APPENDIX F REQUESTS TO FAA REGARDING USER-DEFINED AIRCRAFT IN INM VERSION 7.0B, NOISE-POWER-DISTANCE CURVE ADJUSTMENTS FOR THE GIII AIRCRAFT WITH HUSHKITS, AND A NON-STANDARD DESCENT ANGLE TO RUNWAY 16R

As discussed in Section 5.1.5, LAWA requested FAA guidance and approval on three matters: (1) user-defined aircraft in the INM Version 7.0b, (2) noise-power-distance (NPD) curve adjustments for the GIII aircraft with hushkits, and (3) a non-standard descent angle to Runway 16R. The following pages present copies of LAWA's request on this matter.

Appendix H presents FAA's response to these requests. The noise contours presented in this document followed the FAA guidance.

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Los Angeles World Airports

August 31, 2010

Victor Globa
Environmental Protection Specialist
Federal Aviation Administration
Western-Pacific Region
Los Angeles Airports District Office
P.O. 92007
Los Angeles, CA 90009-2007

Subject: Request for Approval of Integrated Noise Model User-defined Profiles in Support of the Noise Exposure Map Update at Van Nuys Airport

Dear Mr. Globa:

Los Angeles World Airports would like to request the Federal Aviation Administration's (FAA) approval of user-defined profiles to be used in updating the Noise Exposure Maps (NEMs) for Van Nuys Airport (VNY). As you know, the FAA accepted the existing VNY NEMs in April of 2009. The FAA issued the Record of Approval (ROA) for the VNY Part 150 Noise Compatibility Plan (NCP) in October of 2009. In the transmittal of the ROA, the FAA had some concern with the fact that the operational data used to develop the NEMs was now over 10 years old, and indicated that it would be appropriate for LAWA to revise the NEMs due to their age.

LAWA is developing existing and forecast noise exposure contours for VNY in support of the FAA Part 150 NEM Update. Consistent with FAA policies and procedures, we are submitting this package of written requests for approval to use some user-defined aircraft profiles in the Integrated Noise Model (INM) Version 7.0b based on local operator procedures, npd curve adjustments for GIII aircraft with hushkits, and the non-standard descent angle to Runway 16R.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, the FAA approved requests for noise abatement departure profiles for the Lear 25, Lear 35, and Boeing 727 aircraft operated by Clay Lacy Aviation, the Gulfstream IV aircraft operated by the Air Group, and the A-3 aircraft operated by Raytheon. The User-defined profiles for these aircraft types are submitted for FAA/AEE review in accordance with the INM 7.0 User's Guide, "Appendix B: FAA Profile Review and Checklist." The profile information submitted for FAA review and approval is included as attachments to this cover letter. Since these approvals were with a previous version of the INM, each attachment begins with an updated comparison of the departure SEL values for the standard and user-defined profiles derived from INM 7.0b followed by the previous submittal and FAA approval letter. INM Study "EW_INM70b_sdy" is included in a zip file to this overall submittal.

In addition, for VNY the FAA approved a user-defined aircraft for the Gulfstream III (GIII) recertified to 14 CFR Part 36 Stage 3 via hushkit installations. With the publishing of aircraft certification data in FAA AC36-1H for the GIIB/GIII with hushkits, this analysis has been revised to reflect this additional information.

1 World Way Los Angeles California 90045-5803 Mail P.O. Box 92216 Los Angeles California 90009-2216 Telephone 310 646 5262 Internet www.lawa.aero

Victor Globa
Environmental Protection Specialist
Federal Aviation Agency
August 31, 2010
Page 2 of 2

The analysis is included in an attachment along with the previous submittal and FAA approval letter. INM Study "EW_HUSHKIT_INM70b_sdy" is included in a zip file to this overall submittal.

The final attachment is a request for approval to modify the existing arrival profiles for aircraft that would arrive at VNY on Runway 16R which has a 3.9-degree descent angle for both visual and ILS approaches. This modification would be limited to those aircraft types which land on Runway 16R and which have procedure profiles identified in INM. The only requested change is to alter the descent angle from 3.0 to 3.9 degrees. Aircraft with "profile points" appear to have few operations on Runway 16R and therefore it would not be cost effective to derive revised approach profiles for these limited few aircraft. INM Study "EW_INM70b_sdy" is included in a zip file to this overall submittal.

The INM studies and inputs files are provided in an attached zip file to the email transmitting this request.

LAWA requests that the FAA approve the use of these user-defined departure and arrival profiles and npd curve derivations in INM 7.0b for the VNY NEM Update. If you have any specific comments or questions related to this request, please feel free to contact Robert Behr of Harris Miller Miller & Hanson (HMMH) at (916) 368-0707, ext. 2226 or me at (424) 646-6499.

Thank you for your assistance on this matter.

Sincerely yours,

Scott Tatro
Environmental Affairs Officer

SMT:mw

Attachments (submitted electronically only):

Clay Lacy Lear 25 Departure Profile
Clay Lacy Lear 35 Departure Profile
Clay Lacy Boeing 727 Departure Profile
Air Group Gulfstream IV Departure Profile
Raytheon A-3 Departure Profile
Gulfstream III with Hushkits
Runway 16R Aircraft Arrival Profiles for 3.9-degree Descent Angle
ZIP File with INM 7.0b Studies and Detailed Hushkit Calculation Spreadsheet

cc: M. Feldman
R. Freeman
R. Behr

T:\ENVMGT\2010\010180SMT\PCDOCS#273770v1

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Clay Lacy Lear 25 Departure Profile

This memorandum requests FAA approval of a user-defined departure profile for the Lear 25 flown by Clay Lacy Aviation for use in the VNY NEMs Update.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined departure profile for the Clay Lacy Lear 25. The previous analysis, which used INM 6.2, and FAA approval are included as attachments. The revised SEL comparison using INM7.0b is shown in the following tables.

Table 1 Departure SEL Values for Proposed Lacy Lear25 Profile versus Lear25 Standard Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	Lear25 (SEL, dB)	Lacy Lear25 (SEL, dB)	Difference (dB)
0.5	145.2	145.2	0.0
1.0	121.2	116.0	-5.2
1.5	112.6	109.6	-3.0
2.0	108.0	105.3	-2.7
2.5	105.1	102.9	-2.2
3.0	101.3	100.6	-0.7
3.5	99.3	99.3	0.0
4.0	97.6	98.4	0.8
4.5	96.4	97.2	0.8
5.0	95.2	96.0	0.8
5.5	94.1	95.0	0.9
6.0	92.8	93.8	1.0
6.5	91.6	92.4	0.8
7.0	90.5	91.4	0.9
7.5	89.5	90.4	0.9
8.0	88.5	89.3	0.8
8.5	87.6	88.4	0.8
9.0	86.7	87.4	0.7
9.5	85.9	86.6	0.7
10.0	85.0	85.7	0.7

In addition to the standard procedure, Clay Lacy Aviation indicated that they use a departure weight between 12,000 and 13,000 pounds (lbs), rather than the INM standard weight of 15,000 lbs. The table below is a comparison using the lower weight profiles.

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INM User-defined Aircraft Request – Lear 25
Page 2

Table 2 Departure SEL Values for Proposed Lacy Lear25 Profile versus Lear25 Lower Weight Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	Lear25 (SEL, dB)	Lacy Lear25 (SEL, dB)	Difference (dB)
0.5	130.3	130.3	0.0
1.0	116.0	112.1	-3.9
1.5	108.7	105.9	-2.8
2.0	104.5	102.6	-1.9
2.5	100.5	100.0	-0.5
3.0	98.3	98.9	0.6
3.5	96.6	97.4	0.8
4.0	95.1	96.0	0.9
4.5	93.6	94.4	0.8
5.0	91.9	93.0	1.1
5.5	90.5	91.4	0.9
6.0	89.1	90.0	0.9
6.5	87.9	88.7	0.8
7.0	86.8	87.5	0.7
7.5	85.7	86.4	0.7
8.0	84.6	85.3	0.7
8.5	83.7	84.3	0.6
9.0	82.7	83.4	0.7
9.5	81.2	82.3	1.1
10.0	78.3	80.5	2.2

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July 7, 2006

Mr. Sandy Liu
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User Changes to the Integrated Noise Model, Lear 24/25
Reference: HMMH Project Number 300701

Dear Mr. Liu:

This letter is a request for approval of user changes to the Integrated Noise Model (INM) version 6.2 for use at Van Nuys (VNY) airport. These changes involve augmenting the standard departure profiles in the INM with actual procedures as flown by pilots operating at VNY.

Section 1 – Background

We are submitting this request for written approval for changes to the Integrated Noise Model standard profiles in support of a Van Nuys Airport FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

This letter contains data on the Lear 24/25 operating procedures as provided by Clay Lacy Aviation. We will send similar letters containing data for other aircraft operating at VNY which also are flown differently than modeled in the INM. In support of the Part 161 process, we held a meeting on January 24, 2006 with personnel from Clay Lacy Aviation, a Fixed Base Operator (FBO) at VNY, to determine how they operate their Lear 2X series aircraft. Clay Lacy Aviation's approval of our modeling of this procedure is documented in Appendix A. We refer to this procedure as the Clay Lacy procedure in this document.

Section 2 – Statement of Benefit

The differences between the standard INM departure and the Clay Lacy procedure are primarily due to the lower thrust levels used in the Clay Lacy procedure. The standard INM procedure uses 100% power up to 1,500 feet Above Field Elevation (AFE) during departure; the Clay Lacy procedure uses 100% power up to 400 feet AFE, then reduces to 94%, with a reduction to 91% at 1,000 feet AFE. This power setting is held to 3,000 feet AFE when the power is increased to 97%, which corresponds with the maximum climb power of the standard INM procedure. The Lear 24/25 has enough excess power to maintain the required climb gradient in the event of an engine failure at any point in the Clay Lacy procedure.

The lower thrust setting of the Clay Lacy procedure provides a noise benefit for the area within about 3.5 nautical miles (nm) from the brake release point. Beyond this distance, the Clay Lacy procedure is slightly louder than the INM standard due to the lower climb gradient, and hence lower altitude, until climb thrust is applied.

HARRIS MILLER MILLER & HANSON INC.

Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 2

In addition to the procedure described above, Clay Lacy Aviation also indicated that they use a departure weight between 12,000 and 13,000 pounds (lbs), rather than the INM standard weight of 15,000 lbs. We modeled both the standard INM procedure and the Clay Lacy procedure using an aircraft weight of 12,500 lbs to determine the impact of the lower weights on noise at the ground. The Clay Lacy procedure provides a similar benefit compared to the INM standard procedure when the lighter weight is used.

Section 3 – Analysis Demonstrating Benefit

The analysis shows the Clay Lacy procedure provides noise benefits from 1 to 3 nautical miles from the brake release point. The benefit is highest (5.3 dB, SEL) at 1 nm from the brake release point, with the benefit decreasing as the aircraft continues down the flight track. At 3.5 nm, the procedure provides little benefit, and beyond that point, the Clay Lacy procedure gives a slight noise increase, with a consistent maximum penalty of about 1.0 dB (SEL) between 4 and 8 nm from brake release.

Table 1 shows the SEL results under the flight path from the Clay Lacy procedure; the standard INM departure profile is presented for comparison.

Error! Reference source not found. shows the SEL results under the flight path for the Clay Lacy procedure for the lower weight of 12,500 lbs; the standard INM procedure, which was also run with this lighter weight, is given for comparison. At the lower weight, the benefit of the Clay Lacy procedure drops from a maximum of 5.3 dB, SEL to 4.0 dB, SEL. The distance from brake release to where the procedure changes from a benefit to an increase in impact is also smaller, but we believe the benefits of the Clay Lacy procedure near the airport are still significant and that the procedure should be used.

Section 4 – Concurrence on Aircraft Performance

A letter from Clay Lacy Aviation stating agreement with these procedures is found in Appendix A.

Section 5 – Certification of New Parameters

The aircraft performance characteristics provided by Clay Lacy Aviation have been translated into INM procedure steps using standard engineering practice. We developed no new aircraft performance coefficients for this study. The procedure steps data in this study conform to the rules given in the INM User's Guide and SAE-1845. We used net corrected thrust in units of pounds for all thrust settings.

Section 6 – Graphical and Tabular Comparison

Tables 3-8 and Figures 1-6 present the results of the modeling analysis by showing the altitude, airspeed, and net corrected thrust per engine of the modeled procedures as a function of distance from the brake release point.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

enclosures:

HARRIS MILLER MILLER & HANSON INC.

Table 1. Comparison of Noise Impacts from Brake Release for INM Standard and Clay Lacy Departure Procedures

INM Aircraft Model: LEAR25 Profile Weight: 15,000 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Clay Lacy, SEL (dBA)	Difference SEL (dBA)
0.00	153.1	153.1	0.0
0.50	148.5	148.5	0.0
1.00	121.4	116.1	-5.3
1.50	112.4	109.4	-3.0
2.00	107.8	105.0	-2.8
2.50	104.8	102.5	-2.3
3.00	101.2	100.1	-1.1
3.50	99.0	98.9	-0.1
4.00	97.2	98.1	0.9
4.50	96.0	96.9	0.9
5.00	94.8	95.8	1.0
5.50	93.7	94.6	0.9
6.00	92.4	93.3	0.9
6.50	91.2	92.2	1.0
7.00	90.1	91.0	0.9
7.50	89.0	89.9	0.9
8.00	88.0	88.9	0.9
8.50	87.1	87.9	0.8
9.00	86.1	86.9	0.8
9.50	85.3	86.0	0.7
10.00	84.5	85.1	0.6

HARRIS MILLER MILLER & HANSON INC.

Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 5

Table 2. Comparison of Noise Impacts from Brake Release for INM Standard and Clay Lacy Departure Procedures at Lower Weight
INM Aircraft Model: LEAR25 Profile Weight: 12,500 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Clay Lacy, SEL (dBA)	Difference SEL (dBA)
0.00	153.1	153.1	0.0
0.50	130.6	130.4	-0.2
1.00	115.9	111.9	-4.0
1.50	108.5	105.6	-2.9
2.00	104.3	102.3	-2.0
2.50	100.2	99.6	-0.6
3.00	98.0	98.6	0.6
3.50	96.2	97.1	0.9
4.00	94.7	95.7	1.0
4.50	93.1	94.0	0.9
5.00	91.5	92.6	1.1
5.50	90.0	91.0	1.0
6.00	88.7	89.6	0.9
6.50	87.4	88.2	0.8
7.00	86.2	87.0	0.8
7.50	85.1	85.8	0.7
8.00	84.1	84.8	0.7
8.50	83.1	83.7	0.6
9.00	82.1	82.8	0.7
9.50	80.6	81.6	1.0
10.00	77.7	79.8	2.1

Table 3. INM Standard Lear 25 Departure Procedures

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	20	Max Takeoff
2	-	171	20	Max Takeoff
3	1500	-	20	Max Takeoff
4	-	196	10	Max Takeoff
5	3000	-	zero	Max Climb
6	-	250	zero	Max Climb
7	5500	-	zero	Max Climb
8	7500	-	zero	Max Climb
9	10000	-	zero	Max Climb

Table 4. Clay Lacy Lear 25 Departure Procedures

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	10	Max Takeoff
2	-	160	10	Max Takeoff
3	400	-	10	94% RPM
4	1000	-	10	94% RPM
5	1100	-	10	90% RPM
6	3000	-	zero	90% RPM
7		250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

HARRIS MILLER MILLER & HANSON INC.

Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 7

Table 5. INM Standard Lear 25 Departure Parameters
Profile Weight: 15,000 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	2845.3
0.62	0.0	157.1	2527.2
0.95	214.6	172.7	2493.1
1.98	1500.0	176.0	2476.4
2.56	1824.7	202.8	2422.3
2.72	2026.3	203.4	2180.1
3.52	3000.0	206.3	2173.5
5.73	4222.7	268.1	2073.3
7.09	5500.0	273.3	2078.4
9.39	7500.0	281.9	2099.3
12.60	10000.0	293.1	2147.3

Table 6. Clay Lacy Lear 25 Departure Parameters
Profile Weight: 15,000 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	2845.3
0.62	0.0	157.1	2527.2
0.70	57.7	161.3	2518.0
1.06	400.0	162.1	2092.0
1.61	1000.0	163.5	2092.0
1.74	1100.0	163.8	1898.0
3.60	3000.0	168.4	1898.0
3.76	3071.5	174.7	2239.6
6.22	4139.3	267.8	2073.2
7.66	5500.0	273.3	2078.4
9.97	7500.0	281.9	2099.3
13.17	10000.0	293.1	2147.3

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Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 8

Table 7. INM Standard Lear 25 Departure Parameters
Profile Weight: 12,500 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	2845.3
0.42	0.0	143.4	2554.9
0.80	253.5	172.8	2492.5
1.55	1500.0	176.0	2476.4
1.92	1712.4	202.4	2423.3
2.09	1972.8	203.2	2181.0
2.73	3000.0	206.3	2173.5
4.10	3757.3	266.2	2073.1
5.51	5500.0	273.3	2078.4
7.28	7500.0	281.9	2099.3
9.72	10000.0	293.1	2147.3

Table 8. Clay Lacy Lear 25 Departure Parameters
Profile Weight: 12,500 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	2845.3
0.42	0.0	143.4	2554.9
0.62	135.3	161.4	2516.8
0.75	400.0	162.1	2512.6
0.82	500.0	162.3	2092.0
1.17	1000.0	163.5	2092.0
1.25	1100.0	163.8	1898.0
2.68	3000.0	168.4	1898.0
2.84	3071.7	177.6	2239.6
4.44	3770.1	266.3	2073.1
5.84	5500.0	273.3	2078.4
7.61	7500.0	281.9	2099.3

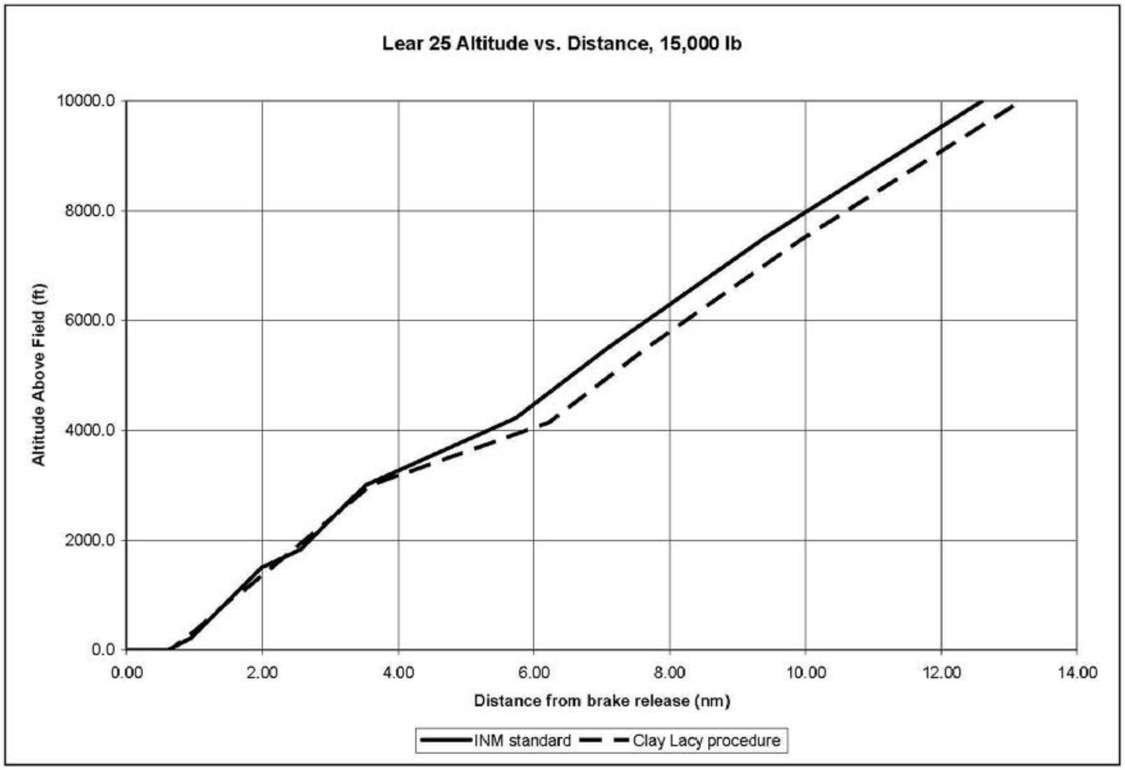

Figure 1. Altitude Profiles for Standard and Clay Lacy Procedures at Weight 15,000 Pounds

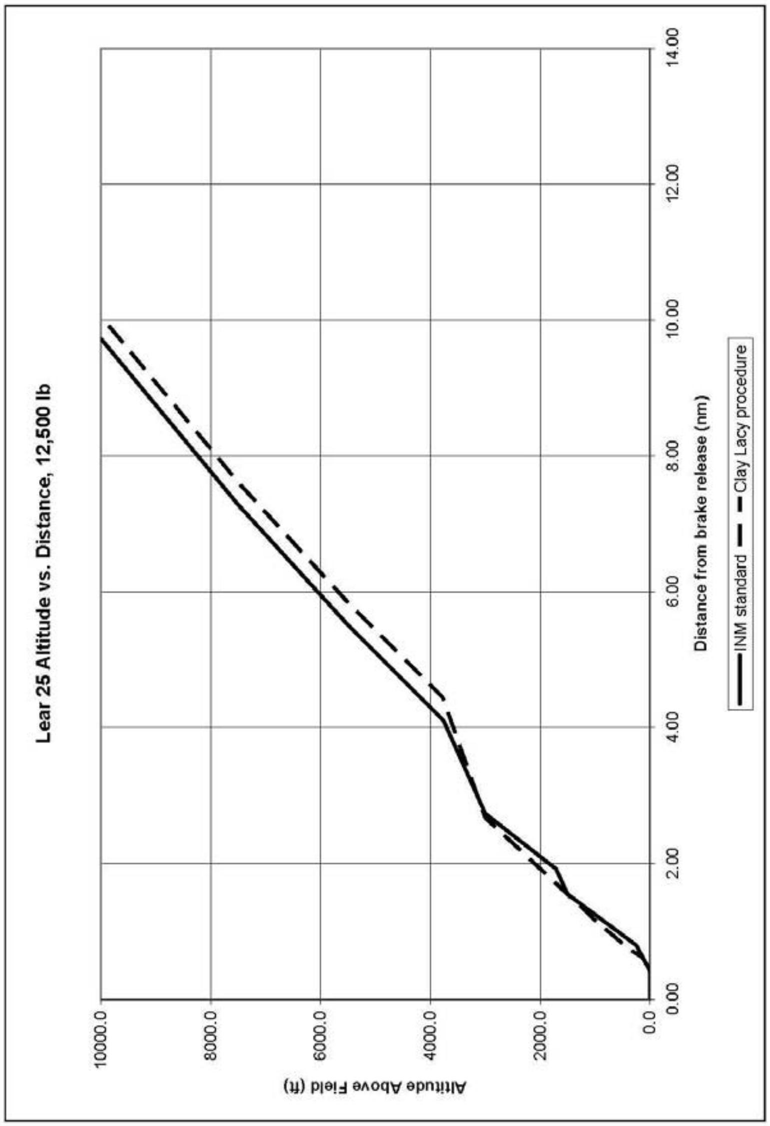

Figure 2. Altitude Profiles for Standard and Clay Lacy Procedures at Weight 12,500 Pounds

HARRIS MILLER MILLER & HANSON INC.

Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 11

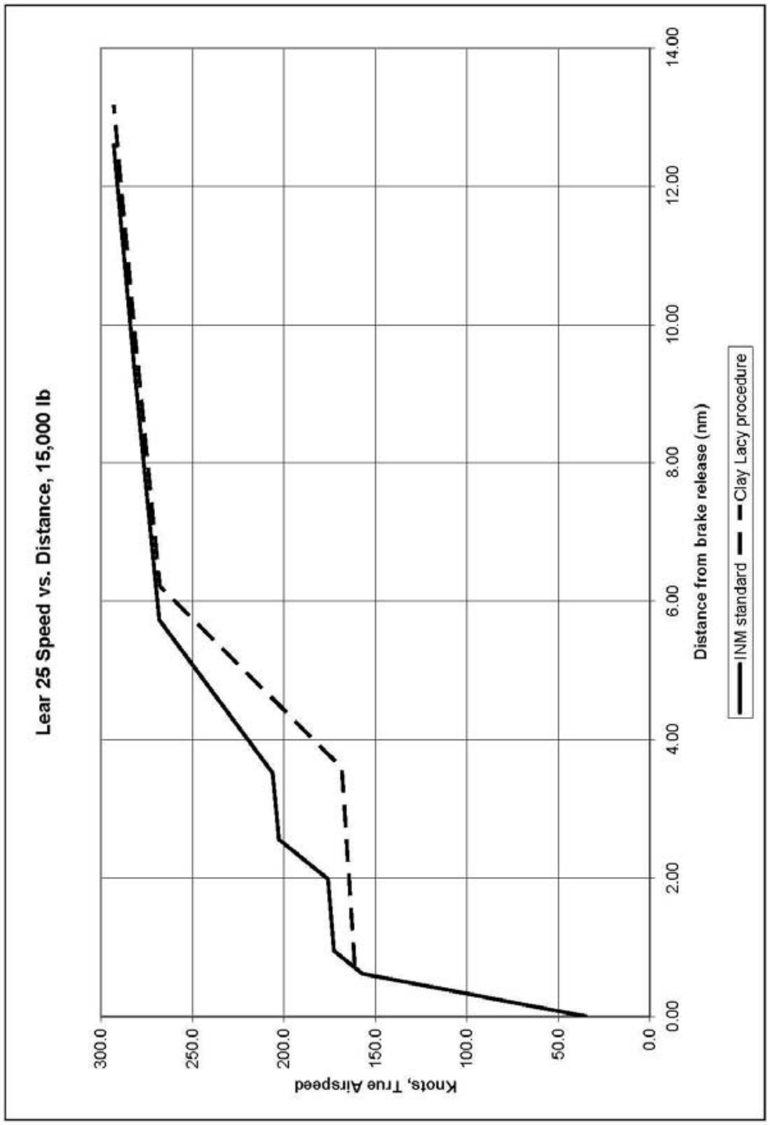

Figure 3. Airspeed Profiles for Standard and Clay Lacy Procedures at Weight 15,000 Pounds

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Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 12

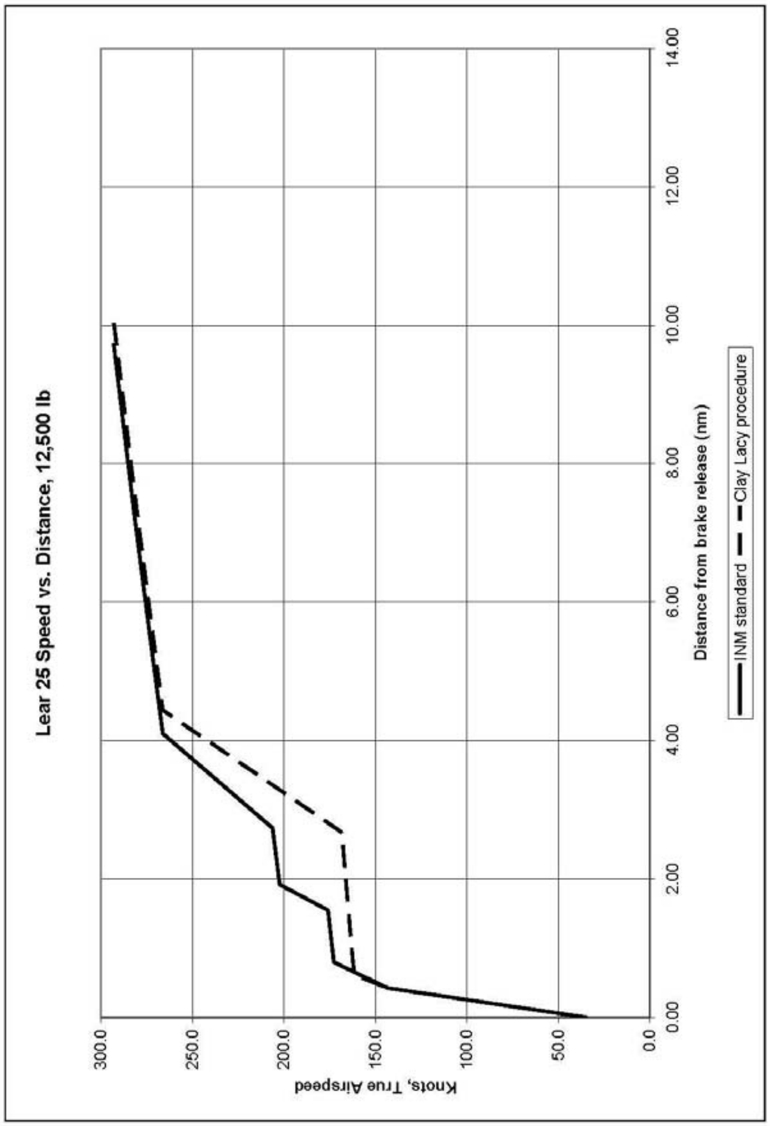

Figure 4. Airspeed Profiles for Standard and Clay Lacy Procedures at Weight 12,500 Pounds

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Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 13

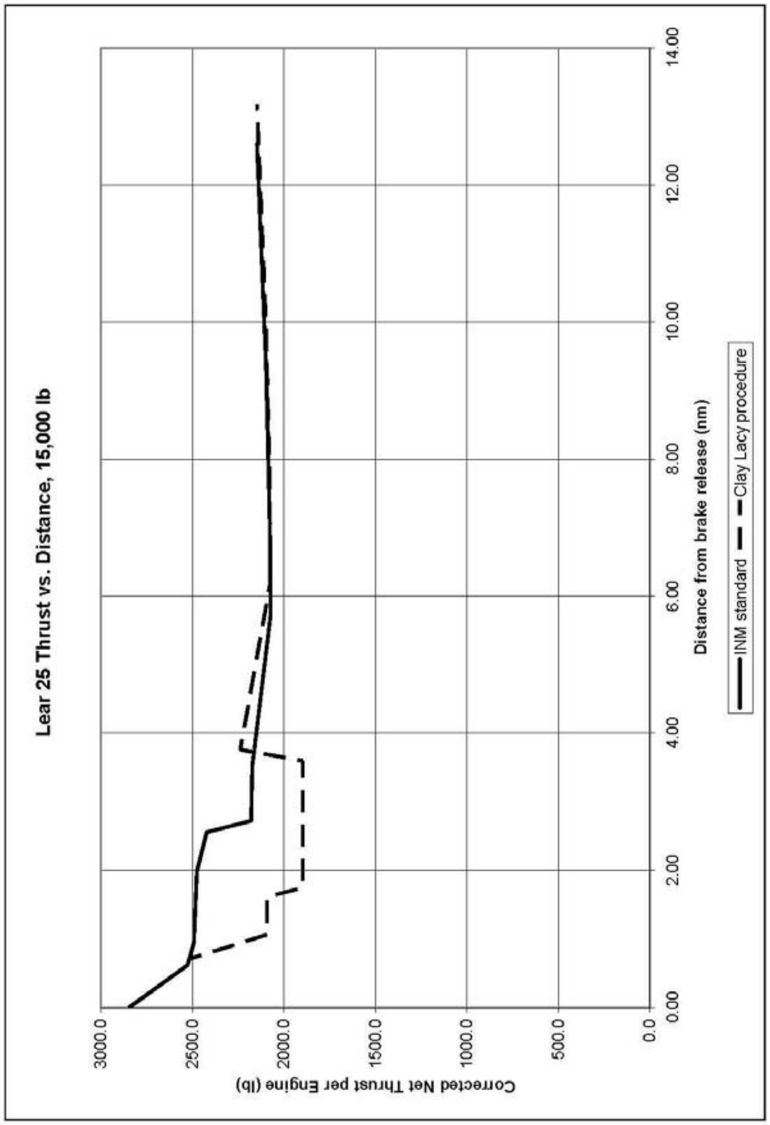

Figure 5. Thrust Profiles for Standard and Clay Lacy Procedures at Weight 15,000 Pounds

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Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 14

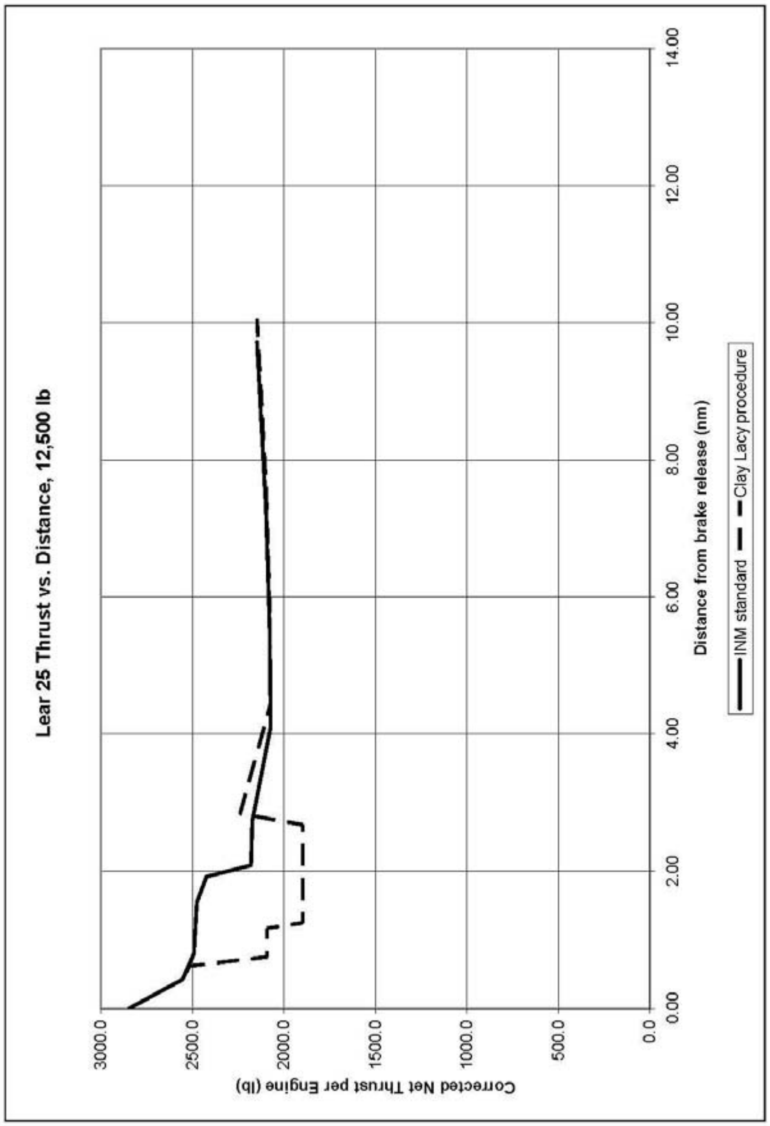

Figure 6. Thrust Profiles for Standard and Clay Lacy Procedures at Weight 12,500 Pounds

HARRIS MILLER MILLER & HANSON INC.

Lear 25 Request for Approval of User Changes to INM
July 7, 2006
Page 15

Appendix A

07/06/2006 21:29 FAX 002

Review and Concurrence of VNY Aircraft Performance Data – Clay Lacy
March 29, 2006
Page 7

Clay Lacy Aviation concurrence with modeled procedures:

Clay Lacy Aviation certifies that the proposed profile for Lear 24/25 aircraft departing from Van Nuys Airport falls within reasonable bounds of the aircraft's performance.

[signature]
Name

PRESIDENT / CLAY LACY AVIATION
Position/ Title

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March 13, 2007

Dr. "Bill" Hua He
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Supplemental Information for Lear 25 Non-Standard Departure Profiles at Van Nuys Airport

Reference: HMMH Project Number 300701

Dear Dr. He:

This letter is in response to questions raised regarding our request (previously submitted in July 2006) to use actual operator profiles for the Lear 25 aircraft when modeling in the Integrated Noise Model (INM) at Van Nuys Airport (VNY). The INM modeling is in support of the VNY FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

Section 1 – Background

In recent communications from the FAA, questions were raised concerning how certain values were calculated using standard engineering procedures. This document and attachments attempt to describe in detail the methodology employed using information from the INM Version 6.0 User's Guide and Technical Manual and SAE-AIR-1845 equations. We have also discussed the differences in this profile and the profile submitted under the VNY Part 150 study with LAWA representatives. They recommended/approved our submittal of this profile as it represents the current procedure flown at VNY by the major Lear 25 operator.

In support of the Part 161 process, we held a meeting on January 24, 2006 with personnel from Clay Lacy Aviation, a Fixed Base Operator (FBO) at VNY, to determine how they operate their Lear 2X series aircraft. After we gathered the data, we converted the data into the required format for the Integrated Noise Model.

As stated in our original letter of request, the differences between the standard INM departure and the proposed procedure are primarily due to the lower thrust levels used in the Clay Lacy procedure. The standard INM procedure uses maximum takeoff power up to 1,500 feet Above Field Elevation (AFE) during departure; the Clay Lacy procedure uses maximum takeoff power up to 400 feet AFE, then reduces to 94% RPM, with a reduction to 91% RPM at 1,000 feet AFE. The 91% RPM power setting is held to 3,000 feet AFE when the power is increased to 97% RPM, which corresponds with the maximum climb power of the standard INM procedure. The Lear 24/25 has enough excess power to maintain the required climb gradient in the event of an engine failure at any point in the Clay Lacy procedure.

Section 2 – Derivation of New Parameters

Data provided by Clay Lacy included the aircraft power setting, flap setting, altitude, and calibrated/indicated airspeed at various points in the profile as shown in the following table.

HARRIS MILLER MILLER & HANSON INC.

Supplemental Data for Lear 25 Request for Approval of User Changes to INM
March 13, 2007
Page 2

Clay Lacy Lear 25 Departure Procedures

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	10	Max Takeoff
2	-	160	10	Max Takeoff
3	400	-	10	94% RPM
4	1000	-	10	94% RPM
5	1100	-	10	91% RPM
6	3000	-	zero	91% RPM
7		250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

These aircraft performance characteristics were then translated into INM procedure steps by using standard engineering practice to determine the reduced thrust settings. The procedure steps data conform to the rules given in the INM User's Guide / Technical Manual and SAE-AIR-1845. We developed no new aircraft performance coefficients for this study. The procedure for the calculation of the thrust levels in corrected net thrust per engine in pounds follows with actual calculations in the attached spreadsheet.

The Lear aircraft do not have data coefficients in the thr_gnrl.dbf file to assist in converting N1 to pounds thrust. Data are included for three Cessna-types; therefore, it was decided to use a comparative method to determine the approximate Lear thrust levels. From the thr_gnrl.dbf file, we obtained the regression coefficients (E, F, GA, GB, H, K1, K2) for the Cessna INM types (CNA500, CNA55B, and CNA750) and used the SAE-AIR-1845 thrust equation:

$$F_n / \delta = E + F\,v + G_A\,h + G_B\,h^2 + H\,T_C + K_1\,N_1 + K_2\,N_1^2$$

where

F_n / δ corrected net thrust per engine (pounds)
v equivalent/calibrated airspeed (knots)
h pressure altitude (feet) MSL
T_C temperature (°C) at the aircraft
$E, F, G_A, G_B, H, K_1, K_2$ regression coefficients
N_1 power setting

From the thr_jet.dbf file we obtained the regression coefficients for the Lear aircraft as before, except for K_1 and K_2. We computed the corrected net thrust for the Cessna aircraft at a representative pressure altitude of 1,800 feet MSL and 160 knots calibrated airspeed for various N_1 levels (50 – 100). We then determined the percent of total thrust for each N_1 level and derived an average percent of total thrust for 91% and 94% N_1. These average percentages were then applied to the maximum thrust determined for the Lear aircraft through use of the equation above (without the K_1 and K_2 terms). The resulting corrected net thrust levels were then input into the INM procedure profile for the Lear aircraft (91% - 1898 pounds, 94% - 2086 pounds).

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Supplemental Data for Lear 25 Request for Approval of User Changes to INM
March 13, 2007
Page 3

Translated into INM Procedure

ACFT_ID	OP	PROF_ ID1	PROF_ ID2	STEP #	STEP_ TYPE	FLAP	THR	PRM1	PRM2	PRM3
L25LAC	D	LACY	1	1	T	20	T	0.0	0.0	0.0
L25LAC	D	LACY	1	2	A	10	T	1698.0	160.0	0.0
L25LAC	D	LACY	1	3	C	10	T	400.0	0.0	0.0
L25LAC	D	LACY	1	4	C	10	U	500.0	0.0	2086.0
L25LAC	D	LACY	1	5	C	10	U	1000.0	0.0	2086.0
L25LAC	D	LACY	1	6	C	10	U	1100.0	0.0	1898.0
L25LAC	D	LACY	1	7	C	ZERO	U	3000.0	0.0	1898.0
L25LAC	D	LACY	1	8	A	ZERO	C	1500.0	250.0	0.0
L25LAC	D	LACY	1	9	C	ZERO	C	5500.0	0.0	0.0
L25LAC	D	LACY	1	10	C	ZERO	C	7500.0	0.0	0.0
L25LAC	D	LACY	1	11	C	ZERO	C	10000.0	0.0	0.0

Clay Lacy Lear 25 Profile Points
Profile Weight: 12,500 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	2833.39
0.42	0.0	144.5	2543.01
0.63	145.7	162.7	2505.24
0.77	400.0	163.3	2502.17
0.84	500.0	163.6	2086.00
1.20	1000.0	164.8	2086.00
1.29	1100.0	165.0	1898.00
2.77	3000.0	169.8	1898.00
2.94	3071.1	178.3	2238.21
4.67	3819.8	268.6	2074.19
6.08	5500.0	275.5	2084.77
7.92	7500.0	284.1	2111.79
10.44	10000.0	295.5	2167.60

Section 3 –Comparison with Measured Data

Noise monitor readings at permanent noise monitorV-7, located approximately two nautical miles from brake release for Runway 16R departures and near runway centerline, were gathered for the Lear 25 departures and compared to the INM results at the same point. The range of measured SEL values for the Lear 25 departures was 96 – 105 dBA. The modeled SEL for the Clay Lacy procedure was 102.2 dBA, near the center of the measured range of values. The modeled SEL for the Lear 25 Standard profile at V-7 was 104.2 dBA.

HARRIS MILLER MILLER & HANSON INC.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. I hope this clarifies questions you had on our previous request. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr

Robert D. Behr
Senior Consultant

Attachment: Lear 25 Data Sheet

Lear 25/35 Data Sheet
Computation of cutback thrust levels in pounds, given N1 Levels

	E	F	G1	G2	H	K2	K3		
CNA500	1743.1	-1.64678	-2.01E-03	-1.56E-07	0	-4.97E+01	5.45E-01		
CNA55B	1373.8	-2.2903	-8.88E-05	3.23E-08	0	-4.49E+01	6.63E-01		
CNA750	4778.6	-6.56571	6.71E-04	-4.11E-07	0	-1.47E+02	1.97E+00		
LR25 (max)	2845.4	-2.03911	-1.68E-02	2.18E-06	0				
LR35 (max)	3412.2	-3.888	-4.41E-03	1.54E-06	0				
Speed	160								
Alt	1800								
Fn/(delta)	N1 Level		CNA500	CNA55B	CNA750			LEAR25	LEAR35
Absolute	50		354.02	422.42	1329.36				
	60		456.73	703.41	2034.52				
	70		668.43	1117.05	3134.64				
	80		989.14	1663.34	4629.72				
	90		1418.85	2342.29	6519.76				
	91		1467.81	2417.48	6730.49				
	94		1621.25	2651.02	7386.37				
	96		1728.99	2813.34	7843.37				
	100		1957.55	3153.90	8804.76			2496.0	2787.2
% of max	50		18.1%	13.4%	15.1%				
thrust	60		23.3%	22.3%	23.1%				
	70		34.1%	35.4%	35.6%	CNAX			
	80		50.5%	52.7%	52.6%	AVG	STD_DEV		
	90		72.5%	74.3%	74.0%	73.6%	1.0%	1837.027	2051.324
	91		75.0%	76.7%	76.4%	76.0%	0.9%	1897.587	2118.948
	94		82.8%	84.1%	83.9%	83.6%	0.7%	2086.384	2329.77
	96		88.3%	89.2%	89.1%	88.9%	0.5%	2218.181	2476.941
	100		100.0%	100.0%	100.0%				

U.S. Department of Transportation
Federal Aviation Administration

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

April 4, 2007

Mr. Robert D Behr Jr.
Harris Miller Miller & Hanson Inc.
945 University Avenue, Suite 201
Sacreamento, CA 95825

Dear Mr. Behr:

The Office of Environment and Energy has reviewed the proposed non-standard INM departure profiles for three aircraft (Lear 25, Boeing 727 and A3) submitted for aircraft modeling for Van Nuys Airport (VNY) in support of the Los Angeles World Airports (LAWA) FAA Part 161 Study. Our office has also reviewed the supplemental steps used in deriving the non-standard profiles.

Our office approves the proposed revision of the profiles, with the understanding that

(1) The Clay Lacy Aviation has reviewed and verified that the proposed profiles for Lear25 and Boeing 727 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

(1) The Raytheon Flight Test Operations has reviewed and verified that the proposed profiles for A-3 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

Please understand that approvals listed above are limited to this particular Part 161 Study. Any additional projects or non-standard INM input will require separate approval.

