INM Version 6.1 Software Update

March 4, 2003

Version Information

INM Version 6.1 is a software update to Version 6.0c. You must already have INM 6.0, 6.0a, 6.0b, or 6.0c to use this software update. If you do not have one of these four previous versions, you can order a CD-ROM containing INM 6.0 by downloading the INM Order Form from the FAA AEE-100 web site www.aee.faa.gov/noise/inm . After installing INM 6.0, you can download the INM 6.1 software update, which contains all previous updates.

The Version 6.0 User's Guide is the current manual for INM Version 6.1 software. The Version 6.0 Technical Manual is the current technical description of the methods used by INM 6.1 to calculate aircraft noise around airports. Release notes *Inm60a.pdf*, *Inm60b.pdf*, *Inm60c.pdf*, and this document, *Inm61.pdf*, record the changes to INM after the User's Guide and Technical Manual were published.

Installation Instructions

1. Use MS Windows to make a copy of your existing *INM6.0c* directory. Select your *INM6.0c* directory and, using the Windows File Manager under the "Edit" menu, select "copy" and then select "paste". This will create a new directory called "*Copy of INM6.0c*".
2. Use the right button of your mouse to select the *Copy of INM6.0c* directory created in step 1. Select "Rename" and rename the directory *INM6.1*.
3. Download the *INM61.EXE* file from the FAA Web site. Put it in the new *INM6.1* directory.
4. This update contains replacements to the *test411* and *test50* example studies and will overwrite all files relevant for an INM 6.1 example study. However, it will not delete files that are no longer relevant. For this reason, it is recommended that you delete or move/rename your existing INM *test411* and *test50* example studies before proceeding to step 5.
5. Double click on the *INM61.EXE* file name to automatically extract the updated files into the new *INM6.1* directory. Select the "Unzip" button. This process overwrites the old INM 6.0c files and replaces them with those required for INM 6.1. The distributed files are:

File	Date
inm.exe	02/27/2003
compute.dll	02/27/2003
graph.dll	02/27/2003
compu50.dll	02/27/2003
winutil.dll	02/27/2003
inm60a.pdf	05/19/2000
inm60b.pdf	01/16/2001
inm60c.pdf	09/07/2001
inm61.pdf	02/27/2003

File (continued)	**Date**
sys_data.dbf*	02/11/2003
sys_data\acdb60.bin	02/11/2003
sys_data\spectra.bin	08/29/2002
usr_data\sys_aprt.dbf	02/03/2003
usr_data\sys_rwy.dbf	02/03/2003
usr_data\bad_rwy.txt	01/28/2003
usr_data\loc_pts.dbf	01/28/2003
helo\HeloExample\study.inm, etc.	12/04/2002
helo\Helicopter.pdf	05/28/2002
helo\HnmGrd.exe	02/27/2003
helo\hnmgrd.cfg	08/27/2002
process\dxf\CadCvrt.exe	02/27/2003
process\dxf\cadcvrt.cfg	01/21/2003
process\census\Census2000.exe	02/27/2003
process\census\Census2000.pdf	07/24/2002
process\census\Tiger2000.exe	02/27/2003
process\census\tiger2000.cfg	04/29/2002
process\census\shapefile.dbf	11/09/2001
process\census\fipscode.dat	07/18/2001
process\census\fipstate.dat	07/18/2001
utility\Alaska3CD.exe	02/27/2003
utility\WriteCpBin.exe	02/27/2003
utility\WriteDbfTxt.exe	02/27/2003
utility\PopConr.exe	02/27/2003
utility\Utility.pdf	01/16/2003

New Lateral Attenuation Function

Per SAE-AIR-1845, INM makes adjustments to predicted noise levels based on lateral attenuation effects. The recommended adjustment is defined in SAE-AIR-1751, which was published in March of 1981. SAE-AIR-1751 provides a method for combining multiple lateral attenuation effects, including those related to source configuration and those related to propagation, with a simple formula for all aircraft. It is recognized that measurements of aircraft with fuselage-mounted engines, that were prevalent at the time SAE-AIR-1751 was developed, dominate these source effects. Further, SAE recognized separate relations for wing-mounted (SAE-AIR-1906) and propeller aircraft (SAE-AIR-1751, SAE-AIR-1845), but did not develop similar relations for those aircraft at the time.

Recent research, both in the US and internationally, has confirmed a need to update the lateral relationships developed in 1981 for SAE-AIR-1751. This research recognizes different source effects among jet aircraft with fuselage-mounted engines and wing-mounted engines, as well as propeller-driven aircraft. Research also recognizes the need to model these source effects separately from ground propagation effects. These relationships will be specified in a future update to SAE-AIR-1751, which is still in the process of development and peer review. When published, the updated methodology will be implemented into a future version of INM.

