



LAX/Community Noise Roundtable

Work Program Item A12

Noise Exposure From A320 Family of Aircraft:
United Airlines Vortex Generator Retrofit Program

November 8, 2017

What is a Vortex Generator and How Does it Reduce Noise?



A Vortex Generator (VG) is a small metal device that disrupts the air flow over an opening in the wing of the A320 family of aircraft

- Installing VGs reduces a high-pitched tonal noise during the approach phase of flight by 2 to 6 decibels
- Many new A-320 aircraft manufactured after March 2014 are equipped with the VGs
- A-320 aircraft manufactured before March 2014 are not equipped with VGs, but can be retrofitted
- In 2014, LAWA identified the airlines that operate the A-320 family of aircraft at LAX and quantified the number of historic operations



Photo Credit: Lufthansa

What is a Vortex Generator and How Does it Reduce Noise?



The VG, shown here mounted upstream of a circular opening used to equalize the pressure in wing fuel tanks, reduces the whistling noise produced by the Airbus 320 family of aircraft.

Photo Credit: Lufthansa

Historic A320 Arrivals at LAX



| Time Period | Total Arrivals | A318-A321 Arrivals | A318-A321 Arrivals (%) |
|-------------|----------------|--------------------|------------------------|
| August 2010 | 24,864 | 3,808 | 15.3 |
| August 2012 | 26,599 | 4,132 | 15.5 |
| August 2014 | 28,074 | 4,883 | 17.4 |

In August 2014, 17% of LAX arrivals consisted of A318-A321 aircraft.

| August 2014 | | | | | |
|-------------|-------------------------------------|--------------------|----------------|-----------------------|-------------------------|
| Airline ID | Airline | A318-A321 Arrivals | Total Arrivals | % of Airline Arrivals | Size of A318-A321 Fleet |
| VRD | Virgin America* | 1200 | 1200 | 100% | 53 |
| UAL | United | 821 | 3318 | 25% | 152 |
| AWE | US Airways+ | 560 | 564 | 99% | 265 |
| AAL | American | 447 | 3045 | 15% | 49 |
| DAL | Delta | 381 | 2334 | 16% | 128 |
| JBU | JetBlue | 311 | 311 | 100% | 135 |
| NKS | Spirit | 279 | 279 | 100% | 61 |
| ACA | Air Canada | 243 | 259 | 94% | 70 |
| ROU | Air Canada Rouge | 186 | 186 | 100% | 20 |
| VOI | Volaris | 181 | 181 | 100% | 51 |
| FFT | Frontier | 123 | 123 | 100% | 55 |
| TAI | Taca International | 106 | 106 | 100% | 43 |
| LRC | Lineas Aeras Costarricenses (LACSA) | 31 | 31 | 100% | 15 |
| AAV | Alegiant Air | 9 | 210 | 4% | 11 |
| GA | General Aviation | 5 | 745 | 1% | |

15 airlines make up those A318-A321 arrivals, and 80% of these arrivals were by four airlines.

In some cases, an airline's entire fleet consists of A320 aircraft.

*Virgin America merged with Alaska Airlines in 2016

+US Airways merged with American Airlines in 2015

The United Airlines VG Retrofit Program



LAWA and the LAX Roundtable considered several options for encouraging the A-320 operators to retrofit their aircraft

- The Roundtable encouraged LAWA to pursue discussions with United Airlines, which had already been considering whether to install the VGs on its aircraft
- LAWA Executive Director Deborah Ale Flint sent a letter to United Airlines requesting that it voluntarily install the VGs on its aircraft
- Based on LAWA's and San Francisco International Airport's written request, United decided to undertake a VG retrofit program on its fleet of A319 and A320 aircraft

The United Airlines VG Retrofit Program (cont.)



United Airlines had intended to give a presentation on their VG retrofit program this evening, but were unable to attend due to a schedule conflict. United provided the following text to share with the LAX Roundtable:

- United works in partnership with the Federal Aviation Administration, international air navigation service providers and our airport partners to improve the noise levels around our airports. However, our most important noise-reduction initiative is investing billions of dollars in new, quieter, more fuel efficient aircraft.
- Additionally, in 2017, United began installing vortex generators on its Airbus 319/320 fleet to reduce the unique whistling sound that occurs at slower speeds on arrival due to the wing design.
- The VG retrofit program includes over 150 aircraft and will extend over several years.
- The modification is being accomplished during scheduled heavy maintenance checks due to the requirement to drain the fuel tanks to complete the VG installation.



Photo Credit: United Airlines

The United Airlines VG Retrofit Program (cont.)



- United's first VG retrofit was completed in mid-August 2017
- United expects to complete approximately 12 additional aircraft by the end of 2017
- The VG retrofits are expected to continue at a rate of about 2-3 aircraft per month into the future
- The VG retrofit schedule is totally dependent on the heavy maintenance requirements of each aircraft and are accomplished at SFO and other maintenance facilities around United's system
- The aircraft are out of service for an extended period to accomplish all of the required maintenance



Other VG Retrofit Requests

In addition to United Airlines, the San Francisco International Airport Airport/Community Roundtable (SFO ACRT) requested several airlines operating A-320 aircraft at SFO to voluntarily retrofit their aircraft with VGs including Virgin America and jetBlue

- Virgin America was considering SFO ACRT's request at the time the Alaska Airlines acquisition was in process
- As of this date, Virgin America has not committed to undertaking a VG retrofit program
 - In August 2014, Virgin America had the highest amount of A-320 arrivals at LAX
- jetBlue indicated to the SFO ACRT that while its A320s manufactured after March 2014 have VGs, the airline would not commit to retrofitting its older A-320s

Given the positive results from LAWA's outreach to United Airlines, LAWA is in the process of making similar requests of other airlines that operate the A320 family of aircraft at LAX

The United Airlines VG Retrofit Program



Questions?