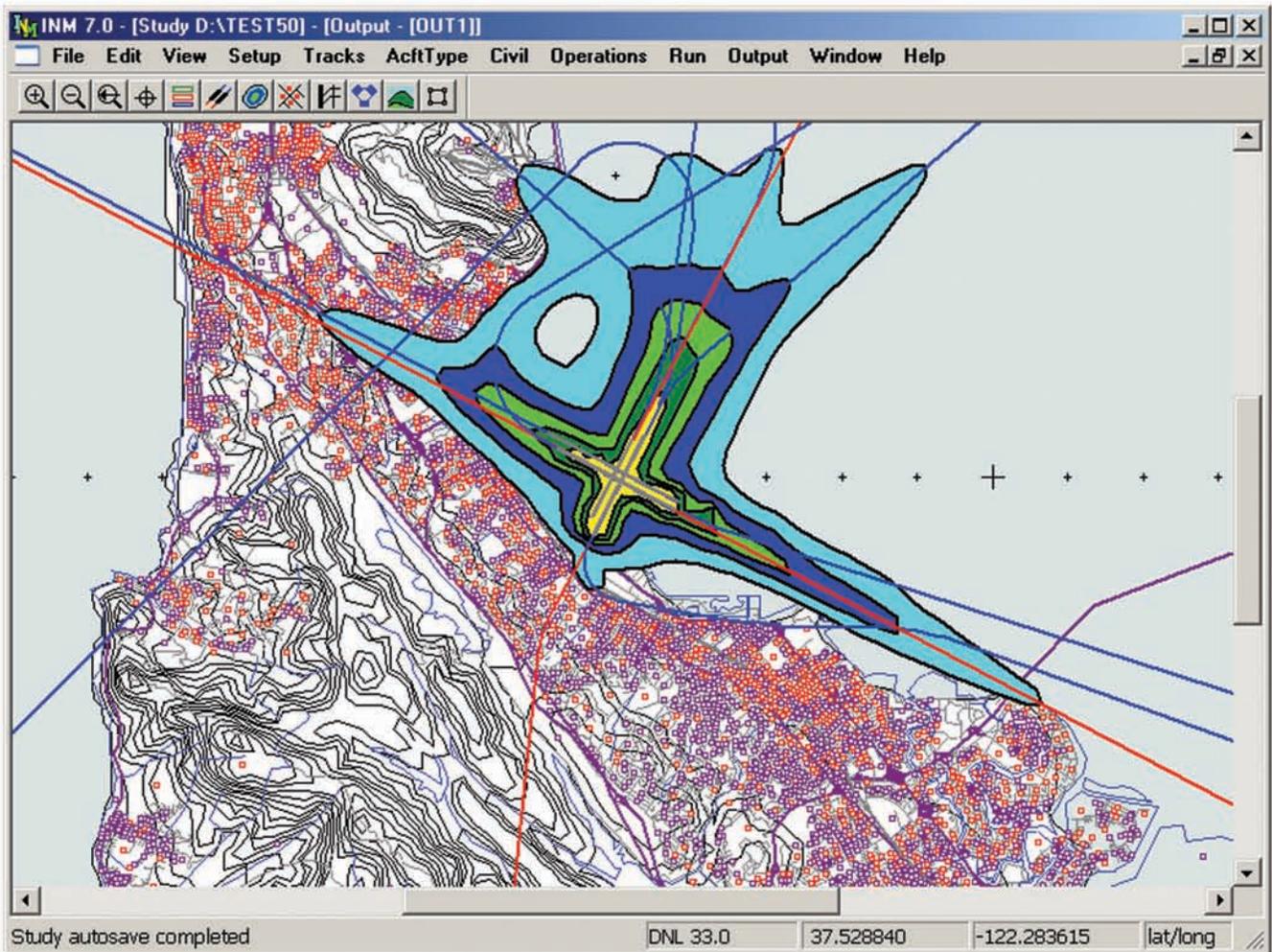




# INM *User's Guide*

Office of Environment  
and Energy



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The Federal Aviation Administration, Office of Environment and Energy, Noise Division (AEE-100) has developed Version 7.0 of the Integrated Noise Model (INM) with support from the ATAC Corporation and the Department of Transportation Volpe National Transportation Systems Center. The FAA Integrated Noise Model is widely used by the civilian aviation community for evaluating aircraft noise impacts in the vicinity of airports. The model is typically used in the U.S. for FAR Part 150 noise compatibility planning, FAR Part 161 approval of airport noise restrictions, and for environmental assessments and environmental impact statements under the current version of FAA Order 1050.1E.

New features in INM 7.0 include: lateral attenuation calculations based on SAE-AIR-5662; flight path segmentation, flight procedure step types, bank angle calculations, and thrust reverser implementation based on ECAC Doc 29; helicopter modeling methods based on Version 2.2 of FAA's Heliport Noise Model (HNM); an HNM study import function; a scenario annualization function allowing operations to be adjusted after performing a run; a multi-threaded run mode; fixed-spacing contour grid functionality; increased differentiation between different type of aircraft (civil, military, and helicopter); the ability to input location values in lat/long or X/Y; and many extended database fields.

INM Version 7.0 software runs on PCs using a minimum hardware configuration of a Pentium III processor, Microsoft Windows 2000 or XP operating systems, 1.0-Gb RAM, mouse input device, hard disk drive, and CD-ROM drive.

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## **PREFACE**

The FAA Office of Environment and Energy supports the assessment of aircraft noise impacts by developing and maintaining noise-evaluation models and methodologies. In particular, the FAA's Integrated Noise Model (INM) is widely used by the civilian aviation community for evaluating aircraft noise impacts in the vicinity of airports. Since 1978, the FAA has made the INM model available to hundreds of U.S. and international users. Domestic use of the model includes FAR Part 150 and 161 noise compatibility planning and FAA Order 1050 environmental assessments and impact statements.

INM was originally designed for a batch-process mainframe-computer environment and evolved in the mid-1980s to the PC microcomputer environment. In Version 5, INM was rewritten to include a new graphics user interface, enhanced data preparation and data input aids, new graphics and plotting capabilities, and improved and faster noise calculation algorithms. In Version 6, INM acoustic modeling capabilities were enhanced by the introduction of average noise spectra. In Version 7, INM acoustic and flight performance modeling capabilities are again enhanced to stay consistent with evolving best practices and a helicopter noise modeling capability is added.

The INM model is developed and maintained by:

- FAA Office of Environment and Energy (AEE-100) – project management
- ATAC Corporation – system integration, user interface, and flight model.
- Volpe National Transportation Systems Center (VNTSC) – noise model

The FAA formed a Design Review Group (DRG) as a technical advisory group of government and private sector experts in the fields of aviation, acoustics, and computer modeling. The DRG guides the FAA in INM and other noise model development. The DRG reviews functional designs and recommends how to effectively implement designs to meet FAA and industry user requirements.

The DRG consists of the INM development team (AEE-100, ATAC, and VNTSC), representatives from various FAA offices, other Federal agencies, airport authorities, industry, and international organizations:

Federal Aviation Administration:

- Office of Environment and Energy, Noise Division (AEE-100)
- Office of Systems Capacity & Requirements, Airspace Capacity Planning (ASC-200)
- Office of Airspace Management, Environmental Programs (ATA-300)
- Office of System Architecture & Program Evaluation, Program Analysis & Operations Research, Technology (ASD-430)
- Office of Airport Planning/Programming, Community/Environmental Needs (APP-600)
- Eastern Region (AEA-530), Jamaica, NY

Other Government:

- Armstrong Laboratory OEBN, Wright Patterson Air Force Base, OH
- MASSPORT, Noise Abatement Office, East Boston, MA
- Metropolitan Washington Airports Authority, Alexandria, VA
- NASA Langley Research Center, Acoustics Division, Hampton, VA
- U.S. Army Construction Engineering Research Lab, Champaign, IL
- Volpe National Transportation Systems Center, Cambridge, MA

Corporations:

- ATAC Corporation, Sunnyvale, CA
- Boeing Commercial Airplane Group, Seattle, WA
- Bolt Beranek & Newman Inc., Systems & Technologies, Canoga Park, CA
- Eldred Engineering Inc., East Boothbay, ME
- Harris Miller Miller & Hanson Inc., Burlington, MA
- Howard Needles Tammen & Bergendoff Inc., Alexandria, VA
- Landrum & Brown Inc., Lawrence, KS
- Leigh Fisher Associates Inc., San Mateo, CA
- LeTech Inc., Alexandria, VA
- Metron Inc., Reston, VA
- Ricondo & Associates, San Francisco, CA
- SAIC Inc., Falls Church, VA
- URS Greiner Engineering Sciences, Tampa, FL
- Wyle Laboratories Inc., Arlington, VA

International:

- DELTA Acoustics & Vibration, Lyngby, DENMARK
- SINTEF DELAB, Trondheim, NORWAY

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AEE wishes to express our appreciation to the INM development team. At the Volpe National Transportation Systems Center (VNTSC), we thank Gregg Fleming, Environmental Measurement and Modeling Division Chief, Chris Roof, Aviation Environmental Design Tool (AEDT) Project Lead, Eric Boeker, INM Project Lead, and team members Paul Gerbi and David Senzig. At the ATAC Corporation, we wish to thank David Holl, VP of Aviation Modeling Technology, Eric Dinges, AEDT/INM Project Lead, and team members Denise Rickel, Justin Hemann, and Lena Mirsky.