In anticipation of an update to SAE-AIR-1751, the source noise data within INM 6.1 have been reorganized to differentiate between fuselage-mounted, wing-mounted, and propeller aircraft categories. Furthermore, the existing SAE-AIR-1751 framework within INM has been adapted to more closely correlate with measurements that have been collected both in the United States and internationally. Specifically, the 1981 version of SAE-AIR-1751 outlines aircraft noise attenuation up to elevation angles of 60 degrees for all aircraft types. To better correlate with research collected over the last 4 years, INM 6.1 applies lateral attenuation for wing-mounted jets and propeller aircraft only up to elevation angles of 30 degrees. This algorithm change will increase the predicted noise impact for these aircraft. In INM 6.1, there are no changes in lateral attenuation for jet aircraft with tail-mounted engines or military aircraft. For test studies of current and projected fleet mix, these changes may increase overall contour area by 3-6 percent.

This refinement to INM 6.1 provides better correlation with results that have been observed in multiple research projects that have been performed over the last four years. Furthermore, this update is consistent with changes made by groups outside the US who source SAE-AIR-1751 in their own noise models. For planning purposes, AEE-100 has concluded that it is better to begin using a modified implementation of the current SAE-AIR-1751 that correlates with current research rather than to wait on a published, full implementation of an updated SAE-AIR-1751, which could be 18-24 months away. Continued use of the older methodology will result in planning trends that will under-represent contour area, and this trend will only become more pronounced as fuselage mounted aircraft such as the DC9 and 727 series of aircraft are retired.

New Military Aircraft Data

The INM 6.1 software release contains new noise data and fixed-point profiles for a large number of NOISEMAP-derived aircraft. Also, NOISEMAP AC Codes are now used for INM military noise group identifiers. As an example, the INM F-18 has a noise group identifier of M04501, which is the NOISEMAP AC code for the F-18. Details of these changes are presented in Database Modification items 11 through 17 and in the Appendix at the end of these release notes. The Appendix shows the mapping between INM aircraft for INM 6.0c and 6.1, NOISEMAP aircraft, and NOISEMAP AC codes.

INM 6.1 will automatically use the new identifiers and NPD curves if standard data were used in a version 6.0x study. However, INM 6.1 will *not* automatically convert user-defined military aircraft noise data. This conversion issue affects data modified or data added to any of the military noise groups listed in the attached Appendix. For example, if you modified or added noise data to NPD curves to PW200 for the F16A, you will see an error message similar to "**Error in record PW200 E 75.00 D. There is no Noise Group for this record. Record # 36**" when you first open your study in INM 6.1. If this occurs, you should select "No" for the delete record question, close INM, and then modify the study-level *npd_curv.dbf* file using an application such as Microsoft EXCEL. Replace the old identifier "PW200" with the new identifier "M04401", being careful not to change column widths because this will alter the DBF structure and INM will not read the file. Alternatively, you can use INM 6.0c to modify your study so that all user-defined noise data have noise identifiers different from INM 6.0c standard noise identifiers listed in the Appendix. Data modification can be done inside INM 6.0c, without directly modifying DBF files with EXCEL, but this method involves more steps. If you have any trouble with converting to new military noise identifiers, please contact ATAC Corporation at email address *inm@atac.com*.

New ESRI Shapefile Export Function

The INM 6.1 software release contains a new export function that writes ESRI Shapefiles containing INM graphics output layers. These Shapefiles can be read by ESRI ArcView and other GIS programs that support the ESRI format. The "File // Save As Shapefile" function is available when the Output Graphics window is active. Operation of the function is similar to the "File // Save As DXF" function, except that a pre-existing output directory is selected instead of inputting a file name.

Output Graphic layers that are enabled (visible) are exported. Three pre-named files for each active graphics layer (**.shp*, **.shx*, and **.dbf*) are written to an existing directory that is selected by the user. For example, noise contours are exported to *Noise-Contours.shp*, *Noise-Contours.shx*, and *Noise-Contours.dbf* files. The DBF file identifies objects in the Shapefiles; for example, *Noise-Contours.dbf* could have three records – DNL_65, DNL_70, and DNL_75 – identifying three contours in the *Noise-Contours.shp* file. Coordinates can be exported as feet, meters, or latitude/longitude decimal degrees. The table below lists the 11 Shapefiles that are available.

Shapefiles (shp, shx, dbf)
*Airport-Drawings.**
*Airport-Runways.**
*Flight-Tracks.**
*Grid-Points.**
*Locations-Points.**
*Noise-Contours.**
*Overlay-Contours.**
*Population-Points.**
*Radar-Tracks.**
*Terrain-Contours.**
*Tiger-Lines.**

New TIGER/Lines Import Function

The INM 6.1 software release contains a new import function for Census Tiger/Line data. Three new graphics layers are supported: county, place (e.g., city), and census block boundaries.