Sincerely,

M. Marsan

Dr. Mehmet Marsan
Acting Manager
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Clay Lacy Lear 35 Departure Profile

This memorandum requests FAA approval of a user-defined departure profile for the Lear 35 flown by Clay Lacy Aviation for use in the VNY NEMs Update.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined departure profile for the Clay Lacy Lear 35. The previous analysis, which used INM 6.2, and FAA approval are included as attachments. The revised SEL comparison using INM7.0b is shown in the following tables.

Table 1 Departure SEL Values for Proposed Lacy Lear35 Profile versus Lear35 Standard Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	Lear35 (SEL, dB)	Lacy Lear35 (SEL, dB)	Difference (dB)
0.5	119.5	119.4	-0.1
1.0	104.8	100.7	-4.1
1.5	98.0	94.7	-3.3
2.0	94.1	89.9	-4.2
2.5	90.8	87.5	-3.3
3.0	86.7	85.4	-1.3
3.5	84.8	83.8	-1.0
4.0	83.1	84.4	1.3
4.5	81.8	83.3	1.5
5.0	80.6	82.0	1.4
5.5	79.5	80.7	1.2
6.0	78.4	79.6	1.2
6.5	77.3	78.4	1.1
7.0	76.3	77.3	1.0
7.5	75.4	76.2	0.8
8.0	74.6	75.4	0.8
8.5	73.7	74.6	0.9
9.0	73.0	73.7	0.7
9.5	72.4	73.0	0.6
10.0	71.7	72.4	0.7

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April 23, 2007

Dr. "Bill" Hua He
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User Changes to the Integrated Noise Model, Lear35

Reference: HMMH Project Number 300701

Dear Dr. He:

This letter is a request for approval of user changes to the Integrated Noise Model (INM) version 6.2a for use at Van Nuys (VNY) airport. These changes involve augmenting the standard departure profiles in the INM with actual procedures as flown by pilots operating at VNY.

Section 1 – Background

We are submitting this request for written approval for changes to the Integrated Noise Model standard profiles in support of a Van Nuys Airport FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

This letter contains data on the Lear 35 operating procedures. In support of the Part 161 process, we held a meeting on January 24, 2006 with personnel from Clay Lacy Aviation, a Fixed Base Operator (FBO) at VNY, to determine how they operate their Lear 35 aircraft. Clay Lacy Aviation's approval of our modeling of this procedure is documented in appendix A. We refer to this procedure as the Clay Lacy procedure in this document.

Section 2 – Statement of Benefit

The differences for the Lear 35 between the standard INM departure and the Clay Lacy departure procedures are primarily due to the lower thrust levels used at the start of the Clay Lacy procedure. The standard INM procedure uses maximum takeoff power up to 1,500 feet Above Field Elevation (AFE) during departure; the Clay Lacy procedure uses maximum takeoff power up to 400 feet AFE, then reduces to 94%, with a further reduction to 91% at 1,000 feet AFE. This power setting is held to 3,000 feet AFE, where the power is increased to 97%, which corresponds with the maximum climb power of the standard INM procedure. At the same track distance, the INM standard aircraft is at a higher altitude due to the greater thrust used, and so is farther from the ground at the point where the same thrust levels are used. This greater distance from the ground for the modeled INM aircraft gives a slightly lower noise level on the ground compared to the modeled Clay Lacy aircraft.

The power settings and procedure steps used in this analysis can be seen in the attached tables. The Lear 35 has enough excess power to maintain the required climb gradient in the event of an engine failure at any point in the Clay Lacy procedure.

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Section 3 – Analysis Demonstrating Benefit

The analysis shows the Clay Lacy procedure provides noise benefits from one to three and a half nautical miles from brake release. The benefit is highest (4.4 dB, SEL) at two nautical miles from brake release, with the benefit decreasing as the aircraft continues down the flight track. At four nautical miles and beyond, the Clay Lacy procedure gives a slight noise increase, with a consistent maximum penalty of about 1.4 dB (SEL) between four and six nautical miles from brake release.

Table 1 shows the SEL results under the flight path from the Clay Lacy procedure; the standard INM departure profile is presented for comparison.

Table 1 Comparison of Noise Impacts from Brake Release for INM Standard and Clay Lacy Departure Procedures

INM Aircraft Model: LEAR35 Profile Weight: 18,300 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Clay Lacy, SEL (dBA)	Difference SEL (dBA)
0.00	144.6	144.6	0.0
0.50	119.3	119.3	0.0
1.00	104.6	100.7	-3.9
1.50	97.9	94.6	-3.3
2.00	94.1	89.7	-4.4
2.50	90.7	87.3	-3.4
3.00	86.6	85.2	-1.4
3.50	84.7	83.7	-1.0
4.00	83.0	84.4	1.4
4.50	81.8	83.3	1.5
5.00	80.6	82.0	1.4
5.50	79.5	80.9	1.4
6.00	78.4	79.6	1.2
6.50	77.1	78.4	1.3
7.00	76.2	77.2	1.0
7.50	75.3	76.1	0.8
8.00	74.5	75.3	0.8
8.50	73.7	74.5	0.8
9.00	73.0	73.7	0.7
9.50	72.3	73.0	0.7
10.00	71.6	72.3	0.7

Table 2 shows the INM Standard profile data and Table 3 shows the data provided by Clay Lacy including the aircraft power setting, flap setting, altitude, and calibrated/indicated airspeed at various points in the profile.

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Lear 35 Request for Approval of User Changes to INM
April 23, 2007
Page 3

Table 2. INM Standard Lear 35 Departure Procedures
Profile Weight: 18,300 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	20	Max Takeoff
2	-	158	20	Max Takeoff
3	1500	-	20	Max Takeoff
4	-	183	10	Max Takeoff
5	3000	-	zero	Max Climb
6	-	250	zero	Max Climb
7	5500	-	zero	Max Climb
8	7500	-	zero	Max Climb
9	10000	-	zero	Max Climb

Table 3. Clay Lacy Lear 35 Departure Procedures
Profile Weight: 18,300 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	10	Max Takeoff
2	-	160	10	Max Takeoff
3	400	-	10	94% RPM
4	1000	-	10	94% RPM
5	1100	-	10	91% RPM
6	3000	-	zero	91% RPM
7		250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

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Lear 35 Request for Approval of User Changes to INM
April 23, 2007
Page 4

Section 3.1 – Derivation of New Parameters

The Clay Lacy aircraft performance characteristics were then translated into INM procedure steps by using standard engineering practice to determine the reduced thrust settings. The procedure steps data conform to the rules given in the INM User's Guide / Technical Manual and SAE-AIR-1845. We developed no new aircraft performance coefficients for this study. The procedure for the calculation of the thrust levels in corrected net thrust per engine in pounds follows with actual calculations in the attached spreadsheet (Appendix B).

The Lear aircraft do not have data coefficients in the thr_gnrl.dbf file to assist in converting N1 to pounds thrust. Data are included for three Cessna-types; therefore, it was decided to use a comparative method to determine the approximate Lear thrust levels. From the thr_gnrl.dbf file, we obtained the regression coefficients (E, F, GA, GB, H, K1, K2) for the Cessna INM types (CNA500, CNA55B, and CNA750) and used the SAE-AIR-1845 thrust equation:

$$F_n / \delta = E + F v + G_A h + G_B h^2 + H T_C + K_1 N_1 + K_2 N_1^2$$

where
F_n / δ corrected net thrust per engine (pounds)
v equivalent/calibrated airspeed (knots)
h pressure altitude (feet) MSL
T_C temperature (°C) at the aircraft
E, F, G_A, G_B, H, K_1, K_2 regression coefficients
N_1 power setting

From the thr_jet.dbf file we obtained the regression coefficients for the Lear 35 aircraft as before, except for K_1 and K_2. We computed the corrected net thrust for the Cessna aircraft at a representative pressure altitude of 1,800 feet MSL and 160 knots calibrated airspeed for various N_1 levels (50 – 100). We then determined the percent of total thrust for each N_1 level and derived an average percent of total thrust for 91% and 94% N_1. These average percentages were then applied to the maximum thrust determined for the Lear aircraft through use of the equation above (without the K_1 and K_2 terms). The resulting corrected net thrust levels were then input into the INM procedure profile for the Lear aircraft (91% - 2119 pounds, 94% - 2330 pounds).

Table 4. Translated into INM Procedure

ACFT_ID	OP	PROF_ ID1	PROF_ ID2	STEP #	STEP_ TYPE	FLAP	THR	PRM1	PRM2	PRM3
L35LAC	D	LACY	1	1	T	20	T	0.0	0.0	0.0
L35LAC	D	LACY	1	2	A	10	T	1698.0	160.0	0.0
L35LAC	D	LACY	1	3	C	10	T	400.0	0.0	0.0
L35LAC	D	LACY	1	4	C	10	U	500.0	0.0	2330.0
L35LAC	D	LACY	1	5	C	10	U	1000.0	0.0	2330.0
L35LAC	D	LACY	1	6	C	10	U	1100.0	0.0	2119.0
L35LAC	D	LACY	1	7	C	ZERO	U	3000.0	0.0	2119.0
L35LAC	D	LACY	1	8	A	ZERO	C	1500.0	250.0	0.0
L35LAC	D	LACY	1	9	C	ZERO	C	5500.0	0.0	0.0
L35LAC	D	LACY	1	10	C	ZERO	C	7500.0	0.0	0.0
L35LAC	D	LACY	1	11	C	ZERO	C	10000.0	0.0	0.0

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Table 5 shows the resulting profile points for the Clay Lacy Lear 35. For comparison purposes, Table 6 shows the profile points for the Standard INM profile.

Table 5. Clay Lacy Lear 35 Departure Parameters
Profile Weight: 18,300 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	3412.37
0.43	0.0	144.3	2854.93
0.73	184.9	161.4	2789.50
0.89	400.0	161.9	2788.72
0.99	500.0	162.2	2330.00
1.49	1000.0	163.4	2330.00
1.61	1100.0	163.6	2119.00
3.72	3000.0	168.3	2119.00
3.89	3071.3	173.0	2511.56
7.22	4514.5	269.0	2206.27
8.51	5500.0	273.1	2215.97
11.33	7500.0	281.6	2243.94
15.28	10000.0	292.8	2294.54

Table 6. INM Standard Lear 35 Departure Parameters
Profile Weight: 18,300 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	3412.37
0.43	0.0	144.3	2854.93
0.74	192.5	159.4	2797.25
1.85	1500.0	162.5	2794.75
2.44	1815.7	189.1	2697.74
2.60	1993.7	189.6	2427.98
3.53	3000.0	192.5	2431.08
6.64	4452.9	268.8	2205.76
8.01	5500.0	273.1	2215.97
10.84	7500.0	281.6	2243.94
14.79	10000.0	292.8	2294.54

Section 3.2 – Comparison with Measured Data

Noise monitor readings at permanent noise monitorV-7, located approximately two nautical miles from brake release for Runway 16R departures and near runway centerline, were gathered for the Lear 35 departures and compared to the INM results at the same point. The range of measured SEL values for the Lear 35 departures was 74 – 95 dBA. The modeled SEL for the Clay Lacy procedure was 89.7 dBA,. The modeled SEL for the Lear 35 Standard profile at V-7 was 94.1 dBA.

Section 4 – Concurrence on Aircraft Performance

A letter from Clay Lacy Aviation stating agreement with these procedures is found in Appendix A.

Section 5 – Certification of New Parameters

The aircraft performance characteristics provided by Clay Lacy Aviation have been translated into INM procedure steps as shown above. We developed no new aircraft performance coefficients for this study. The procedure steps data in this study conform to the rules given in the INM User's Guide and SAE-1845. We used net corrected thrust in units of pounds for all thrust settings.

Section 6 – Graphical and Tabular Comparison

Figures 1-3 present the results of the modeling analysis by showing the altitude, airspeed, and net corrected thrust per engine of the modeled procedures as a function of distance from the brake release point. These correspond to the tabular data previously shown.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr

Robert D. Behr
Senior Consultant

Attachment: Lear35_Data_Sheet .xls

HARRIS MILLER MILLER & HANSON INC.

Lear 35 Request for Approval of User Changes to INM
April 23, 2007
Page 7

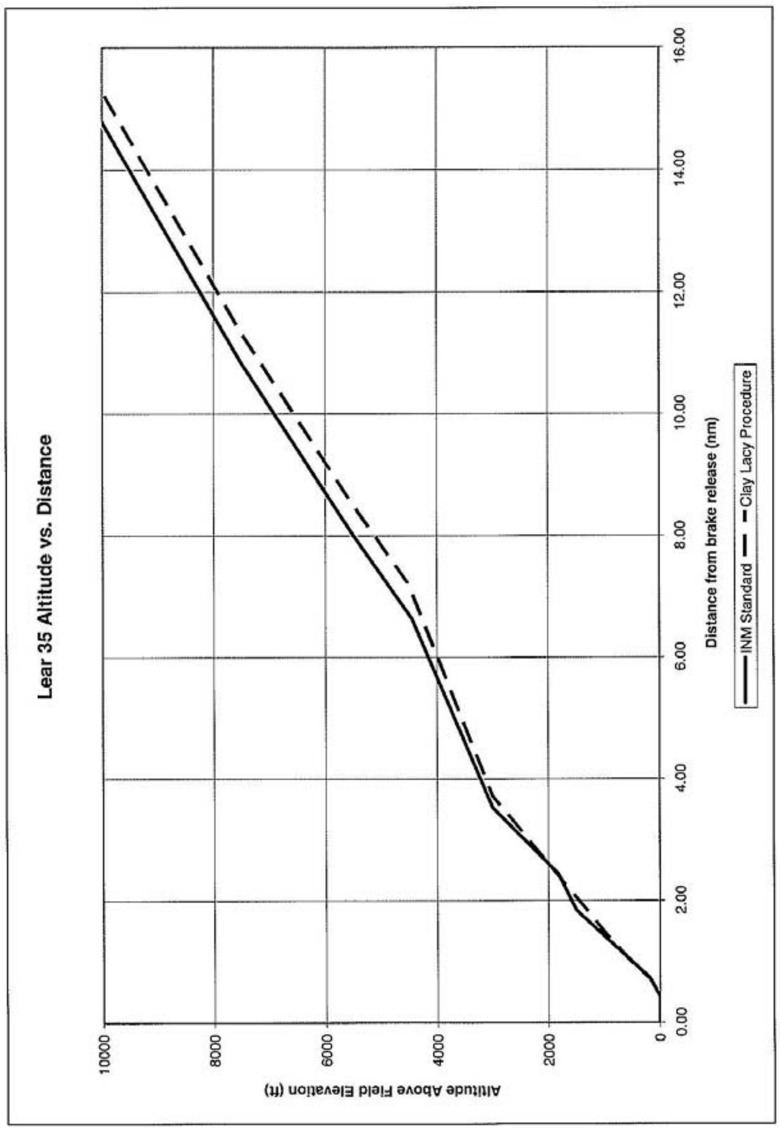

Figure 1. Altitude Profiles for Standard and Clay Lacy Procedures

HARRIS MILLER MILLER & HANSON INC.

Lear 35 Request for Approval of User Changes to INM
April 23, 2007
Page 8

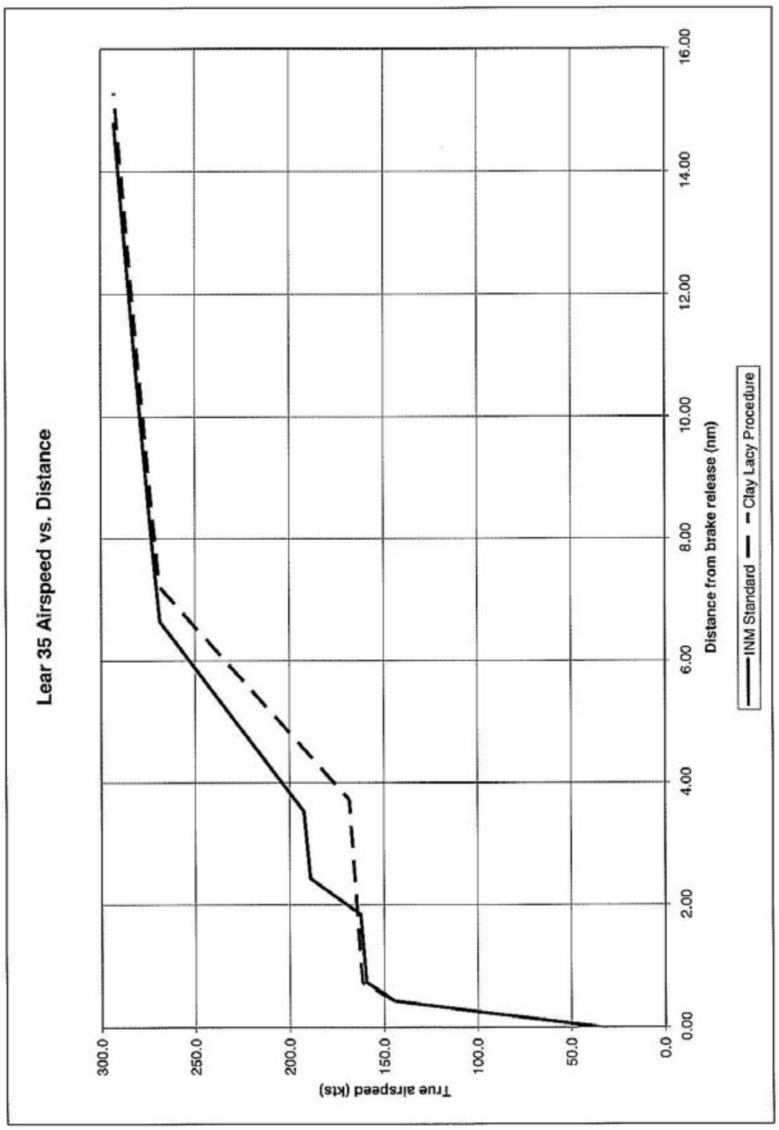

Figure 2. Airspeed Profiles for Standard and Clay Lacy Procedures

HARRIS MILLER MILLER & HANSON INC.

Lear 35 Request for Approval of User Changes to INM
April 23, 2007
Page 9

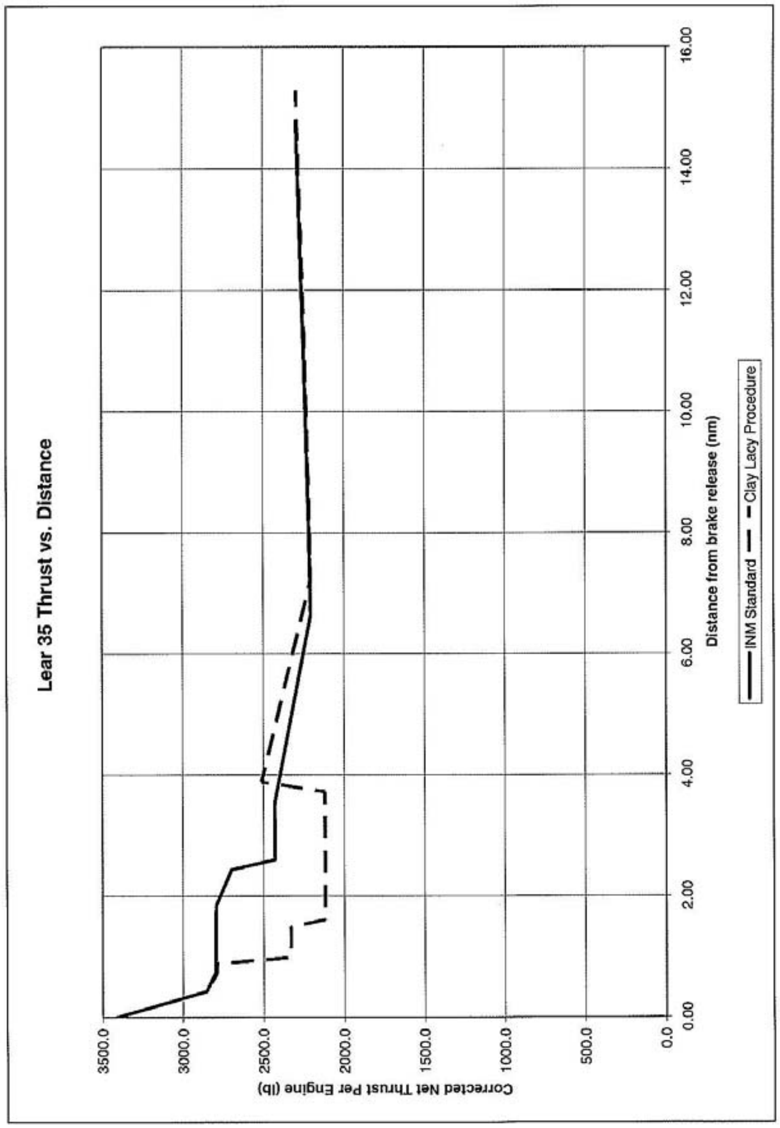

Figure 3. Thrust Profiles for Standard and Clay Lacy Procedures

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B727 Request for Approval of User Changes to INM
April 23, 2007
Page 10

Appendix A

04/23/2007 09:34 8189099537 CLAY LACY AVIATION PAGE 02

Lear 35 Request for Approval of User Changes to INM
March 5, 2007
Page 5

Clay Lacy Aviation concurrence with modeled procedures:

Clay Lacy Aviation certifies that the proposed profile for Lear 35 aircraft departing from Van Nuys Airport provides a reasonably accurate representation of the typical departure procedure and falls within reasonable bounds of the aircraft's performance.