## **DISCLAIMER**

The contents of this report reflect the views of the ATAC Corporation, which is responsible for the facts and accuracy of the material presented herein. The contents do not necessarily reflect the official views or policy of the U.S. Department of Transportation. The INM 7.0 User's Guide does not constitute a standard, specification, or regulation. The design, production, and distribution of this manual have been paid for by user fees.

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## GLOSSARY

AEE	FAA Office of Environment and Energy
AFE	Above Field Elevation (altitude)
AGL	Above Ground Level (altitude)
APP	Approach operation
ARTS	Automated Radar Terminal System (radar tracks)
ATRS	Automated Thrust Restoration System (on aircraft)
C	degrees Celsius (temperature)
CAD	Computer Aided Design (application program)
CAS	Calibrated Airspeed (corrected indicated airspeed)
CD-ROM	Compact Disk Read Only Memory (laser-encoded disk)
CIR	Circuit flight operation
CPA	Closest Point of Approach
dB	decibel, a unit of noise level or noise exposure level
DBF	dBase IV database file format
deg	degrees (angle)
DEM	Digital Elevation Model (terrain data format)
DEP	Departure operation
DLL	Dynamic Link Library (supporting software)
DNL	Day Night Average Sound Level (noise metric)
DOT	U.S. Department of Transportation
DXF	Drawing Exchange Format (CAD graphics data in a text format)
EIS	Environmental Impact Statement
EPNL	Effective Perceived Tone-Corrected Noise Level (noise metric)
EPR	Engine Pressure Ratio (thrust-setting parameter)
F	degrees Fahrenheit (temperature)
FAA	Federal Aviation Administration (U.S. DOT)
FAR	Federal Aviation Regulations
ft	foot, feet
GridFloat	Terrain data format
GUI	Graphical User Interface
h	hours
HNM	Helicopter Noise Model
hp	horsepower
ICAO	International Civil Aviation Organization
IFR	Instrument Flight Rules
ILS	Instrument Landing System
in-Hg	inches of mercury (barometric pressure)
INM	Integrated Noise Model
kg	kilograms
km	kilometers
kt	knots (international nautical miles per hour)
LAMAX	Maximum A-Level (noise metric)
lb	pounds force or weight
$L_{AE}$	Symbol for SEL — A-weighted sound exposure level (dB)
$L_{EPN}$	Symbol for EPNL — perceived sound exposure level (dB)
m	meters
mi	U.S. statute miles
min	minutes
mm-Hg	millimeters of mercury (barometric pressure)
$\mu\text{Pa}$	micropascal ( $10^{-6}$ newton/meter <sup>2</sup> , unit of acoustic pressure)
MSL	Mean Sea Level (altitude above sea level)

N1	Low pressure rotor speed as a percentage of a reference speed
NADP	Noise Abatement Departure Profile (AC-91-53A)
NFDC	FAA National Flight Data Center (database)
NMBG	Noise Model Binary Grid file format for NMPlot
NMPlot	Graphics application program that processes contours
nmi	international nautical mile (1852 meters)
NPD	Noise-power-distance
OVF	Overflight operation
PC	Personal Computer (based on Intel processor architecture)
PNLTM	Maximum Perceived Tone-Corrected Noise Level (noise metric)
s	seconds
SAE	Society of Automotive Engineers
SEL	Sound Exposure Level (noise metric)
TA	Time-Above (noise metric)
TAS	True Airspeed
TAX	Taxi
TCH	Threshold Crossing Height
TGO	Touch-and-go operation
USGS	U.S. Geological Survey
VFR	Visual Flight Rules
VNTSC	Volpe National Transportation Systems Center (U.S. DOT)
Vzf	Zero-flaps minimum safe maneuvering speed
WMF	Windows Metafile (a graphics format)

# 1 SYSTEM INSTALLATION

Install the INM 7.0 system by following the instructions in this section. First, check that your computer system meets the requirements. Then, load the INM files onto your hard disk. After INM is loaded, you can do a quick test of the software to see if it works, and then you can convert previous studies to INM 7.0 format.

## 1.1 Computer System Requirements

The computer system requirements for INM 7.0:

- Pentium III processor or better
- 1.0 Gb of RAM memory or more
- Microsoft Windows 2000, or XP operating system.
- 640x480 16 colors VGA display or better
- Mouse input device
- CD-ROM drive
- 110 Mb of hard disk space for the INM system
- 1 to 100+ Mb of hard disk space for each INM study

Although INM could run on a less capable computer than recommended above, both the graphical user interface and the noise-calculation performance would be slow. Large studies involving thousands of flight operations and/or high resolution noise contours require more real memory than 1.0 Gb.

Your disk drive should have enough capacity to hold the operating system, the INM system software, INM studies, and other Windows applications. The INM system requires about 110 Mb, which includes programs, dynamic link libraries, data, and examples. The size of an INM study can vary greatly, depending on how many cases there are and the amount of graphical input data used.

## 1.2 Software Installation Procedure

The Windows 2000 or Windows XP operating system is required for INM 7.0.

### 1.2.1 Install INM

Put the INM CD-ROM into the CD drive. The setup program should automatically launch. If it does not, from the Windows *Start* menu, select the *Run* function and enter *D:SETUP*, where D is the letter for the CD drive. Follow the instructions in the setup program.

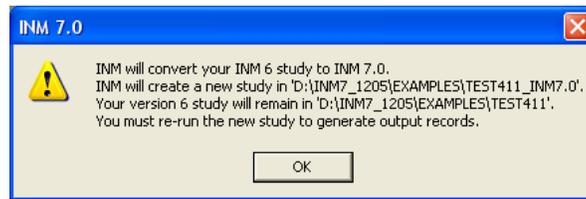
The setup program allows you to install INM 7.0. The setup program creates an INM 7.0 shortcut in the Windows *Start // Programs* menu.

### **1.2.2 Uninstall INM**

You can use either the INM setup program or the Windows *Start // Settings // Control Panel // Add/Remove Programs* function to uninstall INM and/or INM Remote Node.

### **1.2.3 Installation Notes**

- **Dynamic Link Libraries:** The INM setup program does not put DLL files into your operating system directory. The DLL files that are required to run INM are in the INM70 directory.
- **Network users:** You can put the INM system on a network server drive, and your studies on either network or local drives. However, there are some potential problems:
  - INM is a single-user system. Two people cannot run INM from a network server at the same time. This is because INM writes temporary files into the system subdirectories, and one person could overwrite another person's files.
  - Make sure that your network computer clocks are synchronized. INM uses file time stamps to decide whether processes need to be run again. Compared files could have their time stamps written by two different computers. If the two computer clocks are off by a minute or more, INM might run a process when it does not need to, or not run one when it does need to.
- **Gray-on-gray problem:** Windows displays an inactive text box as dark gray text on a gray background, making it very difficult to read the text. If you wish, you can change to black text on a gray background by doing the following:
  1. In the Windows system directory, run the *REGEDIT .EXE* program.
  2. Click on the tree structure until you get to level *HKEY\_CURRENT\_USER // Control Panel // Colors*.
  3. Find "GrayText" in the right panel and change its values from "128 128 128" (dark gray) to "0 0 0" (black).



## 1.3 Converting INM Studies to Version 7.0

Previous versions of INM studies can be converted into INM 7.0 format.

### 1.3.1 Version 6.0, 6.1 or 6.2 Studies

INM 7.0 automatically converts a version 6.x (6.0, 6.0a, 6.0b, 6.0c, 6.1, 6.2, or 6.2a) study into version 7.0 format. The conversion process takes place when you first load a version 6.x study. A message box alerts you that a conversion will take place. Your version 6.x study will not be altered or deleted. Instead, the version 7.0 study is saved in a new directory labeled using the current study name with “\_INM7.0” added to the end. If that directory already exists, you will be prompted to enter a new directory name.

### 1.3.2 Version 5.2a and Earlier

A version 5.x study cannot be directly converted to version 7.0. Instead, convert to version 6.x by loading the study into INM 6.0 (or 6.1, 6.2, etc.), and then load the resulting version 6.x study into INM 7.0.

### 1.3.3 Conversion Rules and Naming Conventions

The version conversion program automatically converts studies to be fully compatible with INM version 7.0. Because of extensive changes to the database and more restrictive rules regarding standard data records, the version conversion program makes numerous changes to INM 6.x study data as outlined below:

#### Scenario / Case Input Format

INM 7.0 uses a three-tier Study / Scenario / Case input data structure rather than the two-tier Study / Case input data structure used by earlier versions of INM. Cases in INM 7.0 are very similar to cases from prior versions of INM, and scenarios are simply groups of one or more cases. INM 7.0 runs scenarios rather than cases, therefore each case in a converted INM 6.x study is automatically added to a newly created single-case scenario. The new scenario uses the name of the existing case with “SCENARIO\_” added to the beginning. All of the original case run options and grid definitions are preserved in the new scenario.