Redistricting Census 2000 TIGER/Line files can be downloaded from the U. S. Census Bureau web site: www.census.gov/geo/www/tiger/rd_2ktiger/tgr2kweb.html . Select a state and download county *zip* files. The *tgr*.zip* files are identified by state and county FIPS codes, which are listed in *process\census\fipscode.dat*. Put the TIGER zip files into a local directory and unzip either 2 or 4 files per county:

1. Unzip the *tgr*.rt1* and *tgr*.rt2* files to get highway, street, and water features; **or**
2. Unzip the above two files, **plus** the *tgr*.rti* and *tgr*.rts* files to add county, place, and census block boundaries.

Open the INM "File // Import Data into Study // TIGER 2000 Line Files" window and select the directory where the unzipped TIGER files reside. Select the state and counties, and edit the size of the bounding rectangle. Press OK and a DOS window pops up and runs the new *Tiger2000.exe* program.

The program reads the TIGER *rt1* and *rt2* files, optionally reads the *rti* and *rts* files, and writes two INM graphics files, *_tiger.bin* and *_tiger.idx*, to the study directory. If the TIGER *rti* and *rts* files exist, the program creates INM graphic layers and ESRI Shapefiles *as polygons* for county, place, and census blocks and saves them to the INM study directory. TIGER data in INM graphics layers exist as boundary *lines*, and when these layers are exported using "File // Save As Shapefile", they are written to Shapefiles as lines. The reason for writing Shapefiles during TIGER data extraction is to preserve counties, places, and census blocks as named polygon objects. The Shapefiles (*Census-Block, Census-County, Census-Place*), can be deleted if not used.

The *Census-Place.dbf* Shapefile contains FIPS place codes. These 5-digit place codes can be deciphered at: www.itl.nist.gov/fipspubs/55new/55-text/ . The *Census-Block.dbf* Shapefile contains 2-character state, 3-digit county, 6-digit census tract, and 4-digit census block codes written as a single 15-character identifier. The census block identifier correlates to the INM population point identifier found in the *pop_pts.dbf* file.

The INM "Output // Output Graphics // Census Display Control" window is modified to accommodate the new graphics layers. The layer formerly named "Trails" is now included in "Streets". The CFCC D51 layer formerly found in "Landmarks" is now in "Airports" (it occasionally contains runways that are displayed as single lines). "Hydrographic" is renamed "Water". Three old layers that were not used much: "Landmarks", "Boundaries", and "Other Features" are now used for the three new layers: "Counties", "Places", and "Census Blocks".

New Airport and Fix Database

The files in the *usr_data* directory are updated with new data from FAA ATA-100, National Airspace System Resource Aeronautical Data CD-ROM, dated 23 January 2003. There are now 1136 airports, 2071 runways, and 8075 navigational aids and fixes in the database. The airports have at least 25,000 operations per year. The *bad_rwy.txt* file lists runways that were removed from *sys_rwy.dbf* because the runway length computed using latitude/longitude data did not match (within 10 feet) the runway length recorded in the database. This is usually because there are no latitude/longitude data for these runways. The navigational aids and fixes in the *loc_pts.dbf* file are within 30 nautical miles of at least one airport in the *sys_aprt.dbf* file.

Updated Example Studies

The *examples* directory contains two example studies, *test411* and *test50*, and a *test50_import* directory. The example *test411* study now reflects NPD data requirements that exist in INM 6.0 series software – the user-defined S76 aircraft has both arrival and departure NPD curves. The example *test50* study now contains new output layers for radar CSV, airport DXF, terrain 3CD, street TIGER, and population PL94-171 data. Streets and population points are Census 2000 data. Also, county, city, and census block layers are available in *test50* output graphics.

Importing radar track data via a specially formatted CSV file (e.g., *RADAR50.CSV*) requires that the file be in a directory separate from the study into which it will be imported (see Reported Problems Fixed #12). For this reason, the *examples* directory now includes a *test50_import* subdirectory containing an example CSV file. Although it is not required, terrain 3TX and 3CD files (e.g., *N37W123.3TX, N37W123.3CD*) and DXF files (e.g., *TEST50.DXF*) may also be

located outside a study directory. These files are now in the *test50_import* directory for demonstration purposes.

DOS Utility Programs

Four computer programs are provided in a new *utility* directory. These programs run in a DOS window by typing the program name and possibly one or more command line parameters after the DOS prompt. Information on program purpose and use is in the *Utility.pdf* file in the *utility* directory.