[signature]
Name

CEO CLAY LACY AVIATION
Position/ Title

Lear 25/35 Data Sheet
Computation of cutback thrust levels in pounds, given N1 Levels

	E	F	G1	G2	H	K2	K3
CNA500	1743.1	-1.64678	-2.01E-03	-1.56E-07	0	-4.97E+01	5.45E-01
CNA55B	1373.8	-2.2903	-8.88E-05	3.23E-08	0	-4.49E+01	6.63E-01
CNA750	4778.6	-6.56571	6.71E-04	-4.11E-07	0	-1.47E+02	1.97E+00
LR25 (max)	2845.4	-2.03911	-1.68E-02	2.18E-06	0		
LR35 (max)	3412.2	-3.888	-4.41E-03	1.54E-06	0		
Speed	160						
Alt	1800						

Fn/(delta)	N1 Level	CNA500	CNA55B	CNA750			LEAR25	LEAR35
Absolute	50	354.02	422.42	1329.36				
	60	456.73	703.41	2034.52				
	70	668.43	1117.05	3134.64				
	80	989.14	1663.34	4629.72				
	90	1418.85	2342.29	6519.76				
	91	1467.81	2417.48	6730.49				
	94	1621.25	2651.02	7386.37				
	96	1728.99	2813.34	7843.37				
	100	1957.55	3153.90	8804.76			2496.0	2787.2
% of max	50	18.1%	13.4%	15.1%				
thrust	60	23.3%	22.3%	23.1%				
	70	34.1%	35.4%	35.6%	CNAX			
	80	50.5%	52.7%	52.6%	AVG	STD_DEV		
	90	72.5%	74.3%	74.0%	73.6%	1.0%	1837.027	2051.324
	91	75.0%	76.7%	76.4%	76.0%	0.9%	1897.587	2118.948
	94	82.8%	84.1%	83.9%	83.6%	0.7%	2086.384	2329.77
	96	88.3%	89.2%	89.1%	88.9%	0.5%	2218.181	2476.941
	100	100.0%	100.0%	100.0%				

U.S. Department of Transportation
Federal Aviation Administration

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

May 4, 2007

Mr. Robert D Behr Jr.
Harris Miller Miller & Hanson Inc.
945 University Avenue, Suite 201
Sacreamento, CA 95825

Dear Mr. Behr:

The Office of Environment and Energy has reviewed your proposed use of non-standard INM departure profile of Lear35 in aircraft noise modeling for Van Nuys Airport (VNY) in support of the Los Angeles World Airports (LAWA) FAA Part 161 Study. Our office has also reviewed the supplemental steps used in deriving the non-standard profiles.

Our office approves the proposed revision of the profiles, with the understanding that Clay Lacy Aviation has reviewed and verified that the proposed profile for Lear35 is within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

Please understand that approvals listed above are limited to this particular Part 161 Study. Any additional projects or non-standard INM input will require separate approval.

Sincerely,

M. Marsan

Dr. Mehmet Marsan
Acting Manager
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Clay Lacy Boeing 727 Departure Profile

This memorandum requests FAA approval of a user-defined departure profile for the Boeing 727 flown by Clay Lacy Aviation for use in the VNY NEMs Update.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined departure profile for the Clay Lacy Boeing 727. The previous analysis, which used INM 6.2, and FAA approval are included as attachments. The revised SEL comparison using INM7.0b is shown in the following tables.

Table 1 Departure SEL Values for Proposed Lacy B727 Profile versus B727 Standard Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	B727 (SEL, dB)	Lacy B727 (SEL, dB)	Difference (dB)
0.5	138.8	138.3	-0.5
1.0	120.7	120.1	-0.6
1.5	109.6	105.1	-4.5
2.0	105.6	101.9	-3.7
2.5	103.5	99.5	-4.0
3.0	101.4	97.5	-3.9
3.5	95.0	96.0	1.0
4.0	93.6	94.6	1.0
4.5	92.2	93.4	1.2
5.0	91.1	92.2	1.1
5.5	90.0	91.4	1.4
6.0	89.2	91.6	2.4
6.5	88.4	90.7	2.3
7.0	87.6	89.8	2.2
7.5	87.0	89.0	2.0
8.0	86.3	88.3	2.0
8.5	85.6	87.6	2.0
9.0	85.0	86.9	1.9
9.5	84.4	86.1	1.7
10.0	83.9	85.5	1.6

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July 7, 2006

Mr. Sandy Liu
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User Changes to the Integrated Noise Model, 727

Reference: HMMH Project Number 300701

Dear Mr. Liu:

This letter is a request for approval of user changes to the Integrated Noise Model (INM) version 6.2 for use at Van Nuys (VNY) airport. These changes involve augmenting the standard departure profiles in the INM with actual procedures as flown by pilots operating at VNY.

Section 1 – Background

We are submitting this request for written approval for changes to the Integrated Noise Model standard profiles in support of a Van Nuys Airport FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

This letter contains data on the Boeing 727 operating procedures. The data are based on using the Stage 3 certificated 727EM2 (stage length 1; 156,000 lb) as the base aircraft. We will send similar letters containing data for other aircraft operating at VNY which also are flown differently than modeled in the INM. In support of the Part 161 process, we held a meeting on January 24, 2006 with personnel from Clay Lacy Aviation, a Fixed Base Operator (FBO) at VNY, to determine how they operate their Boeing 727 aircraft. Clay Lacy Aviation's approval of our modeling of this procedure is documented in appendix YY. We refer to this procedure as the Clay Lacy procedure in this document.

Section 2 – Statement of Benefit

The differences between the standard INM departure and the Clay Lacy procedure are primarily due to the lower thrust levels used in the Clay Lacy procedure from 500 to 3,000 feet Above Field Elevation (AFE). The standard INM procedure uses Maximum Takeoff power up until 200 knots are reached during departure; the takeoff flaps are set to 5 degrees and retracted during the acceleration portion of the departure. The Clay Lacy procedure uses Maximum Takeoff power up to 400 feet AFE, and then reduces to an Engine Pressure Ratio (EPR) of 1.8. This EPR setting is held to 3,000 AFE when the power is increased to Maximum Climb, which corresponds with the standard INM procedure. The Clay Lacy procedure also uses 15 degrees of flaps (due to the relatively short runway at VNY), which are maintained until 3,000 feet AFE is reached.

The lower thrust settings of the Clay Lacy procedure provide a noise benefit for the area within about three nautical miles (nm) from the brake release point. Beyond this distance, the Clay Lacy procedures is slightly louder than the INM standard due to the lower climb gradient, and hence lower altitude, until climb thrust is applied.

HARRIS MILLER MILLER & HANSON INC.

B727 Request for Approval of User Changes to INM
July 7, 2006
Page 2

Section 3 – Analysis Demonstrating Benefit

The analysis shows the Clay Lacy procedure provides noise benefits from one to three nautical miles from the break release point. The benefit is highest (4.4 dB, SEL) at 1.5 nm from the brake release point. Beyond 3.5 nm, the Clay Lacy procedure gives a slight noise increase, with a maximum penalty of about 2.5 dB (SEL) at 6 nm from the brake release point.

Table 1 shows the SEL results under the flight path from the Clay Lacy procedure; the standard INM departure profile is presented for comparison.

Section 4 – Concurrence on Aircraft Performance

A letter from Clay Lacy Aviation stating agreement with these procedures is found in Appendix A.

Section 5 – Certification of New Parameters

The aircraft performance characteristics provided by Clay Lacy Aviation have been translated into INM procedure steps using standard engineering practice. We developed no new aircraft performance coefficients for this study. The procedure steps data in this study conform to the rules given in the INM User's Guide and SAE-1845. We used net corrected thrust in units of pounds for all thrust settings.

Section 6 – Graphical and Tabular Comparison

Tables 2-5 and Figures 1-3 present the results of the modeling analysis by showing the altitude, airspeed, and net corrected thrust per engine of the modeled procedures as a function of distance from the brake release point.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

enclosures:

HARRIS MILLER MILLER & HANSON INC.

B727 Request for Approval of User Changes to INM
July 7, 2006
Page 3

Table 1. Comparison of Noise Impacts from Brake Release for INM Standard and Clay Lacy Departure Procedures
INM Aircraft Model: 727EM2 Profile Weight: 156,000 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Clay Lacy, SEL (dBA)	Difference SEL (dBA)
0.00	145.1	145.1	0.0
0.50	142.3	142.1	-0.2
1.00	120.8	120.0	-0.8
1.50	109.5	105.1	-4.4
2.00	105.5	101.7	-3.8
2.50	103.3	99.3	-4.0
3.00	101.2	97.4	-3.8
3.50	95.0	95.8	0.8
4.00	93.4	94.4	1.0
4.50	92.0	93.1	1.1
5.00	90.9	92.0	1.1
5.50	90.0	91.2	1.2
6.00	89.1	91.6	2.5
6.50	88.4	90.7	2.3
7.00	87.4	89.8	2.4
7.50	86.9	88.9	2.0
8.00	86.2	88.1	1.9
8.50	85.5	87.5	2.0
9.00	84.8	86.9	2.1
9.50	84.3	86.0	1.7
10.0	83.7	85.5	1.8

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B727 Request for Approval of User Changes to INM
July 7, 2006
Page 4

Table 2. INM Standard B727 Departure Procedures
Profile Weight: 156,000 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	5	Max takeoff
2	1000	-	5	Max takeoff
3	-	170	5	Max takeoff
4	-	200	2	Max takeoff
5	-	210	zero	Max Climb
6	3000		zero	Max Climb
7	-	250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

Table 3. Clay Lacy B727 Departure Procedures
Profile Weight: 156,000 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	15	Max takeoff
2	-	160	15	Max takeoff
3	400	-	15	Max takeoff
4	500	-	15	1.8 EPR
5	3000	-	15	1.8 EPR
6	-	210	zero	Max Climb
7		250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

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B727 Request for Approval of User Changes to INM
July 7, 2006
Page 5

Table 4. INM Standard B727 Departure Parameters
Profile Weight: 156,000 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	14658.3
0.93	0.0	162.7	13453.4
1.87	1000.0	165.1	13816.3
2.11	1119.9	174.0	13781.5
3.00	1523.6	206.0	13595.4
3.16	1572.8	210.9	10682.0
3.36	1630.3	216.6	10618.2
5.16	3000.0	221.1	10838.5
6.95	3463.0	265.0	10588.8
9.97	5500.0	273.3	10916.7
13.16	7500.0	281.9	11238.5
17.50	10000.0	293.1	11640.7

Table 5. Clay Lacy B727 Departure Parameters
Profile Weight: 156,000 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	14658.3
0.83	0.0	154.3	13515.2
0.97	56.8	161.3	13485.5
1.30	400.0	162.1	13610.1
1.45	500.0	162.3	10330.0
5.63	3000.0	168.4	10360.0
5.80	3053.1	173.3	11243.7
7.51	3604.0	223.1	10935.6
9.37	4084.1	267.5	10688.8
11.50	5500.0	273.3	10916.7
14.68	7500.0	281.9	11238.5
19.03	10000.0	293.1	11640.7

HARRIS MILLER MILLER & HANSON INC.

B727 Request for Approval of User Changes to INM
July 7, 2006
Page 6

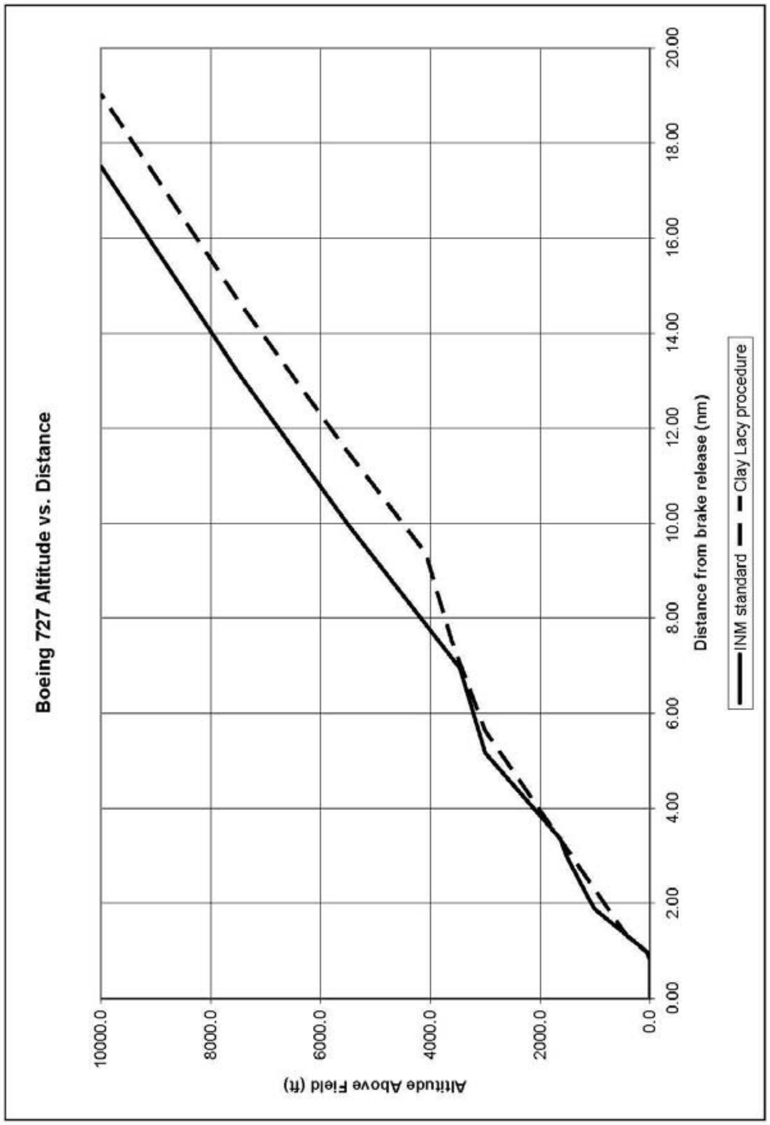

Figure 1. Altitude Profiles for Standard and Clay Lacy Procedures

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B727 Request for Approval of User Changes to INM
July 7, 2006
Page 7

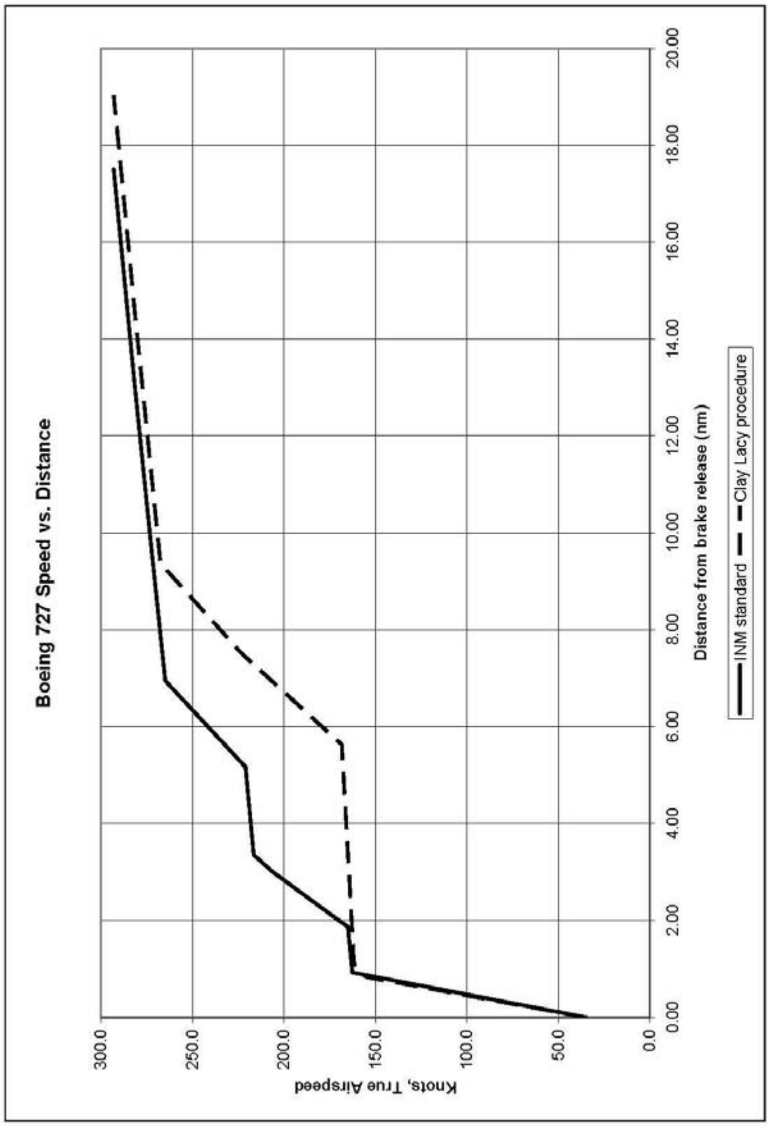

Figure 2. Airspeed Profiles for Standard and Clay Lacy Procedures

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B727 Request for Approval of User Changes to INM
July 7, 2006
Page 8

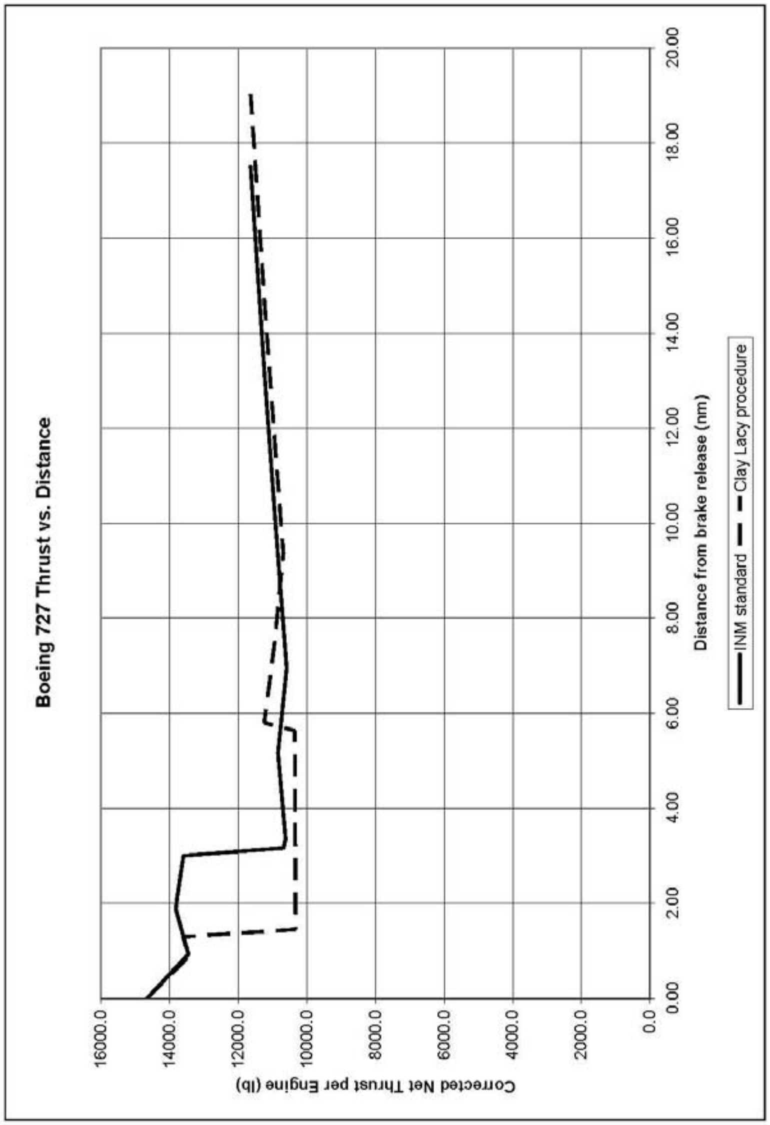

Figure 3. Thrust Profiles for Standard and Clay Lacy Procedures

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B727 Request for Approval of User Changes to INM
July 7, 2006
Page 9

Appendix A

07/06/2006 21:30 FAX 004

HARRIS MILLER MILLER & HANSON INC.

Review and Concurrence of VNY Aircraft Performance Data – Clay Lacy
March 29, 2006
Page 25

Clay Lacy Aviation concurrence with modeled procedures:

Clay Lacy Aviation certifies that the proposed *profile for Boeing 727 aircraft departing* from Van Nuys Airport falls within reasonable bounds of the aircraft's performance.

Name

PRESIDENT/CLAY LACY AVIATION
Position/ Title

HARRIS MILLER MILLER & HANSON INC.
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March 13, 2007

Dr. "Bill" Hua He
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Supplemental Information for Boeing 727 Non-Standard Departure Profiles at Van Nuys Airport

Reference: HMMH Project Number 300701

Dear Dr. He:

This letter is in response to questions raised regarding our request (previously submitted in June 2006) to use actual operator profiles for the Boeing 727 aircraft when modeling in the Integrated Noise Model (INM) at Van Nuys Airport (VNY). The INM modeling is in support of the VNY FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

Section 1 – Background

In recent communications from the FAA, questions were raised concerning how certain values were calculated using standard engineering procedures. This document and attachments attempt to describe in detail the methodology employed using information from the INM Version 6.0 User's Guide and Technical Manual and SAE-AIR-1845 equations.

In support of the Part 161 process, we held a meeting on January 24, 2006 with personnel from Clay Lacy Aviation, a Fixed Base Operator (FBO) at VNY, to determine how they operate their Boeing 727 aircraft. We received data directly from Clay Lacy which were then converted into the required format for the Integrated Noise Model.

As stated in our original letter of request, the differences between the standard INM departure for the 727EM2 Standard (Stage Length 1) and the Clay Lacy procedure are primarily due to the lower thrust levels used in the Clay Lacy procedure from 500 to 3,000 feet Above Field Elevation (AFE). The standard INM procedure uses Maximum Takeoff power up until 200 knots are reached during departure; the takeoff flaps are set to 5 degrees and retracted during the acceleration portion of the departure. The Clay Lacy procedure uses Maximum Takeoff power up to 400 feet AFE, and then reduces to an Engine Pressure Ratio (EPR) of 1.8. This EPR setting is held to 3,000 AFE when the power is increased to Maximum Climb, which corresponds with the standard INM procedure. The Clay Lacy procedure also uses 15 degrees of flaps (due to the relatively short runway at VNY), which are maintained until 3,000 feet AFE is reached.

Section 2 – Derivation of New Parameters

Data provided by Clay Lacy included the aircraft power setting, altitude, and calibrated/indicated airspeed at various points in the profile. These aircraft performance characteristics were then translated into INM procedure steps using standard engineering practice which is detailed below and in the attached spreadsheet. The procedure steps data conform to the rules given in the INM User's

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Supplemental Data for Boeing 727 Request for Approval of User Changes to INM
March 13, 2007
Page 2

Guide / Technical Manual and SAE-AIR-1845. We developed no new aircraft performance coefficients for this study.

To develop the "cut-back" thrust levels in corrected net thrust per engine (pounds), we determined the true airspeeds at the corresponding altitudes. Based on a standard day and standard lapse rate, we used the INM thrust calculator to convert the 1.8 EPR to pounds thrust per engine.