#### Aircraft Data

INM will no longer allow standard data identifiers to be applied to non-standard data. INM will force name changes for any aircraft, noise, or profile identifiers

that match standard identifiers but apply to user-defined or non-standard data. See below for details related to each data type.

INM 7.0 separates aircraft into three different aircraft types, Civil Airplanes, Military Airplanes, and Helicopters. Any aircraft data in an existing INM 6.x study is assigned to either the Civil or Military Airplane aircraft type in INM 7.0 based on its noise identifier. All aircraft in the INM 6 series utilized the same parameters and were treated in the same fashion in the model, helicopters were essentially modeled as airplanes. Therefore even data that supposedly represented a helicopter in the INM 6 series is considered airplane data in INM 7.0 and is assigned to the Civil or Military Airplane aircraft types. Any aircraft using an INM noise identifier will be considered a Civil Airplane. Any aircraft using a NOISEMAP noise identifier will be considered a Military Airplane. See Sections 9 and 10 for differences between the Civil and Military Airplane aircraft types within INM.

Exception: An INM 6.x user-defined aircraft with a standard INM aircraft identifier that originally utilized an INM noise identifier but was assigned a NOISEMAP noise identifier by the user will be considered a Civil aircraft in INM 7.0. You will be required to rename the NOISEMAP noise identifier during the version conversion process.

### **Aircraft Identifiers**

During version conversion, Airbus aircraft identifiers are automatically updated in the new INM 7.0 study. These changes are summarized below:

INM 6.0 Identifier	INM 7.0 Identifier
A300	A300B4-203
A30062	A300-622R
A310	A310-304
A319	A319-131
A320	A320-211
A32023	A320-232
A32123	A321-232
A330	A330-301
A33034	A330-343
A340	A340-211

You will also be required to rename aircraft identifiers used in the INM 6.x study in the following situations:

- Any aircraft identifiers in the exiting 6.x study matching the new INM 7.0 helicopter identifiers will be automatically renamed by INM. The new identifiers are created by adding “\_H” to the end of the existing identifier. This also applies to any helicopter data obtained from the “HeloExample” example helicopter study distributed with the INM 6 series. As noted above these aircraft will be assigned to the Civil or Military Airplane aircraft types.

- Any user-defined aircraft using standard INM 7.0 aircraft identifiers must be renamed. A user-defined aircraft is any aircraft that has one or more data parameters that deviate from the values contained in the standard INM database. For example, an INM 6.x aircraft created as a copy of a standard aircraft with only a minor change, such as a revised maximum gross takeoff weight, is considered a user-defined aircraft. During version conversion INM will offer to rename the aircraft for you (by adding “\_U” to the end of the existing identifier), or you may enter a new identifier yourself. INM 7.0 will create a complete set of aircraft data for the new identifier by using available user-defined parameters along with standard data where needed. This complete set of aircraft data will be stored in the appropriate study-level files. The one exception to this rule is when only an aircraft’s group identifier differs from the standard database. INM 7.0 handles aircraft group identifiers differently than previous versions (see below). Aircraft in this situation are not considered user-defined and do not need to be renamed during version conversion.
- User-defined substitution aircraft that use identifiers that match INM 7.0 standard aircraft identifiers must be deleted or renamed. During version conversion INM will offer the option of deleting your substitution and replacing it with the matching INM standard Civil Airplane, if applicable. If your substitution identifier matches a standard Military Airplane or Helicopter identifier, you will not have this option and the user-defined identifier must be deleted or re-named. If you choose not to delete your substitution, INM will rename your substitution (by adding “\_U” for Civil or Military Airplanes or “\_H” for Helicopters), or you may choose to rename it yourself.

### **Group Identifiers**

INM 7.0 no longer contains default group identifiers (i.e. “COM”, “MIL”, and “GA”) for each aircraft. You must create your own group identifiers using the *Setup // Group Assignment* window if you wish to define flight operations using the *Operations // Group Percents* and *Operations // Airport Operations* windows. The version conversion process will carry an existing INM 6.x group into INM 7.0 only if that group has operations percentages assigned to it via the INM 6.x *Ops // Group Percents* window.

A group can not contain more than one aircraft type (Civil Airplanes, Military Airplanes, or Helicopters). INM 6.x does not distinguish by aircraft type, and all INM 6.x aircraft are considered to be either Civil Airplanes or Military Airplanes as noted above. Therefore it is possible for an existing INM 6.x group to contain both Civil and Military Airplanes. This situation is automatically detected during version conversion and if it occurs a new group is created for the Military Airplanes, while the original group is modified to contain only the Civil Airplanes. The new group’s identifier is created by appending “\_M7” to the end of the original INM 6.x group identifier. The two INM 7.0 groups are each assigned the same percentage values as the original INM 6.x group.

### Noise Identifiers

When converting studies created with INM versions prior to 6.1, version conversion will automatically update INM noise identifiers for military aircraft with the NOISEMAP noise identifiers that were added in INM version 6.1. (See the INM 6.1 Release Notes for more information)

As noted above, user-defined aircraft using standard aircraft identifiers and assigned to NOISEMAP noise identifiers in an INM 6.x study are considered to be Civil Airplanes. You will be asked to rename the NOISEMAP noise identifier for these aircraft, and INM will copy the corresponding set of noise data to the appropriate study-level files as user-defined data. These aircraft are automatically defined as Civil rather than Military Airplanes due to the fact that these INM 6.x aircraft may have procedural profile records, and therefore, cannot be treated as INM 7.0 Military Airplanes. Military Airplanes are only allowed points-type profiles.

### Profile Identifiers

INM no longer allows user defined profiles to use any standard INM profile identifiers (i.e. "STANDARD", "ICAO\_B", etc.). During version conversion the user will be prompted to re-name any profiles that use any identifier already occurring in the standard database, or allow INM to assign a new identifier. In addition, INM no longer allows users to overwrite individual standard procedure or fixed point profile steps. If a partially overwritten profile is found in an INM 6.x study, the version conversion process will combine any user defined steps with the required standard profile steps to construct the full profile, and will require a new, non-standard profile identifier. The new profile will of course be considered a user-defined profile and the user will be prompted to re-name the profile or allow INM to assign a new identifier.

Some standard profiles were modified within the INM 6.x series and therefore have different numbers of profile steps depending on the INM database version. The INM version conversion process has no indication of which version of INM 6 the converted study was created in. These factors combined could cause instances where the version conversion process may not yield profiles representing the user's intention when converting partially-overwritten standard profiles. In this situation it is the responsibility of the user to assure that the new profile created during version conversion is correct.

### Flight Operations

INM will automatically delete any *Airport Operations* records that do not have associated *Group Percent* records in any of the cases contained in the converted study. *Airport Operations* records must have associated *Group Percent* records to be used in INM.

Flight operations records will automatically be updated during the version conversion process with any newly renamed aircraft and/or profile identifiers.

## **Deleted Data**

Some INM standard data was deleted throughout the evolution of the INM 6 series. The INM version conversion process has no indication of which version of INM 6 the converted study was created in, therefore INM will automatically restore any previously existing standard data that has been deleted from the current database. This means that any converted INM 6.x study will still be able to run in INM 7.0 using the originally intended aircraft data (including flap coefficients, thrust coefficients, etc.) even though this standard data no longer exists in the INM database. Restored standard data will be stored at the study level just like any user-defined data.

## **Other Changes**

INM will convert the *\_TERRAIN.BIN* file used to store terrain contour data in INM 6.x studies to the new INM 7.0 *\_TERRAIN70.BIN* file. The new version of the supports larger data types and therefore allows the display of more terrain contour data in the INM.

INM will convert the thrust coefficients stored in the *THR\_GNRL.DBF* and *THR\_JET.DBF* files from scientific notation to regular notation.

### **1.3.4 Conversion Errors**

Usually, a valid version 6.x study will convert without any problems. A large study with many cases may take a while. You will see various messages written in a text window as conversion takes place. If there are problems during the conversion, you may be prompted to enter information or may be notified if an error takes place. All conversion information is stored in the *VERSION.TXT* file in the study directory.

### **1.3.5 Re-Run INM**

All version 6.x temporary and output files are deleted as part of the conversion process in preparation for re-running the model. After successfully converting a version 6.x study, you must re-run all scenarios (formerly cases) and reprocess all output contours because of modifications in the flight path and noise computation modules.

## **1.4 Quick Tests**

You can quickly test INM by loading one of the example studies that is distributed with the INM system. Also, you can create a simple study to experience inputting data, running the model, and displaying output data.