Database Modifications

1. Approach and departure NPD data for the F4C aircraft (noise id J79) were corrected. The SEL value 133.6 dB was replaced with 131.0 dB for distance 200 feet and thrust 9400 pounds.

2. The J79 NPD data for the F4C aircraft were modified so that start-roll thrust values do not cause abnormally high extrapolated noise levels. New departure SEL, LAMAX, and EPNL curves, at thrust-setting 16000 pounds, were added to the database. The 16000-pound curves are 5 dB higher than the 9400-pound curves.

3. The PW120 NPD data for the DHC8 and DHC830 aircraft were modified so that start-roll thrust values do not cause abnormally high extrapolated noise levels. New departure NPD curves at thrust-setting 150% were added to SEL and EPNL. The 150% curves are 5 dB higher than the 100% curves.

4. Fixed-point approach profile data for INM aircraft A319, A320, A32023, A340, 767400, 777200, and 777300 were modified, as necessary, to bring them into conformance with the INM method of modeling touchdown and reverse thrust. This method is as follows. Let V_{50} and F_{50} be the speed and corrected net thrust per engine at 50 feet over runway threshold, as given by the manufacturer. Let F_S be the static thrust as given in the *aircraft.dbf* file. Let D_L be the landing distance provided by the manufacturer for the standard approach profile. If this is not provided, let D_L be the maximum landing distance as given in the *aircraft.dbf* file. Three points were added to the *prof_pts.dbf* file after the point at nominal distance –954 feet and altitude 50 feet: touchdown point, reverse-thrust point, and taxi-start point. All three points are at altitude 0. Touchdown distance is 0, touchdown speed is V_{50}–1, touchdown thrust is F_{50}, and touchdown NPD mode is Approach. Reverse-thrust distance is 0.1 D_L, reverse-thrust speed is V_{50}–8, reverse thrust is 0.6 F_S, and reverse-thrust NPD mode is Depart. Taxi-start distance is D_L, taxi-start speed is 30, taxi-start thrust is 0.1 F_S, and taxi-start NPD mode is Approach.

5. Data for the Airbus A300-622R with PW4158 engines were added to the INM database. The aircraft identifier is A30062 and the noise identifier is PW4158. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B, and STANDARD, all of which have stage lengths 1 through 6. The STANDARD departure profiles are identical to the ICAO_B profiles.

6. Data for the A310 aircraft were removed from the INM database and new data for the Airbus A310-304 with CF6-80C2A2 engines were added. The aircraft identifier is still A310 and the new noise identifier is A310. The previous A310 used A300 NPD data (noise id 2CF650), which produced more conservative noise contours than the new A310 NPD data. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B, and STANDARD, all of which have stage lengths 1 through 6. The STANDARD departure profiles are identical to the ICAO_B profiles.

7. Data for the Airbus A321-232 with IAE V2530-A5 engines were added to the INM database. The aircraft identifier is A32123 and the noise identifier is V2530. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B, and STANDARD, all of which have stage lengths 1 through 5. The STANDARD departure profiles are identical to the ICAO_B profiles.

8. Data for the Airbus A330-343 with RR TRENT 772B engines were added to the INM database. The aircraft identifier is A33034 and the noise identifier is TRENT7. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B, and STANDARD, all of which have stage lengths 1 through 6. The STANDARD departure profiles are identical to the ICAO_B profiles.

9. Data for the Boeing 737-800 with CFM56-7B26 engines were added to the INM database. The aircraft identifier is 737800 and the noise identifier is CF567B. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B and STANDARD, all of which have stage lengths 1 through 6. The STANDARD departure profiles are identical to the ICAO_B profiles.

10. Data for the Boeing 757-300 with RB211-535E4B engines were added to the INM database. The aircraft identifier is 757300 and the noise identifier is RR535E. The single fixed-point approach profile is a standard 3-degree descent with a level segment at 3000 feet AFE. There are three sets of procedural departure profiles: ICAO_A, ICAO_B and STANDARD, all of which have stage lengths 1 though 6. The STANDARD departure profiles are identical to the ICAO _B profiles. Noise-power-distance (NPD) data for RR535E were updated with newly obtained curves, which include more power settings, LAMAX curves, and PNLTM curves and may model contours more conservatively. This NPD is also used by the existing INM 757RR.

11. Noise datasets for 114 out of 115 military aircraft were removed from INM and replaced with newly processed data from NOISEMAP. NPD data for the KC97L were not changed.

12. INM noise group identifiers for 115 military aircraft were replaced with NOISEMAP aircraft identifiers. For example, the INM aircraft F15E20 now has the noise identifier M04303, which is the NOISEMAP aircraft identifier for the F-15E20. Since NOISEMAP aircraft in INM are in one-to-one correspondence with noise datasets, there is now a clearer link between a NOISEMAP aircraft and its INM derivative. See attached Appendix for the complete list of aircraft.