The attached spreadsheet details the calculations of true airspeed from calibrated airspeed using INM Version 6.0 Technical Manual equations in Section 2.3.3 and SAE-AIR-1845 equation A5,

$v_T = v\ \sigma^{-1/2}$

where
v_T is true airspeed in knots
v is calibrated airspeed in knots
σ is air density ratio at aircraft altitude

Clay Lacy B727 Departure Procedures
Profile Weight: 156,000 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	15	Max takeoff
2	-	160	15	Max takeoff
3	400	-	15	Max takeoff
4	500	-	15	1.8 EPR
5	3000	-	15	1.8 EPR
6	-	210	zero	Max Climb
7		250	zero	Max Climb
8	5500	-	zero	Max Climb
9	7500	-	zero	Max Climb
10	10000	-	zero	Max Climb

Translated into INM Procedure

ACFT_ID	OP	PROF_ID1	PROF_ID2	STEP #	STEP_TYPE	FLAP	THR	PRM1	PRM2	PRM3
727LAC	D	LACY	1	1	T	15	T	0.0	0.0	0.0
727LAC	D	LACY	1	2	A	U-15	T	1000.0	160.0	0.0
727LAC	D	LACY	1	3	C	U-15	T	400.0	0.0	0.0
727LAC	D	LACY	1	4	C	U-15	U	500.0	0.0	10330.0
727LAC	D	LACY	1	5	C	U-15	U	3000.0	0.0	10330.0
727LAC	D	LACY	1	6	A	ZERO	C	1000.0	210.0	0.0
727LAC	D	LACY	1	7	A	ZERO	C	1000.0	250.0	0.0
727LAC	D	LACY	1	8	C	ZERO	C	5500.0	0.0	0.0
727LAC	D	LACY	1	9	C	ZERO	C	7500.0	0.0	0.0
727LAC	D	LACY	1	10	C	ZERO	C	10000.0	0.0	0.0

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Clay Lacy B727 Profile Points
Profile Weight: 156,000 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	14979.4
0.77	0.0	155.5	13836.3
0.92	57.7	162.5	13807.0
1.25	400.0	163.3	13931.2
1.41	500.0	163.6	10330.0
5.86	3000.0	169.8	10330.0
6.03	3052.7	174.5	11559.5
7.76	3607.8	224.9	11252.0
9.65	4090.8	269.7	11005.7
11.77	5500.0	275.5	11232.5
14.97	7500.0	284.1	11554.3
19.33	10000.0	295.5	11956.5

Section 3 –Comparison with Measured Data

The number of Boeing 727 operations in a year was very small limiting the number of noise monitor measurements available for comparison. Fifteen noise monitor readings at permanent noise monitorV-7, located approximately two nautical miles from brake release for Runway 16R departures and near runway centerline, were gathered for the Boeing 727 departures and compared to the INM results at the same point. The range of measured SEL values for the Boeing 727 departures was 101 – 112 dBA. The modeled SEL for the Clay Lacy procedure was 102 dBA. The modeled SEL for the 727EM2 Standard (Stage Length 1) profile at V-7 was 105 dBA.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. I hope this clarifies questions you had on our previous request. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr

Robert D. Behr
Senior Consultant

Attachment: Boeing 727 Data Sheet

Boeing 727 Data Sheet
Computation of True Airspeeds at 160 knots indicated airspeed and two altitudes

Clay Lacy 727 ISA Day
Built on 727EM2 Profile with cutbacks at 400 feet AFE to 500 feet AFE and 500 feet AFE to 3,000 feet AFE

Use following to compute True Airspeed INM 6.0 Technical Manual 2.3.3

			theta	delta	sigma
altitude	500		0.991069	0.953937	0.962534
KIAS	160				
KTAS	163.0842				
Power	1.8 EPR				

			theta	delta	sigma
altitude	3000		0.973881	0.870122	0.893458
KIAS	160				
KTAS	169.2711				
Power	1.8 EPR				

Use INM Thrust Calculator to derive Corrected Net Thrust per Engine

kts2fps	1.6878
T	56.15077
P	29.92
E	799
R	459.67
L	0.003566
EXP	5.256562
nm2ft	6076.116

U.S. Department of Transportation
Federal Aviation Administration

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

April 4, 2007

Mr. Robert D Behr Jr.
Harris Miller Miller & Hanson Inc.
945 University Avenue, Suite 201
Sacreamento, CA 95825

Dear Mr. Behr:

The Office of Environment and Energy has reviewed the proposed non-standard INM departure profiles for three aircraft (Lear 25, Boeing 727 and A3) submitted for aircraft modeling for Van Nuys Airport (VNY) in support of the Los Angeles World Airports (LAWA) FAA Part 161 Study. Our office has also reviewed the supplemental steps used in deriving the non-standard profiles.

Our office approves the proposed revision of the profiles, with the understanding that

(1) The Clay Lacy Aviation has reviewed and verified that the proposed profiles for Lear25 and Boeing 727 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

(1) The Raytheon Flight Test Operations has reviewed and verified that the proposed profiles for A-3 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

Please understand that approvals listed above are limited to this particular Part 161 Study. Any additional projects or non-standard INM input will require separate approval.

Sincerely,

M. Marsan

Dr. Mehmet Marsan
Acting Manager
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Air Group Gulfstream GIV Departure Profile

This memorandum requests FAA approval of a user-defined departure profile for the GIV flown by the Air Group for use in the VNY NEMs Update.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined departure profile for the Air Group GIV. The previous analysis, which used INM 6.2, and FAA approval are included as attachments. The revised SEL comparison using INM7.0b is shown in the following tables.

Table 1 Departure SEL Values for Proposed Air Group GIV Profile versus GIV Standard Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	GIV (SEL, dB)	Air Group GIV (SEL, dB)	Difference (dB)
0.5	107.6	105.9	-1.7
1.0	92.1	91.5	-0.6
1.5	87.2	86.9	-0.3
2.0	84.1	83.8	-0.3
2.5	81.7	81.3	-0.4
3.0	80.2	79.7	-0.5
3.5	78.2	77.9	-0.3
4.0	76.9	76.7	-0.2
4.5	75.7	75.5	-0.2
5.0	74.6	74.2	-0.4
5.5	73.4	73.3	-0.1
6.0	72.4	72.3	-0.1
6.5	71.6	71.4	-0.2
7.0	70.9	70.5	-0.4
7.5	70.1	69.8	-0.3
8.0	69.4	69.1	-0.3
8.5	68.8	68.5	-0.3
9.0	68.2	67.8	-0.4
9.5	67.7	67.3	-0.4
10.0	67.2	66.7	-0.5

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June 9, 2006

Mr. Sandy Liu
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User Changes to the Integrated Noise Model, GIV

Reference: HMMH Project Number 300701

Dear Mr. Liu:

This letter is a request for approval of user changes to the Integrated Noise Model (INM) version 6.2 for use at Van Nuys (VNY) airport. These changes involve augmenting the standard departure profiles in the INM with actual procedures as flown by pilots operating at VNY.

Section 1 – Background

We are submitting this request for written approval for changes to the Integrated Noise Model standard profiles in support of a Van Nuys Airport FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

This letter contains data on the Gulfstream GIV operating procedures as provided by The Air Group. We will send similar letters containing data for other aircraft operating at VNY which also are flown differently than modeled in the INM. In support of the Part 161 process, we held a meeting on January 25, 2006 with personnel from The Air Group, a Fixed Base Operator (FBO) at VNY, to determine how they operate their GIV aircraft. The Air Group's approval of our modeling of this procedure is documented in Appendix A. We refer to this procedure as the Air Group procedure in this document.

Section 2 – Statement of Benefit

The Air Group procedure provides a benefit (maximum of -0.2 dBA, SEL) from 0.5 to 10 nautical miles (nm) from the brake release point.

Section 3 – Analysis Demonstrating Benefit

The differences between the standard INM departure and the Air Group procedure are primarily due to the different flaps schedule used in the Air Group procedure. The Air Group procedure reduces from 20 degrees of flaps at takeoff to 0 degrees of flaps at 400 feet Above Field Elevation (AFE). The standard INM GIV departure uses 20 degrees of flaps from takeoff up to 1,850 feet AFE. The intention of the Air Group procedure is to climb out from VNY at the maximum rate possible; the primary reason for this procedure is to quickly gain altitude to avoid conflicts with arrival traffic at neighboring Burbank airport.

The analysis shows the Air Group procedure provides noise benefits from 0.5 to 10 nautical miles from the brake release point. The benefit is a maximum (-1.7 dB, SEL, relative to the INM standard procedure) at 0.5 nm from the departure end, with the benefit decreasing as the aircraft continues down the flight track.

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Table 1 shows the SEL results under the flight path from the Air Group procedure; the standard INM departure profile is presented for comparison.

Section 4 – Concurrence on Aircraft Performance

A letter from Air Group stating agreement with these procedures is found in Appendix A.

Section 5 – Certification of New Parameters

The aircraft performance characteristics provided by the Air Group have been translated into INM procedure steps using standard engineering practice. We developed no new aircraft performance coefficients for this study. The procedure steps data in this study conform to the rules given in the INM User's Guide and SAE-1845. We used net corrected thrust in units of pounds for all thrust settings.

Section 6 – Graphical and Tabular Comparison

Tables 2-5 and Figures 1-3 present the results of the modeling analysis by showing the altitude, airspeed, and net corrected thrust per engine of the modeled procedures as a function of distance from the brake release point.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

enclosures:

HARRIS MILLER MILLER & HANSON INC.

AG - GIV Request for Approval of User Changes to INM
June 9, 2006
Page 3

Table 1. Comparison of Noise Impacts from Brake Release for INM Standard and Air Group Departure Procedures
INM Aircraft Model: GIV Profile Weight: 63,410 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Air Group, SEL (dBA)	Difference SEL (dBA)
0.00	134.2	134.2	0.0
0.50	107.8	106.1	-1.7
1.00	91.6	90.7	-0.9
1.50	86.6	86.2	-0.4
2.00	83.4	83.1	-0.3
2.50	81.0	80.6	-0.4
3.00	79.7	79.5	-0.2
3.50	77.7	77.4	-0.3
4.00	76.4	76.2	-0.2
4.50	75.3	75.0	-0.3
5.00	74.1	73.4	-0.7
5.50	73.0	72.9	-0.1
6.00	71.7	71.9	0.2
6.50	71.0	71.0	0.0
7.00	70.2	70.1	-0.1
7.50	69.5	69.4	-0.1
8.00	68.8	68.7	-0.1
8.50	68.1	68.1	0.0
9.00	67.6	67.5	-0.1
9.50	67.0	66.9	-0.1
10.0	66.5	66.4	-0.1

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Table 2. INM Standard GIV Departure Procedures
Profile Weight: 63,410 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0.0	-	20	Max takeoff
2	35.0	-	20	Max takeoff
3	-	159.2	20	Max takeoff
4	400	-	20	Max takeoff
5	600	-	20	Max Climb
6	750	-	20	Max Climb
7	1850	-	10	Max Climb
8	3000	-	10	Max Climb
9	-	250	zero	Max Climb
10	5000	-	zero	Max Climb
11	6000	-	zero	Max Climb
12	7000	-	zero	Max Climb
13	8000	-	zero	Max Climb
14	9000	-	zero	Max Climb
15	10000	-	zero	Max Climb

Table 3. Air Group GIV Departure Procedures
Profile Weight: 63,410 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	0	-	20	Max takeoff
2	35	-	20	Max takeoff
3	400	-	20	Max takeoff
4	-	160	zero	Max takeoff
5	2000	-	zero	Max Climb
6	3000	-	zero	Max Climb
7	-	250	zero	Max Climb
8	5000	-	zero	Max Climb
9	6000	-	zero	Max Climb
10	7000	-	zero	Max Climb
11	8000	-	zero	Max Climb
12	9000	-	zero	Max Climb
13	10000	-	zero	Max Climb

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AG - GIV Request for Approval of User Changes to INM
June 9, 2006
Page 5

Table 4. INM Standard GIV Departure Parameters
Profile Weight: 63,410 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	13181.0
0.45	0.0	147.0	11009.1
0.47	35.0	147.1	11011.1
0.70	209.3	160.8	10824.9
0.82	400.0	161.3	10835.9
0.90	500.0	161.5	8667.5
0.99	600.0	161.7	8690.3
1.12	750.0	162.1	8707.3
2.01	1850.0	164.8	8832.7
2.97	3000.0	167.6	8963.7
6.09	4573.4	269.5	8289.4
6.54	5000.0	271.3	8338.0
7.63	6000.0	275.4	8451.9
8.75	7000.0	279.7	8565.8
9.92	8000.0	284.1	8679.7
11.12	9000.0	288.5	8784.3
12.39	10000.0	293.1	8835.2

Table 5. Air Group GIV Departure Parameters
Profile Weight: 63,410 lb

Distance from Brake Release, nm	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Net Corrected Thrust per Engine, lb
0.00	0.0	35.0	13181.0
0.45	0.0	147.0	11009.1
0.47	35.0	147.1	11011.1
0.68	400.0	147.9	11032.2
0.85	566.8	151.9	8791.5
1.34	1062.8	163.7	8735.4
2.07	2000.0	166.0	8842.2
2.88	3000.0	168.4	8956.1
5.04	3628.7	265.7	8181.7
6.47	5000.0	271.3	8338.0
7.56	6000.0	275.4	8451.9
8.69	7000.0	279.7	8565.8
9.85	8000.0	284.1	8679.7
11.06	9000.0	288.5	8784.3
12.32	10000.0	293.1	8835.2

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AG - GIV Request for Approval of User Changes to INM
June 9, 2006
Page 6

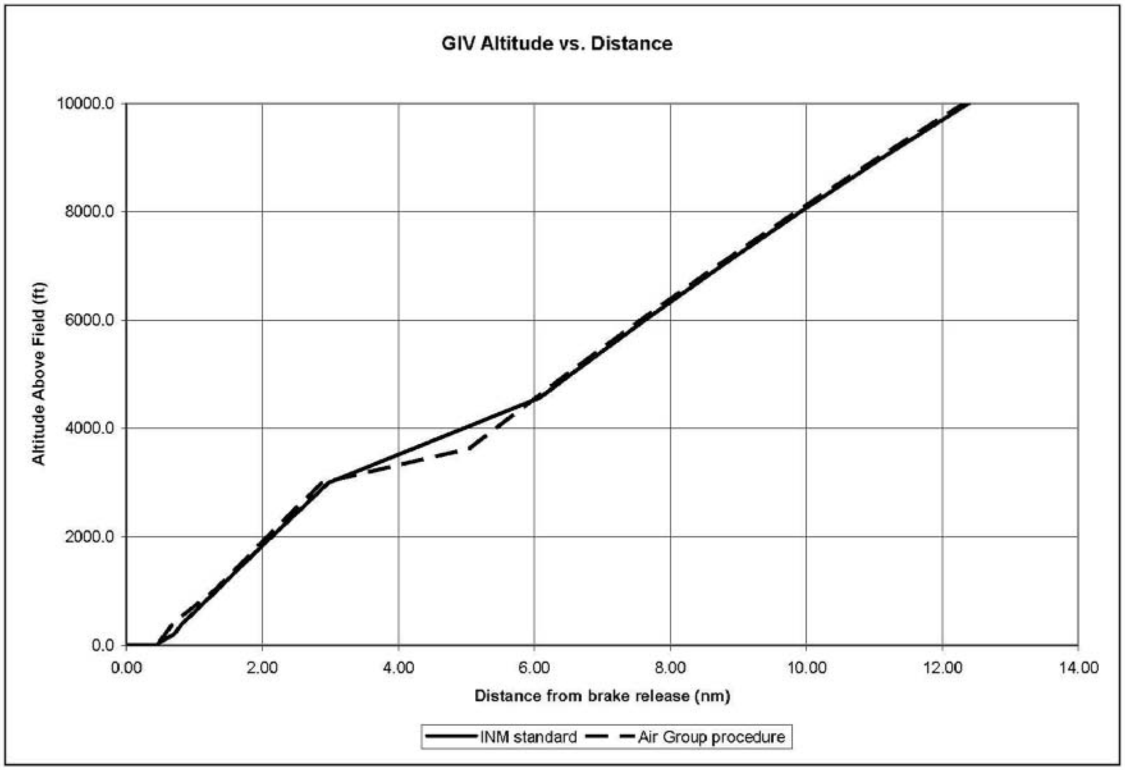

Figure 1. Altitude Profiles for Standard and Air Group Procedures

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AG - GIV Request for Approval of User Changes to INM
June 9, 2006
Page 7

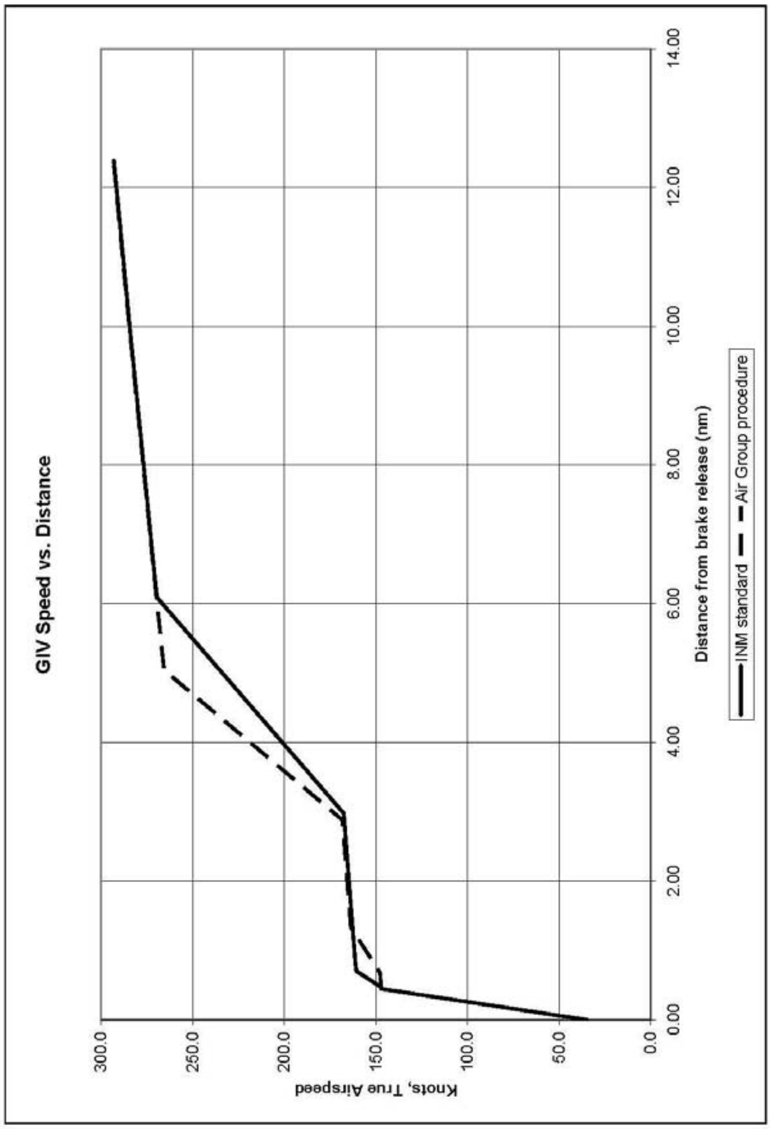
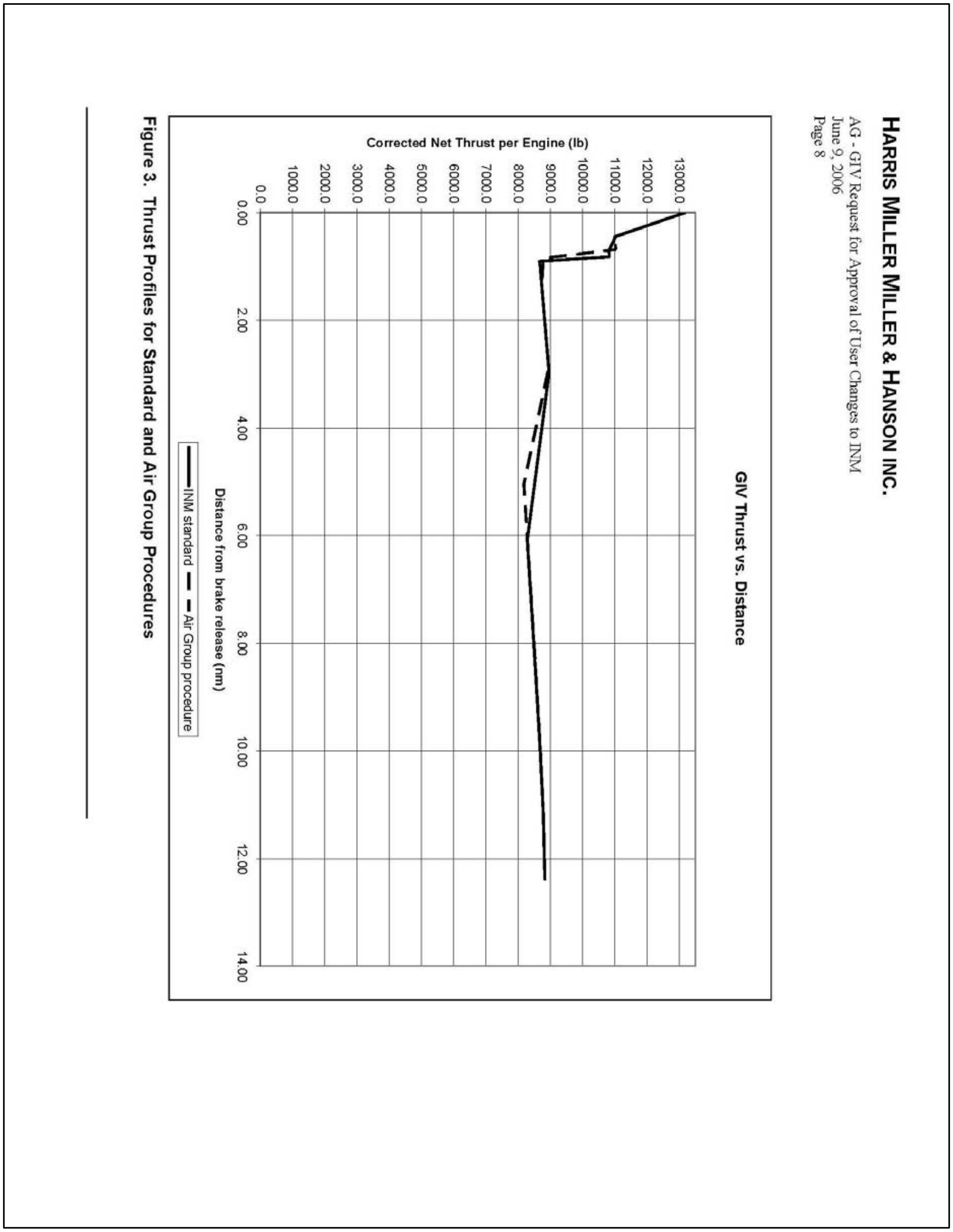


Figure 2. Airspeed Profiles for Standard and Air Group Procedures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AG - GIV Request for Approval of User Changes to INM
June 9, 2006
Page 8
GIV Thrust vs. Distance
Corrected Net Thrust per Engine (lb)
0.0
1000.0
2000.0
3000.0
4000.0
5000.0
6000.0
7000.0
8000.0
9000.0
10000.0
11000.0
12000.0
13000.0
0.00
2.00
4.00
6.00
8.00
10.00
12.00
14.00
Distance from brake release (nm)
INM standard
Air Group procedure
Figure 3. Thrust Profiles for Standard and Air Group Procedures

APPENDIX A

HARRIS MILLER MILLER & HANSON INC.