### 1.4.1 View an Existing Study

1. Use the Windows *Start // Programs* function, select INM 7.0, and click on INM 7.0.
2. After INM loads, click on *File* in the menu bar and select *Open Study* in the pull-down menu. In the Open Study directory-navigation dialog box, double-click on the *EXAMPLES* directory, and then double-click on the *TEST50* study directory. Press the OK button to load the *TEST50* study.
3. Click on *Civil* on the menu bar and select *Aircraft Data* in the pull-down menu. A window will pop-up showing a list of aircraft that are defined for the study. You can click on aircraft identifiers in the left-hand list box to see the data change in the right-hand section of the data-input form (this kind of form is called a "*DBF* window").
4. Try other menu items to see what happens. The one called *Civil // Procedural Profiles* (*Civil* on the menu bar, and *Procedural Profiles* in the drop-down menu) may take a while to load because there are thousands of records to check and organize as it loads.
5. Go to the *Tracks // Input Graphics* function. After the window loads, use the *View // Zoom In* function to enlarge the view. Position the mouse cursor where you want the center of the new window, click with the left mouse button, drag the mouse to create a rectangle (representing the new window border), and click once more with the left mouse button.
6. You can zoom back out by using the *View // Zoom Out* function. It works the same, except that the rectangle represents the area into which the current view will be displayed (a small rectangle causes a large zoom out).
7. You can move around on the diagram without zooming by clicking with the right mouse button, dragging the "rubber band" line to where you want the center of the new window, and then releasing the mouse button.
8. Go to the *Output // Output Graphics* function. Select OUT1 and click OK. After the window loads, select the *View // Layers On/Off* function and click the boxes next to Population Points and Terrain Contours. Then, select OK and wait for INM to load these two layers into the window. It will take a few seconds to load because of the large amount of data involved. A layer that is turned on (one that has a check mark in the box) can be turned off by clicking in the box to make the check mark disappear, and then selecting the OK button.

## 1.4.2 Create a New Study

After you are finished looking at the *TEST50* study, close it by using the *File // Close Study* function. Then, select the *File // New Study* function.

1. In the New Study directory-navigation dialog box, double-click on the directory where you want to create the new study, and then type *A-NEW-STUDY* in the Study Name edit box. Press OK, INM verifies your choice, click on Yes, and INM creates a new directory. All of the study files and subdirectories will go into this directory.
2. INM displays the Study Units dialog box with English units already selected. Press OK.
3. INM displays the Study Setup dialog box. Type "My first study" in the Description edit box, and then select the View Airports button. INM takes a few seconds to load a list of about 1136 U.S. airports.
4. After the airport list appears, type the letter I to jump to states starting with I, and then use the Page Down and Down Arrow keys to highlight the line "IL Chicago O'Hare ORD". Press OK and wait while INM finds ORD runways and scans U.S. nav aids and fixes that are close to ORD. When INM finishes, you will see the airport latitude, longitude, and elevation values in the Study Setup dialog. Also, two *DBF* windows are created containing location points (nav aids and fixes) and runway ends. Press OK to close the Study Setup dialog.
5. Select the *Setup // Civil Aircraft* function, and after INM displays the dialog box, use the scroll bar on the left-hand list box to move down and highlight 767JT9. Press the Include button and then the OK button. INM displays the *Aircraft* window with 767JT9 data.
6. Select the *Setup // Cases* function. After INM displays the *Case* window, select the *Edit // Add Record* function. Click in the Case ID edit box and type CASE-ONE. Leave the airport parameters as they are. Select *Edit // Commit Record*. INM creates a subdirectory *C : \A-NEW-STUDY \CASE-ONE*, where case-related data are stored.
7. Select the *Setup // Scenarios* function. After INM displays the *Scenario* window, select the *Edit // Add Record* function. Click in the Scenario ID edit box and type SCENARIO-ONE. Select CASE-ONE from the Study Cases list box and click on the Include button. Select *Edit // Commit Record*. INM creates a subdirectory *C : \A-NEW-STUDY \SCENARIO-ONE*, where scenario-related data are stored. Within the SCENARIO-ONE directory, INM creates a subdirectory where the scenario run output for the included case is stored.

8. Select the *Tracks // Input Graphics* function. Zoom in on the runway system. Select the *Edit // Add Tracks* mode and click in the circle on 09R (the left end of the lower horizontal runway). Drag a line straight along the runway to the right, about two runway lengths out, and click again. In a similar manner, draw two more segments curving up to the north. Double-click to end the last segment. In the dialog box that pops-up, type DEP-001 for the track identifier and press OK. INM redraws the departure track and colors it blue.
9. Select the *Window // Close All* function to close the various open windows that have accumulated.
10. Select the *Operations // Civil Flight Operations* function. Click on CASE-ONE and press OK. After the *Civil Flight Operations* window appears, select 09R in the Runway drop-down list box. Select *Edit // Add Record*. Select profile STANDARD-6. Click inside the Day edit box and type 300. Select *Edit // Commit Record*.
11. Select the *Run // Grid Setup* function. Click on SCENARIO-ONE and press OK. Select *Edit // Add Record* and then *Edit // Commit Record*. The default CONTOUR grid specifies a rectangle for computing noise contours.
12. Select the *Run // Run Options* function. Select Run Type Single-Metric and leave the rest of the run option parameters as they are. Select *Edit // Commit Record*.
13. Select the *Run // Run Start* function. Click on SCENARIO-ONE, press the Include button, and then press the OK button. INM displays message boxes while calculating flight operations and flight paths. Then, INM displays the *Run Status* window showing the percentage progress while noise is being calculated. When the *Run Status* window disappears, the run is done. Look at the *Run Options* window to see how long the noise calculation took.
14. Select the *Output // Output Setup* function. Select *Edit // Add Record*, click in the Output Id box, and type SCENARIO-ONE-DNL. In the Metric drop-down list box, select DNL. Leave the contour parameters as they are (minimum 55 dB, maximum 85 dB, and increment by 5 dB). Leave the Output type OneScenario and Scenario SCENARIO-ONE parameters as they are. Select *Edit // Commit Record*.
15. Select the *Output // Output Graphics* function. Click on the output identifier to highlight it, and press OK. INM then performs post-processing on the noise files generated during the run to produce noise contours. When finished processing, INM displays the *Output Graphics* window with DNL contours. Double-click on the title bar to maximize the window. Zoom in to see the contours better.

## 2 INTRODUCTION

This section introduces the INM model and software:

- General information about INM
- Version 7.0 enhancements
- Summary of software functions
- Description of the contents of the INM70 disk directory.

### 2.1 The INM Model

INM has many analytical uses, such as assessing changes in noise impact resulting from new or extended runways or runway configurations, assessing new traffic demand and fleet mix, assessing revised routings and airspace structures, assessing alternative flight profiles, and assessing modifications to other operational procedures.

In the United States, the model is the required tool for FAR Part 150 noise compatibility planning, FAR Part 161 approval of airport noise restrictions, and for FAA Order 1050 environmental assessments and environmental impact statements.

INM version 6 software releases, which began in September 1999, have been distributed to over 1000 organizations in 64 countries.

#### 2.1.1 INM Core Calculation Modules

The core calculation modules of INM are based on standards documents produced by the Society of Automotive Engineers (SAE) Aviation Noise Committee (A-21). This internationally represented committee is composed of research institutions, engineering firms, aircraft and engine manufacturers, government regulatory agencies, and end-users of noise modeling tools. The INM's core computation modules are also compliant with other international standards documents including European Civil Aviation Conference (ECAC) Document 29 and International Civil Aviation Organization (ICAO) Circular 205. The five relevant documents pertaining to this release of INM are:

SAE-AIR-1845	“Procedure for the Calculation of Airplane Noise in the Vicinity of Airports”
SAE-AIR-5662	“Method for Predicting Lateral Attenuation of Airplane Noise”
SAE-ARP-866A	“Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity”
ECAC Doc 29	“Report on Standard Method of Computing Noise Contours around Civil Airports”
ICAO Circular 205	“Recommended Method for Computing Noise Contours Around Airports”

You can obtain copies of these documents through SAE, ECAC, and ICAO. Contact information for these organizations is provided in Appendix A.

Changes to INM that affect the core calculation module are often submitted to the SAE A-21 Committee for peer review. SAE independently reviews the data and modeling algorithms that are incorporated into INM.

### **2.1.2 INM is an Average-Value Model**

INM is designed to estimate long-term average effects using average annual input conditions. Because INM is not a detailed acoustics model, differences between predicted and measured values can and do sometimes occur because important local acoustical variables are not averaged, or because complicated physical phenomena are not explicitly modeled.

INM aircraft flight profile and noise calculation algorithms are based on the methodology presented in the SAE-AIR-1845 report.

In the U.S., annual day-night average sound level (DNL or  $L_{dn}$ ) is used for quantifying airport noise. The Federal Aviation Regulation (FAR) Part 150 definition of this quantity is:

Yearly day-night average sound level (Part 150 Sec. A150.205(c)):  
“(YDNL) means the 365-day average, in decibels, day-night average sound level. The symbol for YDNL is also  $L_{dn}$ . It is computed in accordance with the following formula:

$$L_{dn} = 10 \log( (1/365) \sum 10^{L_{dni}/10} )$$

where  $L_{dni}$  is the day-night average sound level for the  $i$ -th day out of the year.” The summation is from  $i = 1$  to 365.