13. Because the military noise group identifiers are changed in INM 6.1, any user-defined aircraft employing the old noise group identifiers will have to be changed to the new identifiers by the user. There is no automated conversion to INM 6.1 for user-defined military aircraft.

14. Data for 84 military aircraft profiles were added to the INM database. These fixed-point profiles were obtained from NOISEMAP, and they are to be used for transient aircraft operations. For each aircraft, there is usually one departure and one approach profile; their profile identifiers are "NOISEMAP 1". A few aircraft have two departure profiles, one using afterburner thrust.

15. The previous "STANDARD" profiles for the F16A, F16GE, F16PW0, and F16PW9 aircraft remain unchanged in INM. New "NOISEMAP" profiles are provided for the F16A, F16GE, and F16PW9 aircraft, but there are no new profiles for the F16PW0.

16. Of the 115 NOISEMAP derived aircraft in INM, 30 do not have "NOISEMAP" and/or "STANDARD" profiles. Military aircraft without profiles: A5C, AV8A, AV8B, BUCCAN, C119L, C121, C123K, CANBER, DOMIN, E8A, F14B, F18EF, HARRIE, HAWK, HS748, HUNTER, JPATS, KC97L, LIGHTN, NIMROD, P3C, PHANTO, PROVOS, T45, U4B, VC10, VICTOR, VULCAN, YC14, YC15.

17. The NOISEMAP approach profiles were modified by adding an extra segment from the approach threshold point at 50 feet to the touchdown point at 0 feet. There are no roll-out and reverse-thrust segments for NOISEMAP aircraft profiles, thus making them as similar as possible to those used in NOISEMAP.

18. Two new NPD sets, 2JT8DW and 2JT8QW, were added to the INM database. The new 2JT8DW is identical to the existing 2JT8D, and the new 2JT8DW is identical to the existing 2JT8DQ. These duplicate sets of NPD's were created to separate "tail-mounted" from "wing-mounted" aircraft for the purpose of identifying which lateral attenuation equation to use. Previously, the 737, BAC111, DC910, and DC930 used the 2JT8D noise curves. The 737 now uses the new 2JT8DW. Previously, the 737D17, 737QN, DC950, DC9Q7, and DC9Q9 used the 2JT8DQ noise curve. The 737D17 and 737QN now use the new 2JT8QW. INM studies that have **user-defined** aircraft based on the 737, 737D17, and 737QN should be updated to reflect the change in NPD name for these aircraft.

19. Three new departure spectral classes, **132**_Tail_Eng2/3.LoBy.Tfan, **133**_Tail_Eng2.Lo/MidBy.Tfan, and **134**_Tail_Eng2.HiBy.Tfan, were added to the INM database. These three spectral classes were added to separate "tail-mounted" and "wing-mounted" aircraft from using the same noise data records. This addition affects 19 NPD curves. The 2JT8D, 2JT8DH, 2JT8DL, 2JT8DQ, 3JT8D, 3JT8DQ, 3JT8E5, 3JT8E7, TAY620, TAY650, and TAY651 now reference **132**_Tail_Eng2/3.LoBy.Tfan instead of **101**_Eng2/3.LoBy.Tfan. The 2JT8D2, RB183, RB183P, and SPEYHK now reference the **133**_Tail_Eng2.Lo/MidBy.Tfan instead of **104**_Eng2.Lo/MidBy. The AE300C, BR710, BR715, and V2525 now reference the **134**_Tail_Eng2.HiBy.Tfan instead of **105**_Eng2.HiBy.Tfan. Note that as a result of this change, it is important to carefully select spectral class assignments for **user-defined** aircraft because different lateral attenuation equations are used for different types of aircraft. INM 6.1 uses departure spectral classes to differentiate among: (1) jet aircraft with fuselage-mounted engines, (2) jet aircraft with wing-mounted engines, (3) propeller-driven aircraft, and (4) other aircraft (helicopters and military aircraft).

Program Modifications

1. A new lateral attenuation equation that decreases to 0 dB at beta angle 30 degrees was added to the INM noise calculation module, as explained in the "New Lateral Attenuation" section above.

2. The File // Export As Shapefile function was added to INM, as explained in the "New Shapefile Export Function" section above.

3. The File // Import Data into Study // Census TIGER Street Files function was modified to include county, place, and census block boundaries, as explained in the "New TIGER/Lines Import Function" section above.

4. The limit on points per line when importing TIGER/Lines data was changed from 1000 to 5000 points per line segment.

5. The Census 2000 PL94-171 configuration file format was changed to conform to the TIGER 2000 configuration file format (i.e., comma-delimited fields). INM normally writes the configuration files when it runs these two functions and the change in format is transparent. A user would deal with these configuration files only when running the programs in a DOS window. *Census2000.pdf* in the *process\ census* subdirectory documents the new format for the *census2000.cfg* file.