Review and Concurrence of VNY Aircraft Performance Data – Air Group
March 29, 2006
Page 4

The Air Group concurrence with modeled procedures:

The Air Group certifies that the proposed profile for Gulfstream IV aircraft departing from Van Nuys Airport falls within reasonable bounds of the aircraft's performance.

DAVID BAKER
Name

CHIEF PILOT
Position/ Title

U.S. Department
of Transportation
Federal Aviation Administration

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

JUN 21 2006

Mr. Bob Behr
Harris Miller Miller & Hanson Inc.
945 University Ave., Suite 201
Sacramento, CA 95825

Dear Sirs:

The Office of Environment and Energy has reviewed the data submitted for the user defined departure profile data for the GIV and approves its use in the Van Nuys Airport FAR Part 161 study.

Please understand that this approval for use of the profile is limited to this particular Van Nuys Airport FAR Part 161 study. Any additional projects or non-standard INM input for VNY will require separate approval as will use of this profile for another site.

Sincerely,

Sandy R. Liu

Sandy Liu
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Raytheon A-3 Departure Profile

This memorandum requests FAA approval of a user-defined departure profile for the A-3 flown by Raytheon for use in the VNY NEMs Update.

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined departure profile for the Raytheon A-3. The previous analysis, which used INM 6.2, and FAA approval are included as attachments. The revised SEL comparison using INM7.0b is shown in the following tables.

Table 1 Departure SEL Values for Proposed Raytheon A-3 Profile versus A-3 Standard Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from start-of-take-off-roll	A-3 (SEL, dB)	Raytheon A-3 (SEL, dB)	Difference (dB)
0.5	134.0	130.6	-3.4
1.0	128.2	125.8	-2.4
1.5	123.3	122.2	-1.1
2.0	109.5	112.2	2.7
2.5	106.7	108.7	2.0
3.0	104.8	106.2	1.4
3.5	103.4	104.2	0.8
4.0	102.3	102.3	±0.0
4.5	101.3	100.7	-0.6
5.0	100.0	99.3	-0.7
5.5	98.6	97.9	-0.7
6.0	97.5	96.9	-0.6
6.5	97.0	96.0	-1.0
7.0	96.8	95.3	-1.5
7.5	96.7	94.4	-2.3
8.0	96.5	93.6	-2.9
8.5	96.4	92.9	-3.5
9.0	96.3	92.1	-4.2
9.5	96.2	91.3	-4.9
10.0	96.1	90.6	-5.5

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June 20, 2006

Sandy Liu
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User Changes to the Integrated Noise Model, A-3

Reference: HMMH Project Number 300701

Dear Mr. Liu:

This letter is a request for approval of user changes to the Integrated Noise Model (INM) version 6.2 for use at Van Nuys Airport (VNY). These changes involve augmenting the standard departure profiles in the INM with actual procedures as flown by pilots operating at VNY.

Section 1 – Background

We are submitting this request for written approval for changes to the Integrated Noise Model standard profiles in support of a Van Nuys Airport FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

This letter contains data on the Douglas A-3 (INM type A3) operating procedures as provided by Raytheon Flight Test Operations (Raytheon). We will send similar letters containing data for other aircraft operating at VNY which also are flown differently than modeled in the INM. In support of the Part 161 process, we received information from January-June 2006 from personnel at Raytheon, a Fixed Base Operator (FBO) at VNY, stating how they operate their A-3 aircraft. Raytheon's approval of our modeling of this procedure is documented in Appendix A. We refer to this procedure as the Raytheon procedure in this document.

Section 2 – Statement of Benefit

The Raytheon procedure provides a benefit (maximum of -6.4 dBA, SEL) from 0.0 to 1.5 nautical miles (nm) from the brake release point.

Section 3 – Analysis Demonstrating Benefit

The differences between the standard INM departure and the Raytheon procedure are primarily due to slightly different initial power settings during the takeoff roll and significant differences during the climb-out phase. The Raytheon procedure begins with a thrust setting of 96% RPM. Upon reaching 400 feet Above Field Elevation (AFE), the power is decreased to a power setting of 93%; this power setting is retained up to 10000 feet AFE. The standard INM A-3 departure uses 97% RPM during the ground roll, with an increase to 98% at rotation and up to 400 feet AFE. At 400 feet, the power is decreased to 93%.

The analysis shows the Raytheon procedure provides noise benefits from 0.0 to 1.5 nautical miles from the brake release point. After about 1.5 nm from brake release, the INM standard aircraft begins a power reduction to 93%, resulting in less noise under the flight path (maximum of 2.9 dBA, SEL, at 2.0 nm from brake release) than the Raytheon procedure due to the higher climb gradient and faster airspeeds of the standard procedure. Raytheon's chief test pilot has stated that the high speed (250

HARRIS MILLER MILLER & HANSON INC.

A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 2

knots at 700 feet AGL) and small climb gradient (5000 feet in 33 nm) of the INM standard procedure is impossible to accept in the high volume air traffic environment around VNY.

Table 1 shows the SEL results under the flight path from the Raytheon procedure; the standard INM departure profile is presented for comparison.

Section 4 – Concurrence on Aircraft Performance

A letter from Raytheon stating agreement with these procedures is found in Appendix A.

Section 5 – Certification of New Parameters

The aircraft performance characteristics provided by Raytheon have been translated into INM procedure steps using standard engineering practice. We developed no new aircraft performance coefficients for this study. The procedure steps data in this study conform to the rules given in the INM User's Guide and SAE-1845. We used % RPM for all thrust settings.

Section 6 – Graphical and Tabular Comparison

Tables 2-3 and Figures 1-3 present the results of the modeling analysis by showing the altitude, airspeed, and engine % RPM of the modeled procedures as a function of distance from the brake release point.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

enclosures:

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A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 3

Table 1. Comparison of Noise Impacts from Brake Release for INM Standard and Raytheon A-3 Departure Procedures
INM Aircraft Model: A3 Profile Weight: Standard 68,000 lb; Raytheon 69,400 lb

Distance from Brake Release (nm)	INM Standard, SEL (dBA)	Raytheon, SEL (dBA)	Difference SEL (dBA)
0.00	154.6	152.8	-1.8
0.50	134.1	130.6	-3.5
1.00	128.3	125.9	-2.4
1.50	123.6	122.3	-1.3
2.00	109.4	112.3	2.9
2.50	106.7	109.4	2.7
3.00	104.8	107.2	2.4
3.50	103.4	105.4	2.0
4.00	102.3	103.8	1.5
4.50	101.3	102.5	1.2
5.00	100.0	101.1	1.1
5.50	98.6	99.9	1.3
6.00	97.5	98.8	1.3
6.50	97.0	97.8	0.8
7.00	96.8	97.0	0.2
7.50	96.7	96.2	-0.5
8.00	96.5	95.5	-1.0
8.50	96.4	94.8	-1.6
9.00	96.3	94.0	-2.3
9.50	96.2	93.3	-2.9
10.0	96.1	92.6	-3.5

HARRIS MILLER MILLER & HANSON INC.

A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 4

Table 2. INM Standard A-3 Departure Procedures
Profile Weight: 68,000 lb

Distance from Brake Release (nm)	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Power Parameter % RPM
0.00	0.0	35.0	97.0
0.20	0.0	105.0	98.0
1.48	400.0	190.0	98.0
1.81	700.0	250.0	93.0
3.13	1400.0	250.0	93.0
4.77	2100.0	250.0	93.0
6.09	3000.0	250.0	93.0
32.92	5000.0	250.0	93.0

Table 3. Raytheon A-3 Departure Procedures
Profile Weight: 69,400 lb

Distance from Brake Release (nm)	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Power Parameter % RPM
0.00	0.0	35.0	96.0
0.20	0.0	133.6	96.0
1.64	400.0	157.7	96.0
1.70	420.0	157.8	93.0
2.00	700.0	158.4	93.0
4.91	3000.0	190.4	93.0
19.11	10000.0	235.7	93.0

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A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 5

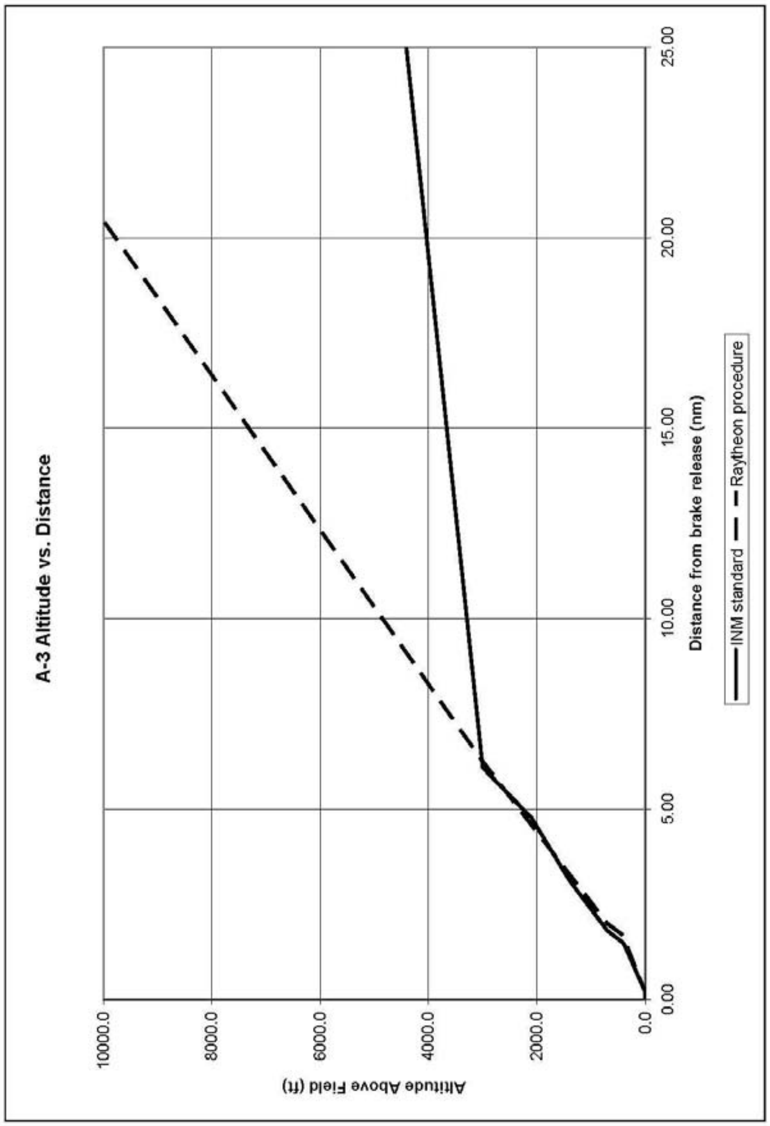

Figure 1. Altitude Profiles for Standard and Raytheon Procedures

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A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 6

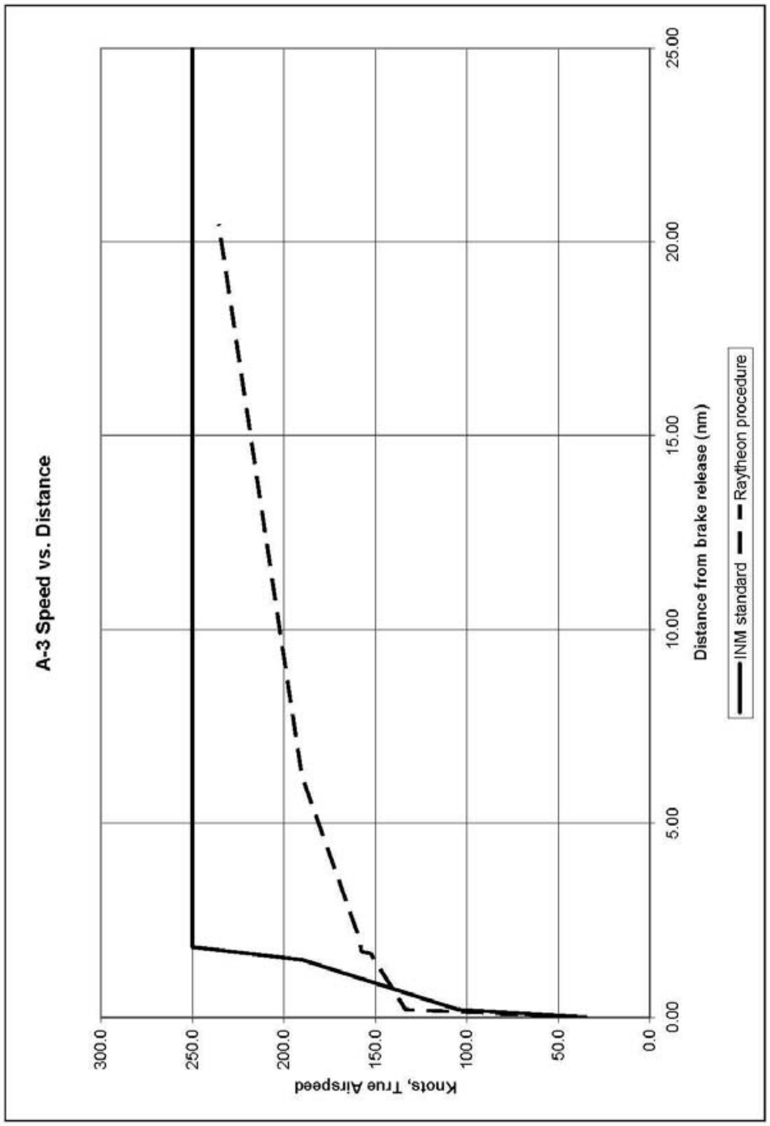

Figure 2. Airspeed Profiles for Standard and Raytheon Procedures

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A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 7

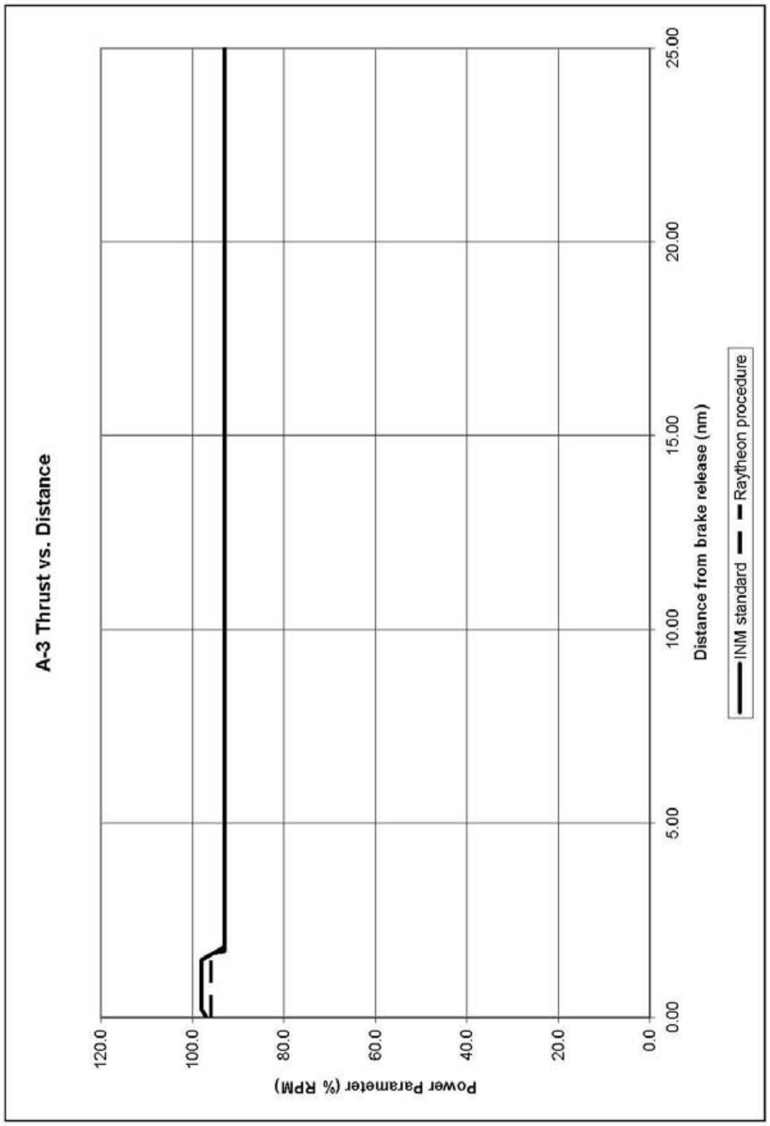

Figure 3. Thrust Profiles for Standard and Raytheon Procedures

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A-3 Request for Approval of User Changes to INM
June 20, 2006
Page 8

APPENDIX A

Review and Concurrence of VNY Aircraft Performance Data - Raytheon
June 7, 2006
Page 4

Raytheon Flight Test Operations concurrence with modeled procedures:

Raytheon Flight Test Operations certifies that the proposed profile for A-3 aircraft departing from Van Nuys Airport falls within reasonable bounds of the aircraft's performance.

Name

Chief Test Pilot
Position/Title

JUN-19-2006 15:24 FROM:TO 8183754587 TO:916 568 1201 P.4/7

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March 13, 2007

Dr. "Bill" Hua He
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Supplemental Information for A-3 Non-Standard Departure Profiles at Van Nuys Airport

Reference: HMMH Project Number 300701

Dear Dr. He:

This letter is in response to questions raised regarding our request (previously submitted in June 2006) to use actual operator profiles for the A-3 aircraft when modeling in the Integrated Noise Model (INM) at Van Nuys Airport (VNY). The INM modeling is in support of the VNY FAR Part 161 study. Los Angeles World Airports (LAWA), the proprietor of VNY, is the sponsor of the study.

Section 1 – Background

In recent communications from the FAA, questions were raised concerning how certain values were calculated using standard engineering procedures. This document and attachments attempt to describe in detail the methodology employed using information from the INM Version 6.0 User's Guide and Technical Manual and SAE-AIR-1845 equations.

In support of the Part 161 process, we received flight profile information from January-June 2006 from personnel at Raytheon, a Fixed Base Operator (FBO) at VNY, stating how they operate their A-3 aircraft. We worked directly with the Raytheon Chief Pilot to gather and record data during actual A-3 departure flights from VNY. The data were then converted into the required format for the Integrated Noise Model.

As stated in our original letter of request, the differences between the standard INM departure and the Raytheon procedure are primarily due to slightly different initial power settings during the takeoff roll and significant differences during the climb-out phase. The Raytheon procedure begins with a thrust setting of 96% RPM. Upon reaching 400 feet Above Field Elevation (AFE), the power is decreased to a power setting of 93%; this power setting is retained up to 10000 feet AFE. The standard INM A-3 departure uses 97% RPM during the ground roll, with an increase to 98% at rotation and up to 400 feet AFE. At 400 feet, the power is decreased to 93%.

Raytheon's chief test pilot has stated that the high speed (250 knots at 700 feet AFE and small climb gradient (5000 feet in 33 nm) of the INM standard procedure is impossible to accept in the high volume air traffic environment around VNY.

Section 2 – Derivation of New Parameters

Data provided by Raytheon included the aircraft power setting, altitude, rate of climb, and calibrated/indicated airspeed at various points in the profile. These aircraft performance characteristics were then translated into INM procedure steps using standard engineering practice which is detailed below and in the attached spreadsheet. The procedure steps data conform to the

HARRIS MILLER MILLER & HANSON INC.

Supplemental Data for A-3 Request for Approval of User Changes to INM
March 13, 2007
Page 2

rules given in the INM User's Guide / Technical Manual and SAE-AIR-1845. We used % RPM for all thrust settings. We developed no new aircraft performance coefficients for this study.

The attached spreadsheet details the calculations of true airspeed from calibrated airspeed using INM Version 6.0 Technical Manual equations in Section 2.3.3 and SAE-AIR-1845 equation A5,

$$v_T = v\,\sigma^{-1/2}$$

where
v_T is true airspeed in knots
v is calibrated airspeed in knots
σ is air density ratio at aircraft altitude

In addition, the attached spreadsheet shows the calculation of the distance traveled for each segment based on time and true airspeed (except for the provided Raytheon data at the 2 nm point) and then incorporated into the INM profile points file detailed in the table below.

Raytheon A-3 Departure Procedures
Profile Weight: 69,400 lb

Distance from Brake Release (nm)	Altitude Above Field Elevation (AFE), feet	True Airspeed, knots	Power Parameter % RPM
0.00	0.0	35.0	96.0
0.20	0.0	133.6	96.0
1.64	400.0	157.7	96.0
1.70	420.0	157.8	93.0
2.00	700.0	158.4	93.0
5.34	3000.0	190.4	93.0
17.77	10000.0	235.7	93.0

Section 3 –Comparison with Measured Data

As previously stated, specific cockpit procedure data were collected on several A-3 flights by Raytheon pilots. The chief pilot was well aware that the cockpit procedure variations would be compared for overall effects on noise monitor measurements. Noise monitor readings at permanent noise monitorV-7, located approximately two nautical miles from brake release for Runway 16R departures and near runway centerline, were gathered for the A-3 departures and compared to the INM results at the same point. The range of measured SEL values for the A-3 departures was 110.3 – 114.3 dBA. The modeled SEL for the Raytheon procedure was 112.2 dBA, nearly the center of the measured range of values. The modeled SEL for the A-3 Standard or Noisemap profile at V-7 was 109.4 dBA.

Section 4 –Other Observations

We noted that the INM standard points profile for the A-3 uses a constant "True Airspeed" of 250 knots from 700 feet through 5,000 feet AFE which is probably inconsistent with normal cockpit procedures to fly calibrated/indicated airspeed.