If you were to use this definition to model noise in INM, you would have to run 365 cases of the model and average the results. Instead, INM uses the concept of an “average annual day”. FAR Part 150 allows the use of average input data in INM, as follows:

Operational data (Part 150 Sec. A150.103(b)): “...the following information must be obtained for input to the calculation of noise exposure contours: ... (2) Airport activity and operational data which will indicate, on an annual average-daily-basis, the number of aircraft, by type of aircraft, which utilize each flight track, in both standard daytime (0700-2200 hours local) and nighttime (2200-0700 hours local) periods for both landings and takeoffs.”

An average annual day is a user-defined best representation of the typical long-term average conditions for the airport. These average conditions include the number and type of operations, routing structure, runway configuration, aircraft weight, temperature, and wind.

It may be useful to perform supplemental analysis for different times of the year to disclose the effects of the seasonal variation in traffic demand. For example, a supplemental analysis for spring as compared to fall and winter time periods may demonstrate differences in noise exposure if significant changes in fleet mix, flight operations, or flight tracks exist. For policy decisions, however, it is necessary to normalize all scenarios to the same time period (a yearly average), to insure an unbiased comparison among alternatives.

### **2.1.3 Developing an INM Study**

1. If you are doing FAR Part 150 or FAA Order 1050 EIS studies, the FAA must approve any changes or additions that you make to the INM standard aircraft, noise, or profile data. Please refer to Appendix A for the FAA contact and Appendix B for the checklist of items needed for FAA approval.
2. Contact the FAA for AC91-53A Noise Abatement Departure Profile (NADP approval). INM does not contain pre-approved NADPs, even though profile procedures for NADPs are presented as examples.
3. INM is not designed for single-event noise prediction, but rather for estimating long-term average noise levels using average input data. Comparisons between measured data and INM calculations must be considered in this context.
4. Make every effort to develop accurate average values for input data. In particular, flight profiles and ground tracks must be modeled realistically. If feasible, obtain actual takeoff weights and use average weight to choose profile stage numbers instead of using trip length.
5. Examine the applicability of INM standard aircraft profiles to the airport under investigation. These data are generic and in some cases may not realistically represent flight operations at your airport (see section 9.7). For example, Air Traffic Control at a large airport typically directs aircraft to climb to and maintain specific altitudes before climbing further (for the purpose of threading traffic flows). However, standard INM departure profiles have aircraft climb continuously to 10,000 feet above the airport, and these generic profiles would be inappropriate to use in such a situation.
6. INM standard profiles start at 6,000 feet above the airport for approaches and end at 10,000 feet above the airport for departures. INM standard aircraft do not exist above these altitudes; consequently, no noise is produced. If you are computing noise in areas where aircraft are known to fly above these altitudes, you must modify the standard procedures by adding more procedure steps or profile points.

7. When doing a study of a high-elevation airport and/or for non-standard temperatures, check all procedural profiles, and if necessary, substitute your own realistic fixed-point profiles for those aircraft that do not seem to perform as expected. INM aircraft performance coefficients were developed from measurements at sea level for a standard-day temperature of 59°F. At higher elevations and/or temperatures, some computed profiles may not be realistic.
8. Do not change or add aircraft performance coefficients unless you follow procedures in SAE-AIR-1845 and use valid source data based on measured data or flight manuals.

#### **2.1.4 Using the INM Computer Program**

1. Do not use a file manager to delete case or output subdirectories. Let INM manage these study subdirectories.
2. If you create your own procedural or fixed-point profiles, always view the profiles using the Civil, Military, or Helicopter // Profile Graphs function to check your work before trying to calculate contours.
3. Some military aircraft do not come with procedural or fixed-point profiles. In such a case, you must create your own fixed-point profiles for military aircraft. These aircraft were taken from the U.S. Air Force NOISEMAP model, and they are indicated by NM at the end of the aircraft description field. Their noise groups are indicated by NOISEMAP in the model-type field.
4. If you use a spreadsheet or database management program to create your own *DBF* files for input into INM, make sure that data in key fields in related files are consistent. For example, runway end identifier, operation type, and track identifier data in the *TRK\_SEGS.DBF* file must correspond exactly to data put into the same three key fields in the *TRACK.DBF* file. Use the *DBF* templates in the *SYS\_DBF* subdirectory to create your files.
5. Latitude and longitude are in decimal degrees. North latitude and east longitude are positive numbers; south latitude and west longitude are negative numbers. Degrees are written to six decimal places, which provides location precision of about 10 centimeters.
6. Check the accuracy of lat/longs for airport reference points, runway end points, navaid locations, and fix locations. These INM-supplied data are taken from the FAA's NASR database (dated 23-January-2003) and may contain errors. These data are in the *SYS\_USER* subdirectory in the *SYS\_APRT.DBF* and *SYS\_RWY.DBF* files.

## **2.2 INM 7.0 Enhancements**

INM 7.0 is the first full INM release since INM 6.2 (22 May, 2006), and it is the first in a new series of releases since INM 6.0 (30 September, 1999). In general terms, a full release incorporates enhancements that require a change in database definition, or includes advancements in noise assessment methodology that could result in a change in noise contours. A full release includes the distribution of a new User's Guide and Technical Manual. A minor release, such as an update to the aircraft database or a software correction, is provided as needed and is posted on the FAA Web site (see Appendix A).

### **2.2.1 General Enhancements**

INM enhancements are based on user experience, recommendation by the noise modeling community including SAE A-21, and advancement in computation technology.

INM 7.0 is the first INM version that explicitly supports helicopter noise modeling. Earlier versions of INM have had some provisions for modeling helicopters, however those versions handle helicopters in the same way as fixed-wing aircraft and therefore can not account for the operating modes and noise directivity that are unique to helicopters. INM uses the helicopter modeling methods and data contained in Version 2.2 of the FAA's Heliport Noise Model (HNM) with a few enhancements. Enhancements include additional helicopter data, provisions for more types of noise directivity data, and more unique helicopter operational modes which are tied to both NPD data sets and helicopter flight path calculations. INM allows the direct import of HNM data into an INM study.

Best practices for modeling aircraft noise in the vicinity of airports have continued to evolve, and INM 7.0 contains several enhancements to remain consistent with these best practices. The majority of the new methods employed in INM 7.0 come from international guidance documents including European Civil Aviation Conference (ECAC) Document 29 and SAE-AIR-5662. Enhancements based on ECAC Document 29 include new procedural profile step types, new thrust reverser implementation, new flight path segmentation algorithms, and the calculation of aircraft bank angle and its affects on both aircraft flight path performance and lateral attenuation. Enhancements from SAE-AIR-5662 include new lateral attenuation algorithms that could have significant impacts on calculated noise contour shapes and areas. The degree of the impact is study-dependent.

INM 7.0 makes a greater distinction between different aircraft types than previous versions of INM. In INM 7.0 aircraft are divided into three types, Civil Airplanes, Military Airplanes, and Helicopters. The menus and functionality available within INM varies depending on the aircraft type. Civil and Military Airplanes are divided based on whether their original source data was developed for the INM or for the U.S. Air Force's NOISEMAP computer model. The type and proper use of the data available from these two models differs, and these

differences are reinforced by separating the aircraft types within INM 7.0. The required data and calculation methods for helicopters are very different than those for fixed-wing aircraft, therefore helicopters are also broken out as their own aircraft type.

The FAA's Office of Environment and Energy (AEE) is currently in the process of combining all of its existing environmental models, including INM, to create a single tool called the Aviation Environmental Design Tool (AEDT). AEDT will better enable FAA and the international community to determine tradeoffs between aircraft noise and emissions. The remaining enhancements described below have been made within INM 7.0 to bring it closer with the eventual structure and capabilities of AEDT.

INM 7.0 allows more flexibility in organizing study input data than previous versions. It does this by using a three-tier Study / Scenario / Case input data structure in lieu of the previous two-tier Study / Case structure. INM 7.0 cases are very similar to earlier-version cases, and scenarios are made up of one or more cases. INM 7.0 runs scenarios rather than cases. By setting up a multi-case scenario, a user can categorize input data to a greater degree. For example, a given study-year scenario can be broken up into separate cases for each airport operating configuration.

The ability to create multi-case scenarios allows for another INM 7.0 enhancement called annualization. INM 7.0 allows a user to define or modify the contribution of the operations for each case to the overall operations in a scenario after a run has been performed. INM then automatically and instantly updates noise output data based on any modifications, without the need for performing another run. Using this function, if a user has set up and run a multi-case scenario with each case representing a different airport operating configuration, they could use annualization to change the amount of time spent in each operating configuration without re-running the scenario. Annualization also allows user to scale operations up or down, for example allowing future years to be quickly modeled from a baseline scenario.

AEDT will utilize contour grids with fixed spacing. The use of fixed grids in lieu of recursively subdivided irregular grids will significantly increase run times due to the greater number of grid points involved. INM 7.0 includes a new run mode designed to speed up noise calculations when using fixed contour grids. The new Multi-Threaded run mode allows INM to take advantage of the current generation of multi-core PC's during noise calculations for a given scenario by dividing the calculations across each available core and running them in parallel.