6. An acceleration-segment fatal error condition was modified. Previously, when the accelerate-to speed was less than or equal to the segment start speed, a fatal error message was generated and flight profile computation stopped. Now, the accelerate-to speed is reset to the start speed plus 0.1 knot, a warning message is issued, and the profile computation continues. The standard INM profiles are not affected by this change.

7. The PROF_ID2 field that encodes departure stage number was modified so that it can contain one digit or one capital letter. This modification was made for potential future use when the number of departure weight categories (stages) exceeds 9, which was the previous limit.

8. The method for calculating the Time-Above (TA) family of metrics was modified. Previously, TA was calculated on a per-flight basis. It is now calculated for individual segments and then summed.

9. The altitude reported in the detailed grid file (*grid_dtl.dbf*) was modified. The INM 6.0 User's Guide indicates that aircraft altitude is reported with respect to airport field elevation (AFE). Beginning with INM 6.0c, aircraft altitude is reported with respect to the grid point elevation. Note that this altitude may be either positive or negative, depending on the relative heights of the grid point and aircraft at closest point of approach. When Terrain is turned Off, the detailed grid altitude is AFE because the grid point elevation is the same as the airport field elevation.

10. The user interface identifiers for spectral classes 104, 202, and 204 that appear in the Acft // Noise Identifiers window were modified to better convey the engine-type characteristics of the spectra. These name changes do not affect noise computation.

11. The error message presented when the CAD file is not yet selected in the Input or Output Graphics CAD Display Control window was modified to help explain the problem better. Note that Output Graphics layers can be exported in DXF and then imported as CAD layers for presentation in Input Graphics. In this way terrain and street layers can be displayed in Input Graphics.

12. The Input Graphics // Edit // Create Track by Radar function was modified to display the number of flight tracks used in computing track position and dispersion at each user-defined point.

Reported Problems Fixed

1. Fixed a problem when using the copy/paste function on an aircraft record. Previously, when the noise identifier was changed in the new aircraft record, there was a problem if the thrust-setting type (pounds, percent, or other) of the new noise identifier did not match the old type. The error is now trapped and a message box is displayed so a user knows that a noise identifier that has the same thrust-setting type must be selected.

2. Fixed a problem in INM Input Graphics Edit function when selecting tracks from a large group of tracks. Now, INM operates properly when more than 100 tracks are in close proximity and a user selects one of them from the list box.

3. Fixed a problem when computing contours in the Output // Output Graphics function. Previously, when the minimum contour level was set too high and no contours were written to the *contours.dat* file, INM opened the file but did not properly close it, and then presented the message: *".._inm.bin could not be created"*. Subsequent attempts to compute contours resulted in an error message: *"The file ..\contours.dat could not be opened for output"*. The file is now properly closed and a more informative message is presented: *"There is a problem reading the Contours.dat file. Most likely, there are no contours. Is the minimum contour level set low enough?"* A user should reset the minimum contour level in the Output // Output Setup window, or, if necessary, reset the low cutoff level in the Run // Run Options window and run the case again.

4. Fixed a minor problem with line-feeds when writing the *version.txt* file after converting from INM 5.2 to INM 6.0.

5. Changed the auto-load feature of INM so that an INM study that has blanks in its directory name is automatically loaded when INM is run. Previously, only a study without blanks in its directory name could be auto-loaded.

6. Fixed a problem with specifying a non-zero contour grid rotation angle. Previously, rotating the contour rectangle would cause the message "Hydrology file angle does not match study" to appear and noise computation would stop. Non-zero rotation angles can now be used.

7. Fixed a problem when viewing extremely large *ops_calc.dbf* files in the Ops // View Calculated Flight Operations window. Previously, scrolling to the bottom of a list of more than 32,000 records caused INM to exit abnormally. Now a message box pops up informing

the user that all the records cannot be displayed. Even though the entire *ops_calc.dbf* file cannot be viewed inside INM, all the records exist in the file.

8. Fixed a problem in the Acft // Procedural Profiles function relating to thrust-setting in percent of static thrust. Previously, when creating a procedural profile with UserValue thrust that is associated with NPD Percent-type parameters, INM asked for the thrust in percent, but read it in as pounds. Now, INM correctly handles the input as a percent of static thrust.

9. Fixed a minor problem in processing terrain elevation. An error in the horizontal position of terrain elevation was introduced in reading terrain data in INM 6.0a. As a result, grid point elevation was selected from an adjacent grid point 3 arc-seconds away (about 300 feet). The difference between adjacent grid point elevations is small, and the effect on studies run with Terrain turned On is considered to be negligible.

