03	18:10:55	JBU300	A320	18:06:23	3435	324	221	18:06:23	65.1	73.4	9
12/15/03	19:59:26	UPS1001	B742	19:55:53	4009	416	284	19:55:52	71.9	81.8	22
12/15/03	20:03:53	JBU91	A320	19:59:48	3769	344	235	19:59:52	70	79.4	19
12/15/03	20:15:58	UAL395	A320	20:11:51	3077	311	212	20:11:52	66.2	75.7	13
12/15/03	21:18:57	FDX1803	A306	21:14:35	3057	328	224	21:14:33	69.3	79.2	18
12/15/03	23:10:32	JBU319	A320	23:06:32	3864	354	241	23:06:21	73.7	77.4	5
12/15/03	23:14:46	FDX1804	DC10	23:10:45	3005	360	245	23:10:47	68.7	78.6	16
12/16/03	3:45:00	UPS962	B741	3:40:59	3024	374	255	3:40:58	72.2	81.9	20
12/16/03	7:59:40	JBU242	A320	7:55:57	2683	370	252	7:55:56	68.3	77.9	15
12/16/03	8:49:17	FDX3805	A306	8:45:14	2726	374	255	8:45:21	66.7	76.4	14
12/16/03	13:27:01	FDX3075	A306	13:22:44	3658	337	230	13:22:43	65.8	70.8	5
12/16/03	17:40:57	ASA385	B734	17:36:32	3940	328	224	17:36:39	65.7	75.2	13
12/16/03	18:09:02	UPS2946	B741	18:04:28	3753	288	196	18:04:38	68.9	78.8	15
12/16/03	18:10:43	FDX1817	B722	18:06:18	3166	301	205	18:06:28	68.5	79.3	19
12/16/03	18:12:38	JBU300	A320	18:08:33	3225	367	250	18:08:39	66.4	74.7	10
12/16/03	18:15:10	AWE623	B733	18:10:41	3038	282	192	18:10:49	66.3	73.6	8