The general enhancements in INM 7.0 (including enhancements since INM 6.0) are summarized in the table below.

Features:	INM 7.0	INM 6.2a	INM 6.2	INM 6.1	INM 6.0
<b>Release Date</b>	2007	2006	2006	2003	1999
<b>1. Modeling</b>					
Advanced Modeling helicopters, tracks and profiles (integrated Heliport Noise Model [HNM] Version 2.2 capabilities)	X				
Modeling helicopters, tracks and profiles (partial implementation of HNM helicopters as fixed-wing aircraft)		X	X	X	X <sup>1</sup>
Commercial, military and user-defined aircraft, tracks and profiles	X	X	X	X	X
Compliance with SAE-AIR-1845 (1986)	X	X	X	X	X
Compliance with ECAC Doc 29 (3 <sup>rd</sup> Edition, 2005)	X				
- Bank angle	X				
- New flight procedure step types	X				
- Updated thrust reverser noise implementation	X				
Thrust reverser noise	X	X	X	X	X
Run-up noise	X	X	X	X	X
<b>2. Noise Computations</b>					
Multi-threaded processing	X				
Single-computer processing	X	X	X	X	X
Scenario Annualization	X				
Lateral attenuation	X	X	X	X	X
- Based on SAE-AIR-1751 (1981)					X
- Based on enhanced SAE-AIR-1751 (1981, and differentiating between engine-mounting configurations)		X	X	X	
- Based on SAE-AIR-5662 (2006)	X				
- Ability to turn off lateral attenuation for helicopters and propeller aircraft	X	X	X		
Attenuation due to line-of-sight blockage from terrain features	X	X	X		
Ability to limit computations to locations within a user-defined geographic boundary	X	X	X		
<b>3. Databases</b>					
New aircraft noise and performance data	X	X	X	X	X
Updates to existing aircraft noise and performance data	X	X	X	X	X
Updated rules for "STANDARD" Profiles	X	X	X		
Spectral Classes	X	X	X	X	X
<b>4. Format and Input/Output</b>					

<sup>1</sup> Helicopter Noise Modeling was first introduced in INM Version 6.0c.

<b>Features:</b>	<b>INM 7.0</b>	<b>INM 6.2a</b>	<b>INM 6.2</b>	<b>INM 6.1</b>	<b>INM 6.0</b>
Study-Scenario-Case Input Format	X				
Study-Case Input Format		X	X	X	X
Import HNM study files	X				
Import <i>DXF</i> , Polyline <i>TXT</i> , Census 2000, and Radar Track <i>CSV</i> files	X	X	X	X	X
Expanded ability to process and import Census Tiger/Line data	X	X	X	X	
Import <i>3CD/TX</i> terrain data	X	X	X	X	X
Import GridFloat and DEM terrain data	X	X	X		
Ability to export noise contours and other visual layers to ESRI Shapefiles	X	X	X	X	
Ability to export noise contours and other visual layers to MapInfo Data Interchange Format files	X	X	X		
<b>5. Metrics</b>					
A-weighted, C-weighted and tone-corrected Metrics	X	X	X	X	X
Time Above Metrics (with location-specific thresholds)	X	X	X	X	X
Supplemental noise metrics: Time Audible (TAud) and Change in Exposure (DDOSE)	X	X	X		
Ambient screening capability	X	X	X		

## 2.2.2 List of Modifications

Below is a list of INM 7.0 modifications that have been made since version 6.2a. The list is organized by INM menu and function item to facilitate referencing within the INM graphical user interface and this User's Guide.

1. INM system
  - INM 7.0 automatically converts a 6.x study to the new *DBF* file formats. Many *DBF* file formats have changed, as documented in Appendix E. If you developed a computer program to read and write INM *DBF* files, you will have to modify your software to conform to the new *DBF* formats.
  - INM case and output directory names have been expanded from 30 to 40 characters.
2. *File* Menu
  - *Import Data into Study // HNM Input File* – added function to import Heliport Noise Model (HNM) input files into your INM study.
  - *Import Data into Study // Terrain Files* – added the ability to import DEM and Gridfloat terrain files.
3. *Edit* Menu
  - No changes.
4. *View* Menu
  - No changes.
5. *Setup* Menu
  - *Scenarios* – added function to create scenarios.
  - *Scenario Copy* – added function to copy scenarios.
  - *Civil Airplanes* – added function to display civil aircraft and their descriptions.
  - *Civil Airplane Substitutions* – added function to display civil aircraft substitutions and their descriptions.
  - *Military Airplanes* – added function to display military aircraft and their descriptions.
  - *Helicopters* – added function to display helicopters and their descriptions. Added data for 19 helicopters.
  - *Aircraft Group Assignment* – added function for assigning aircraft to groups.
  - *Location Points and Population Points* – added the capability to switch between Latitude/Longitude and X/Y coordinates.

6. *Tracks* Menu:

- *Runway and Helipad Identifiers* – updated the Runway Identifiers dialog to include helipads.
- *Runway Ends and Helipads*- updated the Runway Ends dialog to include helipad data. Added the capability to switch between Latitude/Longitude and X/Y coordinates.
- *Track Identifiers* – updated to include helicopter tracks.
- *Track Segments* – updated to include helicopter track segments.
- *Input Graphics* –
  - Added the ability to view terrain and population points
  - *Tracks* – added the ability to view helipads and helicopter tracks. Added the ability to change the track line styles.
  - *Edit // Add Tracks*- added the ability to add tracks to helipads.
  - *Edit // Disperse Track* and *Edit // Add Radar Track* – updated the sub-track percentages and standard deviation to be in compliance with ECAC, Document 29, 3rd edition, Vol. 2, Appendix C-2.

7. *AcftType* Menu:

- Added to select one of the INM aircraft types: Civil, Military, or Helicopter.

8. *Civil* Menu (formerly *Acft*):

- Military aircraft and helicopters are moved to their own menus that follow the same general layout as the *Civil* menu.
- Removed the aircraft group identifier field.
- Increased the Max Takeoff and Max Landing weight *DBF* fields to handle weights up to 9,999,999 pounds.
- The aircraft identifier has been expanded from 6 to 12 characters.
- *Noise Identifiers*- The noise identifier has been expanded from 6 to 12 characters. The level / flyover spectral class has been removed.
- *Profile Identifiers*- Increased the profile weight *DBF* field to handle weights up to 9,999,999 pounds.
- *Procedural Profiles* – added new procedure step types:
- *Jet Coefficients and General Coefficients* - changed the coefficient format from scientific to standard notation.

9. *Military* Menu:

- New menu that mimics the layout of the *Civil* menu, only contains data for military aircraft.

10. *Helicopter* Menu:

- New menu that mimics the layout of the *Civil* menu, only contains data for helicopters.

11. *Operations* Menu (formerly *Ops*):

- The menu is re-arranged to put aircraft-specific functions at the top. The available aircraft operations will change according to which aircraft type is selected in the *AcftType* menu.

12. *Run* Menu:

- *Run Options* –
  - Run options apply to scenarios in INM 7, not cases.
  - Fixed grids are available in addition to recursive contour grids.
  - Terrain options are expanded to include more data sources.
  - An option is added for calculating aircraft bank angle and including bank effects in noise calculations.
  - An option is added for specifying whether to use a boundary file to limit the area covered by contour grid calculations
- *Run Start* –
  - One or more scenarios can be selected for a run.
  - Multithreaded runs are supported.

13. *Output* Menu:

- *Output Setup* – Output records are associated with scenarios instead of cases.
- *Annualize Scenario* – added function to scale flight operations to annual levels on a case-by-case basis.
- *Area Contour Coverage* – added function to display the area covered by each contour level.
- *Scenario Run Input Report* – added function to generate a text file containing all scenario parameters used by INM.

14. *Window* Menu:

- No changes.

15. *Help* Menu:

- No changes.

## 2.3 INM User Interface

You interact with the INM system when you process source data, prepare input data, execute the model, and analyze output data. To facilitate user interface tasks, INM provides various ways to work with data.

### 2.3.1 Data File Format

INM 7.0 can be used with other application programs. Most INM input and output files are in dBase IV format (they have a *DBF* file extension). You can use a spreadsheet or database management program to input and manage large files (especially the *OPS\_FLT.DBF* file), and you can use a spreadsheet or

geographical information system program to create presentation graphics from output *DBF* files.

Please be careful when using other programs so that you do not accidentally change the *DBF* format of an INM file. Some spreadsheets change the field width when you simply change the visual appearance of the data on the screen and then save the file. INM will not read a *DBF* file that has had its format changed.

Because INM mostly uses public *DBF* files (rather than secure, but inaccessible binary files), it must employ strong data validation processing to maintain the integrity of the *DBF* data in memory. Data checking is performed on each record as *DBF* files are read from disk. This requires extra processing time, and you will notice a few seconds delay, especially for large files.