10. Fixed a problem in *HnmGrd.exe*, the program that reads an HNM *for22.dat* file and writes an *nmplot.grd* file. Previously, the longitude value given in the *hnmgrd.cfg* file was read in as 0 degrees, regardless of its value in the configuration file. Now, the longitude is read correctly. Note that NMPlot grid-file software limits latitude and longitude values to 6- to 7-digit accuracy (a "float" variable); therefore, NMPlot decimal degrees are accurate to only 4 decimal places (e.g., −121.1234°), even though they are displayed to 6 decimal places. In general, latitude and longitude values in *nmplot.grd* files do not duplicate INM study values input via the *hnmgrd.cfg* file. Four decimal places in degrees is approximately 35 feet.

11. Fixed a problem when deleting an INM Case. Previously, a false error message would appear when trying to delete a profile after deleting a Case in which the profile was used. Users may now delete these profiles without having to exit and re-enter INM.

12. Identified a problem with the File // Import Data Into Study // Radar Tracks CSV File function. If the CSV file is in the study directory (as it is in the old example Test50 study), INM presents an error message: "Files cannot be written to Study directory". To fix this problem, move the CSV file to another directory and then import it. Also, the Tracks // Input Graphics window must be closed while using this function. These instructions are now displayed on the radar track input file window.

13. Fixed a problem with the Run // Run Options run date and duration when a run finishes between 11 P.M. and midnight. Previously, these two fields were not updated.

14. Fixed a problem with a touch-and-go track not being properly displayed when an approach threshold was defined for the runway end. The noise contours were shifted by the threshold value but the track was not. This was a display problem, not a noise computation problem.

15. Provided an additional error trapping condition for fixed-point circuit (CIR) profiles. If the profile does <u>not</u> have a pair of identical points to identify the place to stretch the profile to cover a touch-and-go track, a error message box notifies the user, and the profile computation process is terminated. The user can then fix the profile. Previously, the lack of duplicate points in a fixed-point circuit profile caused an operating system Application Error that terminated INM.

Appendix – NOISEMAP INM 6.0c/6.1 Mapping

NMAP Aircraft	NMAP AC Code	INM Aircraft ID	INM 6.0C NOISE ID	INM 6.1 NOISE ID
A-3	M00201	A3	GE-8	M00201
A-4C	M00301	A4C	J52P8A	M00301
A-5C	M00401	A5C	GE-10	M00401
A-6A	M00501	A6A	J52P8B	M00501
A-7E	M00601	A7E	TF41A2	M00601
AV-8A	M00701	AV8A	AV-8A	M00701
AV-8B	M00702	AV8B	RR-408	M00702
A-10A	M00901	A10A	AGE100	M00901
A-37	M01001	A37	J8517A	M01001
C-123K	M01101	C123K	R2800	M01101
B-1	M01201	B1	GE-102	M01201
B-2A	M01301	B2A	GE-110	M01301
B-52B&D&E	M01401	B52BDE	J57P19	M01401
B-52G	M01402	B52G	J57P43	M01402
B-52H	M01403	B52H	B-52H	M01403
B-57E&G	M01501	B57E	J57P5	M01501
C-5A	M01601	C5A	TF39GE	M01601
C-7A	M01701	C7A	PW123	M01701
C-9A	M01801	C9A	JT8D9	M01801
C-12	M01901	C12	PT6A41	M01901
C-17	M02001	C17	PW-100	M02001
C-18A	M02101	C18A	JT4111	M02101
C-20	M02201	C-20	MK6118	M02201
C-21A	M02301	C21A	TFE73B	M02301
C-22	M02401	C22	TRS181	M02401
C-23	M02501	C23	PT6R65	M02501
C-118	M02601	C118	RCB17	M02601
C-119L	M02701	C119L	C-119	M02701
C-121	M02801	C121	C-121	M02801
C-130A&D	M02901	C130AD	C-130A	M02901
C-130E	M02902	C-130E	T56-15	M02902
C-130H&N&P	M02903	C130HP	C-130H	M02903
C-131B	M03001	C131B	R99W	M03001
C-135A	M03101	C135A	J5759W	M03101
C-135B	M03102	C135B	J5759	M03102

Appendix – NOISEMAP INM 6.0c/6.1 Mapping – (Continued)