If you have any questions or comments regarding the content of this letter, you can reach me via telephone at 916.568.1116 or via e-mail at rbehr@hmmh.com. I hope this clarifies questions you had

HARRIS MILLER MILLER & HANSON INC.

on our previous request. Thank you for your consideration. I look forward to hearing back from you at your earliest convenience.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

Attachment: A3 Data Sheet

A-3 Data Sheet
Computation of data for profile points INM input

kts2fps	1.6878						
T	56.15077						
P	29.92						
E	799						
R	459.67						
L	0.003566						
EXP	5.256562						
gamma	1.4						
gas_constar	1716.2						
nm2ft	6076.116						
	A-3			ISA Day			
Ground roll	1200	Nmap		Altitude, ROC, Power, KIAS from Raytheon			
				INM 6.0 Technical Manual			2.3.3
First Seg				theta	delta	sigma	
altitude	400			0.991757	0.957421	0.965379	
Distance	10000	1.645788					
KIAS	155						
KTAS	157.7548						
Power	96						
Second Seg				theta	delta	sigma	
altitude	420			0.991619	0.956724	0.96481	
ROC	1000						
ROC (ft/s)	16.66667						
KIAS	155						
KTAS	157.8014						
True (ft/s)	266.3372						
climb (rad)	0.062618						
Distance	10318.98	1.698285		SAE-AIR-1845 Equation A9			
Power	93						
Third Seg				theta	delta	sigma	
altitude	700			0.989694	0.947001	0.956862	
ROC	1000						
ROC (ft/s)	16.66667						
time (sec)	16.8						
KIAS	155						
KTAS	158.4554						
True (ft/s)	267.441						
accel	0.065701						
Distance	12152.23	2		Based on Raytheon flight data (700 feet at 2 r			
Power	93						
Fourth Seg				theta	delta	sigma	
altitude	3000			0.973881	0.870122	0.893458	
ROC	2000						
ROC (ft/s)	33.33333						

time (sec)	69					
KIAS	180					
KTAS	190.43					
True (ft/s)	321.4078					
accel	0.782127					
Distance	32467.51	5.343465		Equation based on velocity and acceleration ε		
Power	93					
Fifth Seg				theta	delta	sigma
altitude	10000			0.925754	0.666625	0.720089
ROC	2000					
ROC (ft/s)	33.33333					
time (sec)	210					
KIAS	200					
KTAS	235.6877					
True (ft/s)	397.7937					
accel	0.363743					
Distance	107983.7	17.77183				
Power	93					

U.S. Department
of Transportation
Federal Aviation Administration

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

April 4, 2007

Mr. Robert D Behr Jr.
Harris Miller Miller & Hanson Inc.
945 University Avenue, Suite 201
Sacreamento, CA 95825

Dear Mr. Behr:

The Office of Environment and Energy has reviewed the proposed non-standard INM departure profiles for three aircraft (Lear 25, Boeing 727 and A3) submitted for aircraft modeling for Van Nuys Airport (VNY) in support of the Los Angeles World Airports (LAWA) FAA Part 161 Study. Our office has also reviewed the supplemental steps used in deriving the non-standard profiles.

Our office approves the proposed revision of the profiles, with the understanding that

(1) The Clay Lacy Aviation has reviewed and verified that the proposed profiles for Lear25 and Boeing 727 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

(1) The Raytheon Flight Test Operations has reviewed and verified that the proposed profiles for A-3 are within the bounds of performance for the aircraft, and that the operators do in fact fly the procedure being modeled.

Please understand that approvals listed above are limited to this particular Part 161 Study. Any additional projects or non-standard INM input will require separate approval.

Sincerely,

M. Marsan

Dr. Mehmet Marsan
Acting Manager
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Gulfstream GIII with Hushkits

Background

This memorandum requests FAA approval of a user-defined aircraft for the Gulfstream III (GIII) recertified to 14 CFR Part 36 Stage 3 via hushkit installations for use in the Van Nuys Airport (VNY) Noise Exposure Map Update (HMMH Project 304380). The Los Angeles World Airports (LAWA) is the sponsoring agency

For the recently conducted Part 161 Study and Noisier Aircraft Phase-out for VNY, HMMH requested and FAA approved the user-defined aircraft GIII that is basically the INM 7.0 standard GIIB with modified noise-power-distance (npd) curves to reflect the effects of the hushkits. The original submittal has been further refined through the use of aircraft certification data as published in Federal Aviation Administration Advisory Circular (AC) 36-1H, Appendix 1, March 2, 2010. There are no changes to the standard GIIB INM profiles.

Statement of Benefit

With the modification of existing GIII aircraft with the hushkits that qualify the aircraft as Stage 3, it becomes necessary to provide this aircraft in the modeling process to accurately reflect the aircraft noise exposure around VNY.

Analysis

The process for modifying the GIIB npd curves to account for the addition of Hushkits will be summarized here with all calculations presented in the step-by-step Excel spreadsheet. The resulting data will be included in the INM 7.0b study for the user-defined aircraft, GIIB_HKC.

With the publishing of certification data for the hushkitted GIIB/GIII aircraft in March 2010, efforts were made to refine the previous process and submittal that the FAA approved on August 29, 2007. The following table shows the AC36-1H, Appendix 1, data listed for the GIIB/GIII with and without hushkits. These data show that the sound level for takeoff is approximately 7-dB less for the GIIB /GIII with hushkits aircraft while the non-hushkit GIIB/GIII aircraft is slightly quieter on approach. Using these data and the existing INM 7.0b npd data for the SPEYHK noise identifier, the revised npd curves were developed.

In INM 7.0b, the GIIB uses the SPEYHK noise curves. The arrival and departure noise curves for SPEYHK have identical values for thrust settings from 1,000 to 10,000 lbs. For this process the following assumptions were made:

- On arrival, the aircraft was approximately 394 feet above the certification measurement position on arrival based on the aircraft certification procedures in 14 CFR Part 36 B36.3c.
- There were no changes to aircraft performance
- Arrival thrust and speed for both the GIIB and GIIB with hushkit certification measurements are the same
- As with the SPEYHK npd curves, the departure and arrival npd curves are identical

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INM User-defined Aircraft Request – GIII with Hushkits
Page 2

Table 1 Aircraft Noise Data for Certificated Turbojet Powered Airplanes
Source: AC36-1H Appendix 1

		MTOW	MLW			THRUST		FLAPS		(EPNdB)				
MANUFACTURER	MODEL	1000#	1000#	ENGINE MODEL	No.	1000#	BPR	TO	AP	TO	SL	AP	STAGE	NOTES
GULFSTREAM	GIIB-GIII	69.70	58.50	SPEY 511-8	2	11.40	0.64	10	39	91.1	103.4	97.3	2	12
GULFSTREAM	G-IIB/G-III(Quiet Tech Aero;STC ST02618AT)	69.70	58.50	SPEY 511-8(RB 163-25)	2	11.40	0.64	10	39	87.0	95.9	97.7	2	12

- The db offset for certification EPNL for unit of thrust also applies to npd curves for other metrics (SEL, Lmax)

The next step was to find the arrival thrust in the INM EPNdB npd curves associated with 394 feet and 97.3 dBA (97.3 dBA is arrival EPNdB reported in AC36-1H for the unhushkitted GIII). Table 2 shows the interpolated EPNdB values for a distance of 394 feet. The interpolation indicates that the thrust level should be 3,373 lbs.

Table 2 INM Thrust Estimate for 394 feet
Source: HMMH

SPEYHK INM 7.0b npd_curve.pdf			interpolated
Thrust	EPNdB in dBA		
	200 ft	400 ft	394 ft
1,000	89.0	85.1	85.2
2,000	94.1	90.2	90.3
4,000	104.3	100.4	100.5
6,000	110.3	106.4	106.5
8,000	117.3	113.1	113.5
10,000	123.9	120.0	120.1

The following step was to determine the dB benefit or difference between the hushkit and non-hushkit GIIB aircraft noise levels as a function of thrust. Both a linear interpolation and a second order equation (quadratic equation) were developed using the two known points and assuming that at zero thrust there is no differential in thrust for the two aircraft. In the final analysis the developed quadratic equation was used to provide a continuous function and to provide the A-weighted dB adjustments at the listed npd curve thrust levels (Table 3).

Table 3 Calculated dB Adjustments to SPEYHK INM npd Curves
Source: HMMH

Thrust (lbs)	Interpolated A-weighted dB Adjustment	
	Linear	Quadratic
1,000	0.4	0.3
2,000	0.4	0.5
4,000	-0.2	0.2
6,000	-2.2	-0.8
8,000	-4.2	-2.6
10,000	-6.1	-5.2

The quadratic adjustments were then added to the SPEYHK npd curves to derive the SPEYHK_HKC npd curves for the different metric npd curves. Table 4 is an example of the SPEYHK and the adjusted SPEYHK_HKC EPNdB npd curves (E). The npd curves for the other npd metrics (M, P, S) are adjusted in the same manner.

Table 5 presents a grid analysis of the resulting SEL values for both the GIIB and proposed GIIB_HKC aircraft on straight out departures. The GIIB_HKC USER profile is the same as that for the GIIB STANDARD; the only changes are to the npd curves. The INM output SEL contours for 85 dB, 90 dB, and 95 dB are shown in Figure 1 (GIIB_HKC in colors) for a standard day.

HARRIS MILLER MILLER & HANSON INC.
INM User-defined Aircraft Request – GIII with Hushkits
Page 4

Table 4 INM npd Curve Adjustments (EPNdB as an Example)

NOISE_ID	NOISE_TYPE	OP_MODE	THR_SET	L_200	L_400	L_630	L_1000	L_2000	L_4000	L_6300	L_10000	L_16000	L_25000
SPEYHK	E	A	1000	89	85.1	82.1	78.7	72.9	66.4	61.7	56.5	50.9	45.2
SPEYHK	E	A	2000	94.1	90.2	87.2	83.8	78	71.5	66.8	61.6	56	50.3
SPEYHK	E	A	4000	104.3	100.4	97.4	94	88.2	81.7	77	71.8	66.2	60.5
SPEYHK	E	A	6000	110.3	106.4	103.4	100	94.2	87.7	83	77.8	72.2	66.5
SPEYHK	E	A	8000	117.3	113.4	110.4	107.2	101.2	94.7	90	84.8	79.2	73.5
SPEYHK	E	A	10000	123.9	120	117	113.6	107.8	101.3	96.6	91.4	85.8	80.1
SPEYHK	E	D	1000	89	85.1	82.1	78.7	72.9	66.4	61.7	56.5	50.9	45.2
SPEYHK	E	D	2000	94.1	90.2	87.2	83.8	78	71.5	66.8	61.6	56	50.3
SPEYHK	E	D	4000	104.3	100.4	97.4	94	88.2	81.7	77	71.8	66.2	60.5
SPEYHK	E	D	6000	110.3	106.4	103.4	100	94.2	87.7	83	77.8	72.2	66.5
SPEYHK	E	D	8000	117.3	113.4	110.4	107.2	101.2	94.7	90	84.8	79.2	73.5
SPEYHK	E	D	10000	123.9	120	117	113.6	107.8	101.3	96.6	91.4	85.8	80.1

NOISE_ID	NOISE_TYPE	OP_MODE	THR_SET	L_200	L_400	L_630	L_1000	L_2000	L_4000	L_6300	L_10000	L_16000	L_25000
SPEYHK_HKC	E	A	1000	89.3	85.4	82.4	79	73.2	66.7	62	56.8	51.2	45.5
SPEYHK_HKC	E	A	2000	94.6	90.7	87.7	84.3	78.5	72	67.3	62.1	56.5	50.8
SPEYHK_HKC	E	A	4000	104.5	100.6	97.6	94.2	88.4	81.9	77.2	72	66.4	60.7
SPEYHK_HKC	E	A	6000	109.5	105.6	102.6	99.2	93.4	86.9	82.2	77	71.4	65.7
SPEYHK_HKC	E	A	8000	114.7	110.8	107.8	104.6	98.6	92.1	87.4	82.2	76.6	70.9
SPEYHK_HKC	E	A	10000	118.7	114.8	111.8	108.4	102.6	96.1	91.4	86.2	80.6	74.9
SPEYHK_HKC	E	D	1000	89.3	85.4	82.4	79	73.2	66.7	62	56.8	51.2	45.5
SPEYHK_HKC	E	D	2000	94.6	90.7	87.7	84.3	78.5	72	67.3	62.1	56.5	50.8
SPEYHK_HKC	E	D	4000	104.5	100.6	97.6	94.2	88.4	81.9	77.2	72	66.4	60.7
SPEYHK_HKC	E	D	6000	109.5	105.6	102.6	99.2	93.4	86.9	82.2	77	71.4	65.7
SPEYHK_HKC	E	D	8000	114.7	110.8	107.8	104.6	98.6	92.1	87.4	82.2	76.6	70.9
SPEYHK_HKC	E	D	10000	118.7	114.8	111.8	108.4	102.6	96.1	91.4	86.2	80.6	74.9

Table 5 Departure SEL Values for Proposed GIIB_HKC versus GIIB
Calculated with INM 7.0b using standard atmospheric conditions

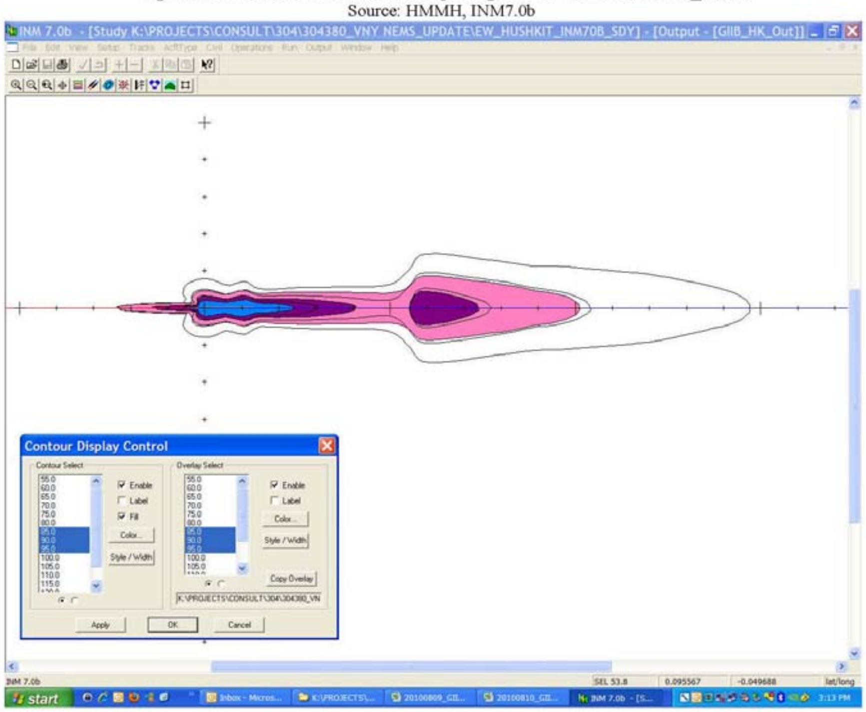
Grid Points (nmi) Distance from start-of-take-off-roll	GIIB (SEL, dB)	GIIB_HKC (SEL, dB)	Difference (dB)
0.5	138.9	133.6	-5.3
1.0	116.0	110.8	-5.2
1.5	102.4	99.9	-2.5
2.0	99.5	97.1	-2.4
2.5	97.2	94.8	-2.4
3.0	95.3	92.9	-2.4
3.5	93.9	91.5	-2.4
4.0	92.7	90.3	-2.4
4.5	91.7	89.2	-2.5
5.0	91.1	88.4	-2.7
5.5	94.5	89.8	-4.7
6.0	99.2	93.2	-6.0
6.5	98.0	92.1	-5.9
7.0	96.7	90.9	-5.8
7.5	95.5	89.8	-5.7
8.0	94.4	88.8	-5.6
8.5	93.3	87.8	-5.5
9.0	92.2	86.8	-5.4
9.5	91.5	86.1	-5.4
10.0	90.7	85.2	-5.5

The EXCEL spreadsheet with the step-by-step calculations is included in a ZIP file attached to the overall submittal.

Request your approval to use these modified npd curves to represent a GIII recertified to 14 CFR Part 36 Stage 3 via a hushkit in the INM 7.0b analysis for the Van Nuys Noise Exposure Map Update.

HARRIS MILLER MILLER & HANSON INC.
INM User-defined Aircraft Request – GIII with Hushkits
Page 6

Figure 1 INM 7.0b Screen Shot Comparing SEL of GIIB and GIIB_HKC
Source: HMMH, INM7.0b



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August 13, 2007

Dr. "Bill" Hua He
Federal Aviation Administration
Office of Environment and Energy
800 Independence Ave., SW
Washington, DC 20591

Subject: Request for Approval of User-defined Aircraft – Gulfstream III Aircraft with Hushkits

Reference: HMMH Project Number 300701

Dear Dr. He:

hmmh

Harris Miller Miller & Hanson Inc. (HMMH) is developing existing and forecast noise exposure contours for Van Nuys Airport (VNY) in support of the Los Angeles World Airports (LAWA) FAA Part 161 Study. We are using the Integrated Noise Model (INM) Version 7.0 for all aircraft noise modeling. This memorandum requests FAA approval of a user-defined aircraft for the Gulfstream III (GIII) recertified to 14 CFR Part Stage 3 via hushkit installations.

In previous correspondence (July 10, 2007), HMMH requested FAA guidance regarding the appropriate INM aircraft to use that would reflect the GIII operating with installed hushkits. The current INM identified aircraft substitution for the GIII is the Gulfstream IIB (INM type GIIB), which the FAA recommended as a conservative estimate for the hushkitted GIII (FAA letter dated July 17, 2007). After further review, HMMH submits this request for a user-defined aircraft that is basically the INM 7.0 standard GIIB with modified noise-power-distance (npd) curves to reflect the effects of the hushkits. There are no changes to the standard GIIB INM profiles.

Attachment 1 is a spreadsheet that summarizes data from FAA AC 36-3H which displays estimated maximum A-weighted sound levels for Gulfstream aircraft. Also included in the spreadsheet is information we received from Mr. Jim Skalecky (FAA) on the latest data he had regarding estimated maximum A-weighted sound levels from hushkitted Gulfstream aircraft. Comparing these data, the hushkitted GIII has maximum A-weighted sound levels for takeoff that are approximately 7.3 dB less than the non-hushkitted GIII while the approach levels of both aircraft are nearly the same. Using these limited data and the existing INM 7.0 data, HMMH developed revised INM Lmax and SEL npd curves as detailed below. We do not have data, nor do we have a need, to create npd curves for the other INM metrics. Therefore our proposed user-defined aircraft only has Lmax and SEL npd curves.

In INM 7.0, the GIIB uses the SPEYHK noise curves. Attachment 2 reproduces the SPEYHK noise curves (INM file npd_curve.dbf) and shows that the arrival and departure noise curves have identical values for thrust settings from 1,000 to 10,000 lbs. We assumed the aircraft was approximately 394 feet above the certification measurement position on arrival, based on the aircraft certification procedures in 14 CFR Part 36 B36.3c. In addition, we assumed that there were no changes to performance profiles between the two aircraft. Our next step was to find the thrust in the Lmax npd curves associated with 394 feet and 89.7 dBA (87.9 dBA is arrival Lmax reported in AC36-3H for the unhushkitted GIII). Table 1 shows the interpolated Lmax values for a distance of 394 feet. The interpolation indicates that the thrust level should be 3,228 lbs to produce an Lmax of 89.7 dBA at a distance of 394 feet.

Table 1 INM Thrust Estimate for 394 feet

SPEYHK INM 7.0 npd_curve.pdf			interpolated
Thrust	Lmax in dBA		
	200 ft	400 ft	394 ft
1,000	86.5	80.4	80.6
2,000	90.6	84.5	84.7
4,000	98.8	92.7	92.9
6,000	108.7	102.6	102.8
8,000	113.5	107.4	107.6
10,000	119.4	113.3	113.5

Both data sources for the take-off maximum A-weighted values (Attachment 1) indicate that there was a thrust-cutback during the take-off certification measurements. However, the thrust was not reported for either aircraft. Without further information, we therefore assumed that:

- There is a linear relationship between thrust and maximum A-weighted value benefit for the hushkit
- There is a constant 0.2 dB benefit at and below 3,228 lb of thrust (as reported in the INM npd_curve.dbf)
- The hushkit provides a linear benefit, in terms of maximum A-weighted level, as a function of thrust
- The 7.3 dB reduction maximum A-weighted sound level occurred at maximum thrust. This is a conservative assumption that would under-predict the benefits of the hushkit because the 7.3 dB was actually measured at a thrust cut back setting and hushkits are typically designed to provide maximum benefit at maximum thrust.
- Aircraft performance for both aircraft is identical
- Estimates of the hushkit's maximum A-weighted sound level benefit can also be directly applied to Sound Exposure Level npd curves.

Table 2 summarizes the two assumed data points for the two aircraft. In summary, the hushkitted GIIB has a 0.2 dB reduction at 3,228 lb of thrust and 7.3 dB reduction at 10,000 lb of thrust compared to the unhushkitted version.

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Table 2 Summary of Thrust versus Benefit

	Lmax (dBA) For Non-Hushkitted GIIB AC36-3H GIIB	Lmax (dBA) For Hushkitted GIII FAA provided	dB Difference	Assumed thrust (INM npd_curve.dbf)
Approach	89.7	89.5	-0.2	3,228
Departure	82.8	75.5	-7.3	10,000

Table 3 presents our proposed adjustment to the INM 7.0 npd curves as a function of thrust. We added the npd curve for 3,228 lb of thrust by interpolating between 2,000 and 4,000 lb of thrust. This allows the INM to model a constant adjustment of -0.2 dB up to 3,228 lbs of thrust. As discussed previously, we assume a linear relationship for the benefit of the hushkit between 3,228 lb and 10,000 lb of thrust.

Table 3 Lmax Adjustment as a Function of Thrust

Curves	Thrust	Interpolated dB adj	
A	1000	-0.2	from INM 7.0 npd
A	2000	-0.2	from INM 7.0 npd
A	3228	-0.2	Added to fix curve interpolation
A	4000	-1.0	from INM 7.0 npd
A	6000	-3.1	from INM 7.0 npd
A	8000	-5.2	from INM 7.0 npd
A	10000	-7.3	from INM 7.0 npd

We created the proposed SPEYHK_HKA entries for npd_curve.dbf by applying these adjustments to the INM 7.0 SPEYHK npd curves Lmax (NOISE_TYPE = M) and SEL (NOISE_TYPE = S) (presented in Attachment 2). The proposed npd_curve.dbf entries are designated SPEYHK_HKA and are presented in Attachment 3. The proposed SPEYHK_HKA noise curves do not include entries for other metrics.

Table 4 presents a grid analysis of the resulting SEL values for both the GIIB and proposed GIIB_HKA aircraft on straight out departures. The GIIB_HKA USER profile is the same as that for the GIIB STANDARD. As discussed above, the only changes are to the npd curves. The INM output SEL contours for 85 dB, 90 dB, and 95 dB are shown in Attachment 4 (GIIB_HKA in colors) for a standard day. The benefit of the proposed GIIB_HKA is only 2.4 to 2.7 dB at a range of 1.5 to 5.0 nautical miles because the GIIB STANDARD profile includes a thrust cut-back. Attachment 4 shows that the proposed aircraft has little benefit on arrival, which is expected. Attachment 4 and Table 4 show most benefit associated with the start-of-take-off roll.