### **2.3.2 Input and Output Capabilities**

INM has the following input capabilities:

- Interactively enter data in various form-input windows.
- Interactively enter ground track data in a graphics window.
- Import data from specially formatted text files, including *DXF* graphics.
- Use a spreadsheet or database management program to directly edit *DBF* input files.

INM has the following output capabilities:

- View output charts, graphics, and tables on the screen.
- Print charts, graphics, and tables on a printer or to print files (for example, Postscript).
- Copy tables and charts to the Microsoft Clipboard for use in other applications.
- Export tables to *DBF* files, or to text files in a fixed-column or comma-quote format.
- Directly access *DBF* output files using a spreadsheet or database management program.

INM does not support Object Linking and Embedding (OLE) methods of exchanging data with other programs.

### **2.3.3 INM Main Menu**

INM displays a menu of functions that lets you manage your study, input data, run the model, and display the results. The main menu functions are introduced below, and they are discussed in detail in Sections 3 through 16.

<i>File</i>	Create a new study, open an existing study, import data, export data, print, and exit.
<i>Edit</i>	Add, delete, copy data records, and edit graphical data.
<i>View</i>	Control the appearance of tables and graphics displays, calculate lat/long values, and calculate thrust values.
<i>Setup</i>	Setup study, aircraft, substitutions, metrics, cases, scenarios, aircraft groups, location- point, and population-point data. Specify file locations and contouring parameters.
<i>Tracks</i>	Input runways, helipads, and ground tracks and do graphical editing.
<i>AcftType</i>	Select whether to work with Civil Airplane, Military Airplane, or Helicopter data in subsequent windows.
<i>Civil / Military / Helicopter</i>	Input aircraft, substitution ( <i>Civil</i> only), flight profile, and noise data.
<i>Operations</i>	Input and calculate flight and runup operations.
<i>Run</i>	Setup grids of points for analysis, define run options, and execute one or more scenarios.
<i>Output</i>	Define output processing, view noise contours and various output tables, and create reports.
<i>Window</i>	Control the appearance of windows and set INM options.
<i>Help</i>	Access help information.

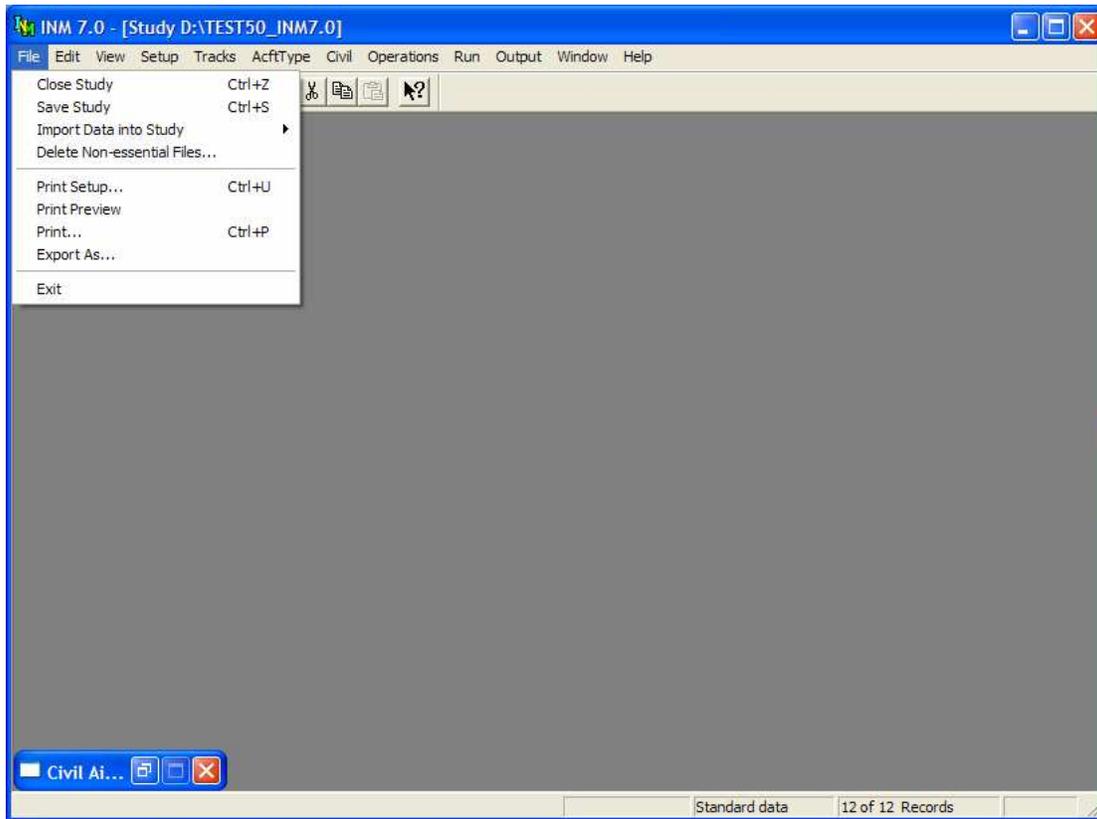
## 2.4 INM70 Disk Directories

The INM 7.0 system software is contained in various disk directories, as briefly described below. Appendix D lists the files contained in the INM system directory and files contained in a typical INM study directory. The INM remote node contains a subset of the directories listed here.

1. **INM70** – This is the main INM system directory. It contains the *INM.EXE* program, supporting dynamic link library (*DLL*) files, a help file, an initialization file, and system subdirectories - everything needed to run INM. You may rename or move this directory.
2. **SYS\_DATA** – This system subdirectory contains the INM standard database in the *ACDB70.BIN* file and the *SPECTRA.BIN* file. The *ACDB70.BIN* file contains 55 *DBF* files used to store both INM standard data and also data required for version conversion in an encrypted compressed binary format. The *DBF* files containing INM standard data are also provided for public view. The *SPECTRA.BIN* file contains data for aircraft spectral classes. Do not rename or delete this subdirectory. Do not change data in the *DBF* files. Do not delete the *BIN* files.
3. **SYS\_DBF** – This system subdirectory contains *DBF* template files used by INM. A template is a *DBF* file without any records. Do not rename or delete this subdirectory or any of the files.
4. **USR\_DATA** – This system subdirectory contains *DBF* files that are used by INM, but you can adapt them for your own use (for example, you can add airport data). Save your modified *USR\_DATA* files before you load a new version of INM. Do not rename or delete this subdirectory.
5. **PROCESS** – This system subdirectory contains software and data that support source data processing:
  - The *CENSUS* subdirectory contains the *CENSUS2000.EXE* console program and data files that INM uses to process U.S. Census CD-ROM data and produce street map and population graphics files for display.
  - The *DXF* subdirectory contains the *CADCVRT.EXE* console program INM uses to process a *DXF* file and produce a graphics file for display.
  - The *TEXT* subdirectory contains example text files. You may delete these files.
6. **EXAMPLES** – This subdirectory contains two example studies converted to INM 7.0 format. It also contains sample radar, terrain, and *DXF* files for one of the example studies. The *EXAMPLES* subdirectory takes up a large amount of disk space. You may move or delete this subdirectory.

7. **UTILITY** – This subdirectory contains several small utility programs. A PDF file in the subdirectory provides a detailed description of each utility. A brief summary of the utilities is provided below.
  - *UTILITY.PDF*: Provides detailed instructions for running each utility.
  - *ALASKA3CD.EXE*: Converts Alaska 3CD terrain data into a standard 3CD format readable by INM.
  - *WRITECPBIN.EXE*: Converts a binary *\_CP.BIN* file from a *POP\_PTS.DBF* file.
  - *WRITEDBFTXT.EXE*: Converts a *DBF* database file to a text format.
  - *POPCONR.EXE*: Computes population numbers within an area exceeding a given noise threshold.
  - *SPECTRALCUTOFFCALCULATOR.EXE*: Creates a file for making audibility runs execute faster.
  - *READ3CD.EXE*: Converts a binary 3CD terrain file to a text format.
  - *WRITE3CD.EXE*: Converts a text file into a binary format terrain 3CD file.
  
8. **INM study directory** – INM creates a study directory when you create a new study using INM. An INM study consists of study-level files (for example, *RWY\_END.DBF*), additions to INM standard *DBF* files, case subdirectories, and output subdirectories. A study directory can be renamed, copied, and/or moved to a different place on your disk or network.
  
9. **INM scenario and case subdirectories** – An INM study consists of one or more "scenarios" (for example, a base scenario and two alternatives). Each scenario is made up of one or more "cases". Study, scenario, and case directories are used to store input data. Tabular output data are put into the scenario subdirectory. Scenario and case subdirectories are created automatically by INM. INM does not allow you to change the name of a scenario or case once it is created. Do not rename or delete these subdirectories outside of INM.
  
10. **INM output subdirectories** – Noise contour data and output graphics data are put into "output" subdirectories. The reason for having separate output subdirectories (instead of using scenario and case subdirectories) is so that you can combine scenarios to form different kinds of output. For example, you can create noise contours showing the difference between two scenarios. You must create an output subdirectory inside INM. INM does not allow you to change the name of an output subdirectory once it is created. Do not rename or delete an output subdirectory outside of INM.