NMAP Aircraft	NMAP AC Code	INM Aircraft ID	INM 6.0C NOISE ID	INM 6.1 NOISE ID
KC-135R	M03104	KC-135	F108CF	M03104
C-137	M03201	C137	JT3D3B	M03201
C-140	M03301	C140	TFE731	M03301
C-141A	M03401	C141A	TF33P7	M03401
E-3A	M03501	E3A	PW100A	M03501
E-4	M03601	E4	CF650E	M03601
EA-6B	M03701	EA6B	P4A	M03701
E-8A	M03801	E8A	JT3D3	M03801
F-4C	M03901	F-4C	J79651	M03901
F-5A&B	M04001	F5AB	GE-13	M04001
F-5E	M04002	F5E	GE21B	M04002
F-8	M04101	F8	J57P20	M04101
F-14A	M04201	F14A	TF30P4	M04201
F-14B	M04202	F14B	GE400	M04202
F-15A	M04301	F15A	PW100	M04301
F-15E	M04303	F15E20	PW2205	M04303
F-15E	M04304	F15E29	PW2295	M04304
F-16A	M04401	F16A	PW200	M04401
F-16C	M04402	F16PW0	PW220	M04402
F-16C	M04403	F16PW9	PW229	M04403
F-16C	M04404	F16GE	GE100	M04404
F-18A/C	M04501	F-18	GE404	M04501
F-18E/F	M04502	F18EF	F18EF	M04502
F-100D	M04601	F100D	J57P21	M04601
F-101B	M04701	F101B	J57P55	M04701
F-102	M04801	F102	J57P23	M04801
F-104D&G	M04901	F104G	GE11A	M04901
F-105D	M05001	F105D	J75P19	M05001
F-106	M05101	F106	J57P17	M05101
F-111A&E	M05201	F111AE	TF30P1	M05201
F-111D	M05202	F111D	F111D	M05202
F-111F	M05203	F-111F	F111F	M05203
FB-111A	M05204	FB111A	FB111A	M05204
F-117A	M05301	F117A	GEF1D2	M05301
KC-10A	M05401	KC10A	CFG50C	M05401

Appendix – NOISEMAP INM 6.0c/6.1 Mapping – (Continued)

NMAP Aircraft	NMAP AC Code	INM Aircraft ID	INM 6.0C NOISE ID	INM 6.1 NOISE ID
KC-97L	M05501	KC97L	R43659	M05501
OV-10A	M05601	OV10A	T76	M05601
P-3A	M05701	P3A	T56A14	M05701
P-3C	M05702	P3C	T56-14	M05702
S-3A&B	M05801	S3A&B	TF346E	M05801
SR-71	M05901	SR71	JT11D2	M05901
T-1	M06001	T1	JT15DM	M06001
T-2C	M06101	T-2C	J856E4	M06101
T-3 (FIREFLY)	M06201	T3	AEIO54	M06201
T-29	M06401	T29	T-29	M06401
T-33A	M06501	T33A	J3335	M06501
T-34	M06601	T34	PT6A25	M06601
T-37B	M06701	T37B	J69T25	M06701
T-38A	M06801	T-38A	TJ85	M06801
T-39A	M06901	T39A	GEJ85	M06901
T-41	M07001	T41	O320E2	M07001
T-42	M07101	T42	IO-550	M07101
T-43A	M07201	T-43A	T-43A	M07201
T-44	M07301	T44	T-44	M07301
T-45	M07401	T45	F405RR	M07401
TR-1	M07501	TR1	J75P1B	M07501
U-2	M07601	U2	J75P13	M07601
U-4B	M07701	U4B	540B1A	M07701
U-6	M07801	U6	R985	M07801
U-8F	M07901	U8F	C480	M07901
U-21	M08001	U21	PT6A20	M08001
YC-14	M08101	YC14	CF650D	M08101
YC-15	M08201	YC15	JT8D17	M08201
JPATS	M08301	JPATS	PT6A68	M08301
PHANTOM	M45001	PHANTO	PHANTO	M45001
TORNADO	M45101	TORNAD	RB1993	M45101
JAGUAR	M45201	JAGUAR	JAGUA	M45201
LIGHTNING	M45301	LIGHTN	302C	M45301
BUCCANEER	M45401	BUCCAN	RB168	M45401
HARRIER	M45501	HARRIE	PEGAS	M45501

Appendix – NOISEMAP INM 6.0c/6.1 Mapping – (Continued)

NMAP Aircraft	NMAP AC Code	INM Aircraft ID	INM 6.0C NOISE ID	INM 6.1 NOISE ID
HUNTER	M45601	HUNTER	RA28	M45601
VICTOR	M45701	VICTOR	VICTO	M45701
VULCAN	M45801	VULCAN	RROLYM	M45801
NIMROD	M45901	NIMROD	SPEY	M45901
VC10	M46001	VC10	CONWY	M46001
HAWK	M46101	HAWK	ADOUR	M46101
PROVOST	M46201	PROVOS	VIP11	M46201
DOMINIE	M46301	DOMIN	VIPER	M46301
CANBERRA	M46401	CANBER	AVON	M46401
HS748	M46501	HS748	DART	M46501