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Table 4 Departure SEL Values for Proposed GIIB_HKA versus GIIB
Calculated with INM 7.0 using standard conditions

Grid Points (nmi) Distance from start-of-take-off-roll	GIIB (SEL, dB)	GIIB_HKA (SEL, dB)	Difference (dB)
0.5	138.9	133.6	-5.3
1.0	116.0	110.8	-5.2
1.5	102.4	99.9	-2.5
2.0	99.5	97.1	-2.4
2.5	97.2	94.8	-2.4
3.0	95.3	92.9	-2.4
3.5	93.9	91.5	-2.4
4.0	92.7	90.3	-2.4
4.5	91.7	89.2	-2.5
5.0	91.1	88.4	-2.7
5.5	94.5	89.8	-4.7
6.0	99.2	93.2	-6.0
6.5	98.0	92.1	-5.9
7.0	96.7	90.9	-5.8
7.5	95.5	89.8	-5.7
8.0	94.4	88.8	-5.6
8.5	93.3	87.8	-5.5
9.0	92.2	86.8	-5.4
9.5	91.5	86.1	-5.4
10.0	90.7	85.2	-5.5

We have included a copy of the INM 7.0 study with the standard GIIB and GIIB_HKA profiles and npd curves.

HARRIS MILLER MILLER & HANSON INC.

In the absence of additional information, we request your approval for us to use these modified npd curves to represent a GIII recertified to 14 CFR Part 36 Stage 3 via a hushkit in the INM 7.0 analysis for the Van Nuys Part 161 Study.

Thank you for your consideration of this request.

Sincerely yours,

HARRIS MILLER MILLER & HANSON INC.

Robert D. Behr
Senior Consultant

Inc: INM 7.0 Study

HARRIS MILLER MILLER & HANSON INC.

INM User-defined Aircraft Request – GIII with Hushkits
August 13, 2007
Page 6

ATTACHMENT 1
ESTIMATED MAXIMUM A-WEIGHTED SOUND LEVELS
MEASURED IN ACCORDANCE WITH PART-36 APPENDIX -C- PROCEDURES
(From AC 36-3H; April 25, 2002)

MANUFACTURER	AIRPLANE	ENGINE	TOGW 1000 LBS	MLW 1000 LBS	TO dBA	APP dBA	TO FLAPS	APP FLAPS	NOTES
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62.00	58.50	80.1	83.9	-	20*	8,15,16
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62.00	58.50	82.6	83.9	-	20*	8,15
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	62.00	58.50	82.6	90.6	20	39	8,15
GULFSTREAM	GULFSTREAM II	SPEY MK511-8	65.50	58.50	84.2	90.7	10	39	8,15,16
GULFSTREAM	GULFSTREAM IIB/GIII	SPEY MK511-8	69.70	58.50	82.8	82.5	10	20*	8,15,16
GULFSTREAM	GULFSTREAM IIB/GIII	SPEY MK511-8	69.70	58.50	82.8	89.7	10	39	8,15,16
GULFSTREAM	GULFSTREAM IV	RR TAY 611-8	73.20	58.50	64.2	80.7	10	39	8,15
GULFSTREAM	GULFSTREAM IV - SP	RR TAY 611-8	74.60	66.00	64.9	81.3	20	39	8,15
GULFSTREAM	G-V	BR700-710A1-10	90.50	75.30	68.0	82.0	10	39	8,15

*****AC36-3H UPDATE INFORMATION*****
ESTIMATED MAXIMUM A-WEIGHTED SOUND LEVELS
MEASURED IN ACCORDANCE WITH PART-36 APPENDIX -C- PROCEDURES
(From James Skalecky, FAA, July 6, 2007 email to Joseph Cardello, HMMH)

MANUFACTURER	AIRPLANE	ENGINE	TOGW 1000 LBS	MLW 1000 LBS	TO dBA	APP dBA	TO FLAPS	APP FLAPS	NOTES
GULFSTREAM	GII (QTA STC ST02618AT)	SPEY MK 511-8	62	58.5	73.2	89.4		39	8, 15, 16
GULFSTREAM	GII (QTA STC ST02618AT)	SPEY MK 511-8	64.8	58.5	74.8	89.4		39	8, 15, 16
GULFSTREAM	GIIB/GIII (QTA STC ST02618AT)	SPEY MK 511-8	68.2	58.5	74.8	89.5		39	8, 15, 16
GULFSTREAM	GIIB/GIII (QTA STC ST02618AT)	SPEY MK 511-8	69.7	58.5	75.5	89.5		39	8, 15, 16

Notes: 8 Thrust cutback used.
15 Based on manufacturer's data
16 Equipped with hushkit.

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INM User-defined Aircraft Request – GIII with Hushkits
August 13, 2007
Page 7

ATTACHMENT 2 INM 7.0 Unmodified npd Curves (npd_curve.dbf)

Lmax

NOISE_ID	NOISE_TYPE	OP_MODE	THR_SET	L_200	L_400	L_630	L_1000	L_2000	L_4000	L_6300	L_10000	L_16000	L_25000
SPEYHK	M	A	1000	86.5	80.4	76.1	71.5	64.1	56.3	50.8	45	38.9	32.8
SPEYHK	M	A	2000	90.6	84.5	80.2	75.6	68.2	60.4	54.9	49.1	43	36.9
SPEYHK	M	A	4000	98.8	92.7	88.4	83.8	76.4	68.6	63.1	57.3	51.2	45.1
SPEYHK	M	A	6000	108.7	102.6	98.3	93.7	86.3	78.5	73	67.2	61.1	55
SPEYHK	M	A	8000	113.5	107.4	103.1	98.5	91.1	83.3	77.8	72	65.9	59.8
SPEYHK	M	A	10000	119.4	113.3	109	104.4	97	89.2	83.7	77.9	71.8	65.7
SPEYHK	M	D	1000	86.5	80.4	76.1	71.5	64.1	56.3	50.8	45	38.9	32.8
SPEYHK	M	D	2000	90.6	84.5	80.2	75.6	68.2	60.4	54.9	49.1	43	36.9
SPEYHK	M	D	4000	98.8	92.7	88.4	83.8	76.4	68.6	63.1	57.3	51.2	45.1
SPEYHK	M	D	6000	108.7	102.6	98.3	93.7	86.3	78.5	73	67.2	61.1	55
SPEYHK	M	D	8000	113.5	107.4	103.1	98.5	91.1	83.3	77.8	72	65.9	59.8
SPEYHK	M	D	10000	119.4	113.3	109	104.4	97	89.2	83.7	77.9	71.8	65.7

SEL

NOISE_ID	NOISE_TYPE	OP_MODE	THR_SET	L_200	L_400	L_630	L_1000	L_2000	L_4000	L_6300	L_10000	L_16000	L_25000
SPEYHK	S	A	1000	89.4	85.5	82.5	79.1	73.3	66.8	62.1	56.9	51.3	45.6
SPEYHK	S	A	2000	93.5	89.6	86.6	83.2	77.4	70.9	66.2	61	55.4	49.7
SPEYHK	S	A	4000	101.7	97.8	94.8	91.4	85.6	79.1	74.4	69.2	63.6	57.9
SPEYHK	S	A	6000	111.8	107.9	104.9	101.5	95.7	89.2	84.5	79.3	73.7	68
SPEYHK	S	A	8000	117.3	113.4	110.4	107	101.2	94.7	90	84.8	79.2	73.5
SPEYHK	S	A	10000	123.9	120	117	113.6	107.8	101.3	96.6	91.4	85.8	80.1
SPEYHK	S	D	1000	89.4	85.5	82.5	79.1	73.3	66.8	62.1	56.9	51.3	45.6
SPEYHK	S	D	2000	93.5	89.6	86.6	83.2	77.4	70.9	66.2	61	55.4	49.7
SPEYHK	S	D	4000	101.7	97.8	94.8	91.4	85.6	79.1	74.4	69.2	63.6	57.9
SPEYHK	S	D	6000	111.8	107.9	104.9	101.5	95.7	89.2	84.5	79.3	73.7	68
SPEYHK	S	D	8000	117.3	113.4	110.4	107	101.2	94.7	90	84.8	79.2	73.5
SPEYHK	S	D	10000	123.9	120	117	113.6	107.8	101.3	96.6	91.4	85.8	80.1

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INM User-defined Aircraft Request – GIII with Hushkits
August 13, 2007
Page 8

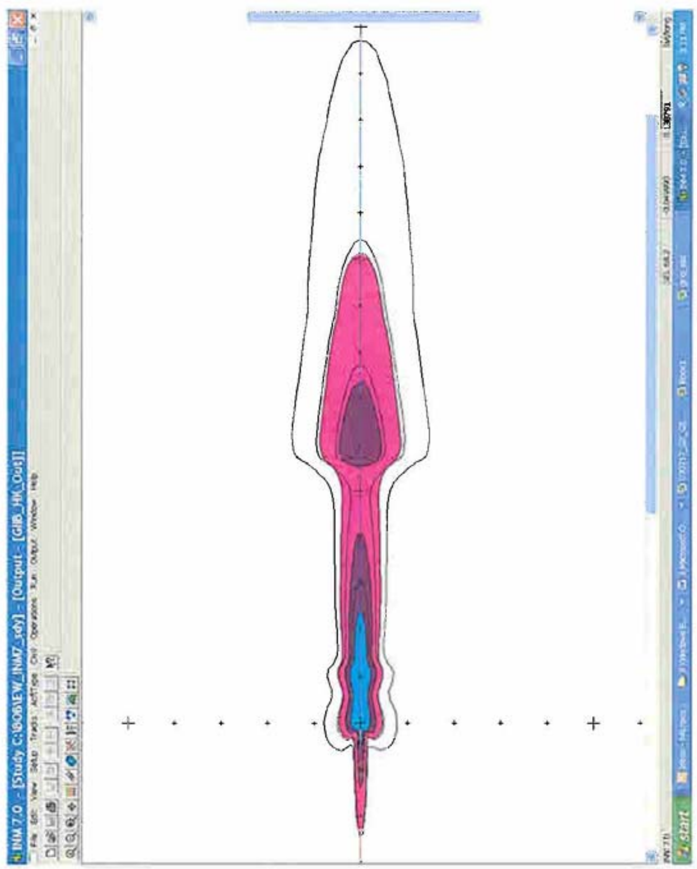
ATTACHMENT 3 Proposed INM 7.0 npd_curve.dbf Entries for GIII Recertified to 14 CFR Part 36 Stage 3 via a Hushkit

M = Lmax; S = SEL

NOISE_ID	NOISE_TYPE	OP_MODE	THR_SET	L_200	L_400	L_630	L_1000	L_2000	L_4000	L_6300	L_10000	L_16000	L_25000
SPEYHK_HKA	M	A	1000	86.3	80.2	75.9	71.3	63.9	56.1	50.6	44.8	38.7	32.6
SPEYHK_HKA	M	A	2000	90.4	84.3	80	75.4	68	60.2	54.7	48.9	42.8	36.7
SPEYHK_HKA	M	A	4000	97.8	91.7	87.4	82.8	75.4	67.6	62.1	56.3	50.2	44.1
SPEYHK_HKA	M	A	6000	105.6	99.5	95.2	90.6	83.2	75.4	69.9	64.1	58	51.9
SPEYHK_HKA	M	A	8000	108.3	102.2	97.9	93.3	85.9	78.1	72.6	66.8	60.7	54.6
SPEYHK_HKA	M	A	10000	112.1	106	101.7	97.1	89.7	81.9	76.4	70.6	64.5	58.4
SPEYHK_HKA	M	D	1000	86.3	80.2	75.9	71.3	63.9	56.1	50.6	44.8	38.7	32.6
SPEYHK_HKA	M	D	2000	90.4	84.3	80	75.4	68	60.2	54.7	48.9	42.8	36.7
SPEYHK_HKA	M	D	4000	97.8	91.7	87.4	82.8	75.4	67.6	62.1	56.3	50.2	44.1
SPEYHK_HKA	M	D	6000	105.6	99.5	95.2	90.6	83.2	75.4	69.9	64.1	58	51.9
SPEYHK_HKA	M	D	8000	108.3	102.2	97.9	93.3	85.9	78.1	72.6	66.8	60.7	54.6
SPEYHK_HKA	M	D	10000	112.1	106	101.7	97.1	89.7	81.9	76.4	70.6	64.5	58.4
SPEYHK_HKA	S	A	1000	89.2	85.3	82.3	78.9	73.1	66.6	61.9	56.7	51.1	45.4
SPEYHK_HKA	S	A	2000	93.3	89.4	86.4	83	77.2	70.7	66	60.8	55.2	49.5
SPEYHK_HKA	S	A	4000	100.7	96.8	93.8	90.4	84.6	78.1	73.4	68.2	62.6	56.9
SPEYHK_HKA	S	A	6000	108.7	104.8	101.8	98.4	92.6	86.1	81.4	76.2	70.6	64.9
SPEYHK_HKA	S	A	8000	112.1	108.2	105.2	101.8	96	89.5	84.8	79.6	74	68.3
SPEYHK_HKA	S	A	10000	116.6	112.7	109.7	106.3	100.5	94	89.3	84.1	78.5	72.8
SPEYHK_HKA	S	D	1000	89.2	85.3	82.3	78.9	73.1	66.6	61.9	56.7	51.1	45.4
SPEYHK_HKA	S	D	2000	93.3	89.4	86.4	83	77.2	70.7	66	60.8	55.2	49.5
SPEYHK_HKA	S	D	4000	100.7	96.8	93.8	90.4	84.6	78.1	73.4	68.2	62.6	56.9
SPEYHK_HKA	S	D	6000	108.7	104.8	101.8	98.4	92.6	86.1	81.4	76.2	70.6	64.9
SPEYHK_HKA	S	D	8000	112.1	108.2	105.2	101.8	96	89.5	84.8	79.6	74	68.3
SPEYHK_HKA	S	D	10000	116.6	112.7	109.7	106.3	100.5	94	89.3	84.1	78.5	72.8

ATTACHMENT 4

Comparison of SEL Contours (85, 90, 95) for GIIB_HKA (Color) and GIIB (Black)



U.S. Department
of Transportation
**Federal Aviation
Administration**

Office of Environment and Energy

800 Independence Ave., S.W.
Washington, D.C. 20591

August 29, 2007

Mr. Robert Behr
Harris Miller Miller and Hanson Inc.
945 University Avenue, Suite 201
Sacramento, California 95825

Dear Mr. Behr,

The Office of Environment and Energy (AEE) has received the memo dated August 13, 2007, referencing HMMH Project Number 300701 requesting approval for a user-defined aircraft type. AEE has reviewed the request for approval for INM user defined aircraft for the Gulfstream III recertified to 14 CFR Part Stage 3 via hushkit installations (GIII) for the Part 161 Study at Van Nuys Airport (VNY).

After reviewing the assumptions and methodology used to develop the GIII user-defined aircraft, the use of the GIII is accepted for the Part 161 Study at VNY.

Sincerely,

M. Marsan

Mehmet Marsan, Ph.D.
Acting Manager
AEE/Noise Division

HARRIS MILLER MILLER & HANSON INC.

VNY Noise Exposure Maps Update

Arrival Profile for 3.9-degree Descent Angle

This memorandum requests FAA approval of a user-defined arrival profile for those aircraft with procedure profiles for use in the VNY NEMs Update.

The INM standard arrival profiles for most INM aircraft types consist of a 3-degree descent angle to the runway or displaced threshold. At VNY Runway 16R (the primary arrival runway for all jet aircraft and larger aircraft types), the published descent angle for both the ILS approach and the visual approach is 3.9 degrees. To correct for this non-standard descent angle, HMMH proposes to derive a user-defined aircraft profile that changes the descent angle in each aircraft procedure arrival profile to 3.9 degrees while keeping the other parameters (altitude, calibrated airspeed, and flap settings) the same as the standard arrival profile. Tables 1 and 2 show, for example, the standard and user-defined arrival profiles for the Lear 35 aircraft for the affected steps.

Table 1. INM Standard Lear 35 Arrival Profile
Profile Weight: 13,800 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Descent Angle
1	6,000	250	0	3.0
2	3,000	144.5	10	3.0
3	1,500	134.5	D-Intr	3.0
4	1,000	127.8	D-40	3.0
5	touchdown		D-40	

Table 2. INM User-Defined Lear 35 Arrival Profile
Profile Weight: 13,800 lb

Step Number	Altitude Above Field Elevation (AFE), feet	Calibrated Airspeed, knots	Flaps	Thrust Setting
1	6,000	250	0	3.9
2	3,000	144.5	10	3.9
3	1,500	134.5	D-Intr	3.9
4	1,000	127.8	D-40	3.9
5	touchdown		D-40	

Those aircraft types existing and projected for VNY in 2015 that do not have procedure profiles but fixed-point profiles would not be changed. These would primarily include the Boeing 737-800 for which the number of operations is and expected to be small.

Runway 16R has a displaced arrival threshold of 1,431 feet. Figure 1 shows the two descent angle profiles plotted out to 10 nautical miles from the end of Runway 16R.

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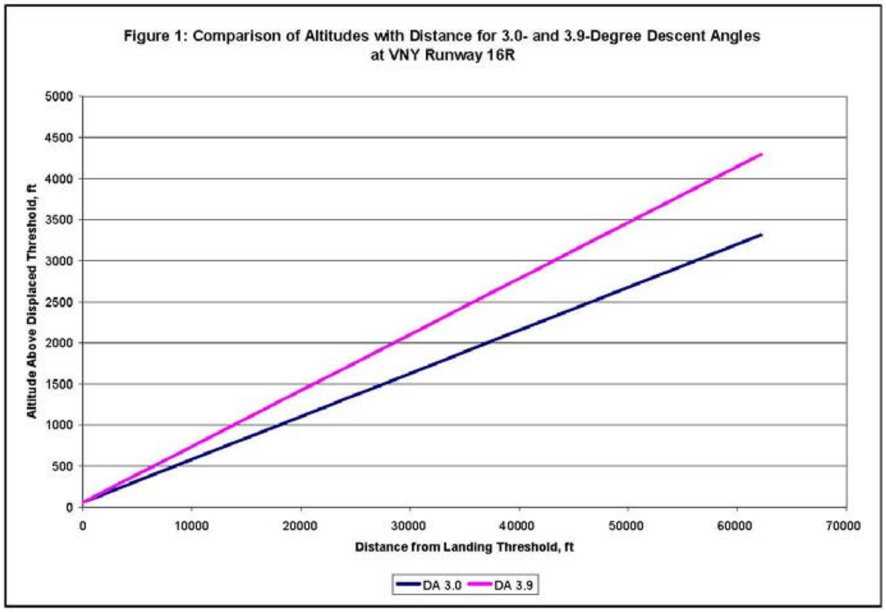
INM User-defined Aircraft Request – Non-Standard Descent Angle to Runway 16R
Page 2



Again, using the Lear 35 as an example, Table 3 provides the comparison of the SEL values for the standard and 3.9-degree arrival using INM7.0b. As shown in Table 3 and Figure 2, the 3.9-degree descent angle for the Lear 35 shows an approximate 2-3-dB decrease at the points presented.

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INM User-defined Aircraft Request – Non-Standard Descent Angle to Runway 16R
Page 3

Table 3 SEL Values for Example Lear35 Standard Arrival Profile versus Lear35 User-Defined 3.9-degree Descent Angle Arrival Profile Calculated with INM 7.0b using standard atmospheric conditions

Grid Points (nmi) Distance from Runway 16R	Lear35 3.0-degree Descent Angle (SEL, dB)	Lear35 3.9-degree Descent Angle (SEL, dB)	Difference (dB)
10.0	66.7	63.1	-3.6
9.5	67.3	63.8	-3.5
9.0	68.1	64.5	-3.6
8.5	68.8	65.3	-3.5
8.0	69.4	66.0	-3.4
7.5	70.0	66.9	-3.1
7.0	70.6	67.8	-2.8
6.5	71.2	68.8	-2.4
6.0	71.9	69.5	-2.4
5.5	72.7	70.3	-2.4
5.0	73.4	71.1	-2.3
4.5	74.2	72.1	-2.1
4.0	75.6	73.0	-2.6
3.5	77.3	74.0	-3.3
3.0	79.0	75.5	-3.5
2.5	80.8	76.9	-3.9
2.0	82.3	79.0	-3.3
1.5	84.1	81.0	-3.1
1.0	86.3	83.4	-2.9
0.5	89.3	86.6	-2.7

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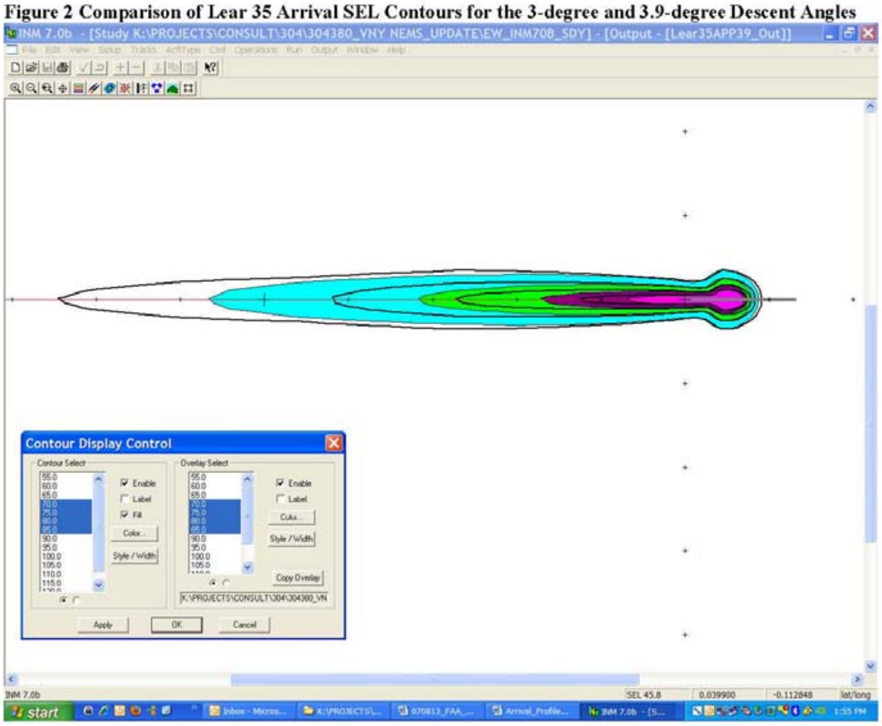
Figure 2 Comparison of Lear 35 Arrival SEL Contours for the 3-degree and 3.9-degree Descent Angles



Descent Angle 3 degrees – black line; Descent Angle 3.9 degrees – color fill-in.

While only the Lear 35 profile is shown, similar results can be expected from the other aircraft types landing on Runway 16R based on the differences in altitude shown in Figure 1.

This request is to modify the descent angle only for those aircraft arriving on Runway 16R with procedure profiles within the INM 7.0b. No other changes to the profiles for the arrivals will be made. Those aircraft arriving on the other runways will continue to be modeled using the standard INM arrival profiles.

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