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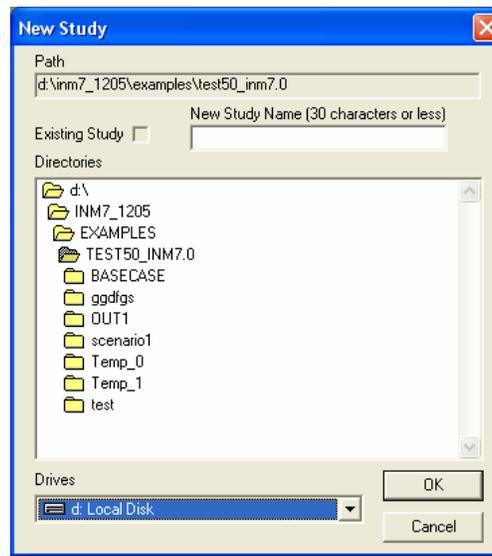


### 3 FILE MENU

There are three different *File* menus:

1. The one shown above is used when a *DBF* window or a table window is active.
2. A slightly different set of *File* functions is displayed when a graphics window is active.
3. A menu with fewer functions is displayed when there is no study loaded. New Study and Open Study functions are available on this menu.

All the *File* functions are described in this section.



### 3.1 New Study

Menu Item: *File // New Study*

Use this function to create a new INM study. Study data are contained in a directory (folder) on a disk drive. The name of the study is the name of the directory.

To create a new study:

1. Select a disk drive.
2. Move up and down the directory tree by double clicking on directory names. Select a directory that will contain the new study (the parent directory).
3. Type a study name in the New Study Name input box. The name can be up to 30 characters long.
4. Press *OK*. INM displays a verification box for the study pathname.
5. After verifying that the study is where you want it, press *Yes*. INM creates the study directory inside the parent directory and writes a few key files.
6. INM displays a dialog box that allows you to choose the kind of physical units (English or metric) for the study. Select one. Press *OK*.
7. INM displays the Study Setup dialog box. Fill out this box as described in *Setup // Study* in Section 6.1. Press *OK*.

INM lets you create a study almost anywhere on your disk, so carefully check the study pathname before selecting *Yes* in the verification dialog box. This extra verification step is included to protect you from creating a study in the wrong directory.

If you happen to choose a study pathname that already is an INM study (one that has the *STUDY . INM* and *STUDY . CSV* files), INM places a check mark in the Existing Study box and does not allow a new study to be created with that pathname. However, all other directories are available for use as a new study directory, even if they have files in them. All directories can be used as a parent for a study directory, even another study.

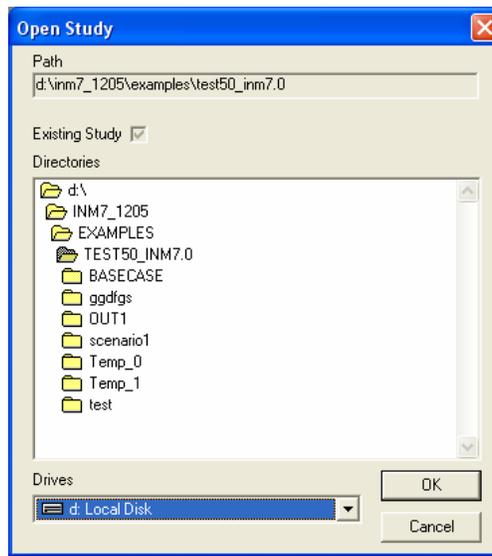
An INM study is an independent entity, meaning that the directory does not have to be in a particular place on your disk. After you create a study and close it, you can use a file manager to change the directory name and/or move the directory to some other place. Then, you can open the study again and use it. For this reason, INM does not keep an internal list of study directories.

After creating a new study, INM displays a dialog box that lets you choose the kind of physical units that will be displayed in the windows. Once you commit to a system of units, you cannot change to the other system of units. The table below shows various physical variables and their units in the two systems:

<u>Variable</u>	<u>English</u>	<u>Metric</u>
X,Y coordinates	nmi	km
Track distance	nmi	km
Runway distance	ft	m
Profile distance	ft	m
Altitude	ft	m
Weight (mass)	lb	kg
Speed	knot	km/hr
Climb rate	ft/min	m/min
Temperature	°F	°C
Pressure	in-Hg	mm-Hg
Area	mi <sup>2</sup>	km <sup>2</sup>

INM converts units when displaying data in windows. The type of unit is shown next to the input parameter; for example, (ft) or (m).

Even though INM can accept metric input, you should be aware that INM data are stored in *DBF* files in English units, and user-created *DBF* file data must be in English units. Small round-off errors are introduced when input metric units are converted to English units, saved in *DBF* files, read back into INM, and converted back to metric for display. Some data, such as thrust values and aerodynamic coefficients, are stored and displayed only in English units.



## 3.2 Open Study

Menu Item: *File // Open Study*

Use this function to open an existing study:

1. Select a disk drive.
2. Move up and down the directory tree by double clicking on directory names. Select the study directory.
3. Verify that there is a check mark in the Existing Study box, and press *OK* to load the study.

INM reads a few key files and changes the main menu bar, allowing you to start an INM session. The full pathname of the current study is displayed on the title bar at the top of the INM main window.

There is another way to open a study: To load a recently opened study, go to the *File* menu and click on a study name at the bottom of the menu.

### **3.3 Close Study**

Menu Item: *File // Close Study*

Use this function to save all data and close the study. The INM program continues to run, and you can create or open another INM study.

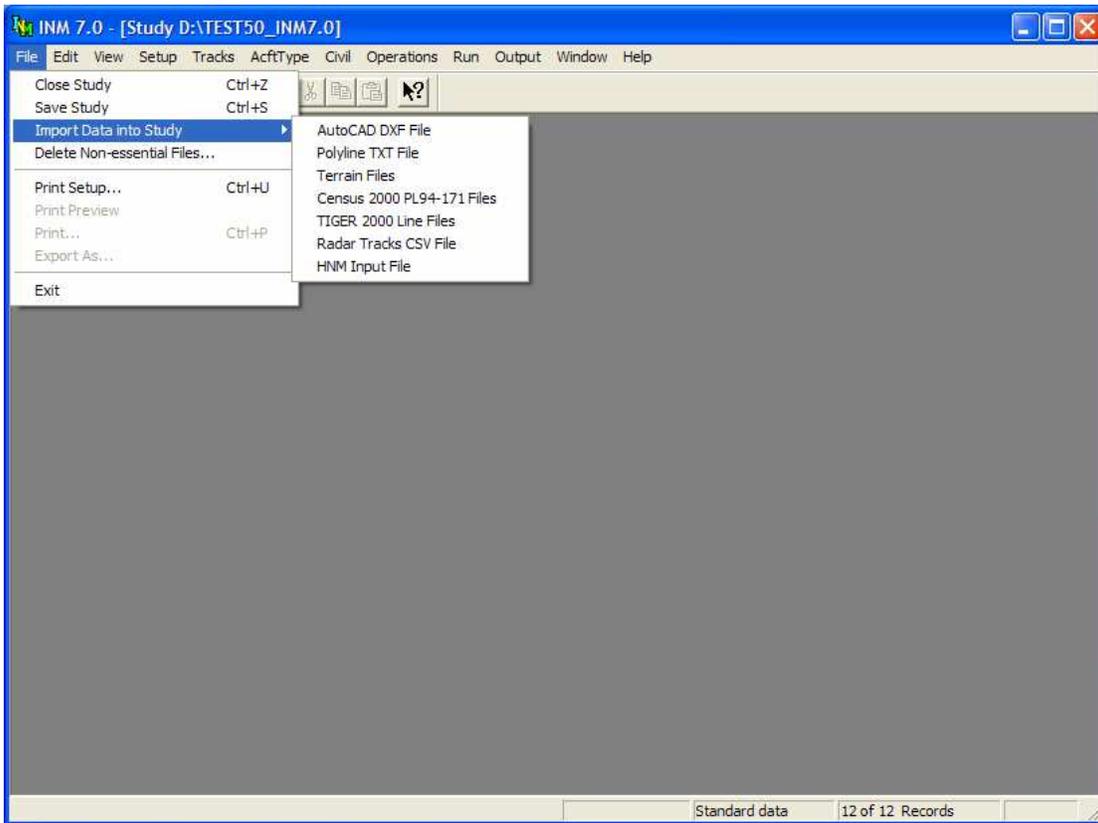
INM will not allow you to close a study if you have forgotten to commit a new record in an open *DBF* window. Commit (or delete) the record and then close the study.

### **3.4 Save Study**

Menu Item: *File // Save Study*

Use this function to save data in memory to disk files. When you commit a record, INM moves your data from the user interface area to another area in computer memory, but the record is not yet saved to disk. When you close a window, INM saves the associated *DBF* file. Minimizing a window does not save the file because the window is still open.

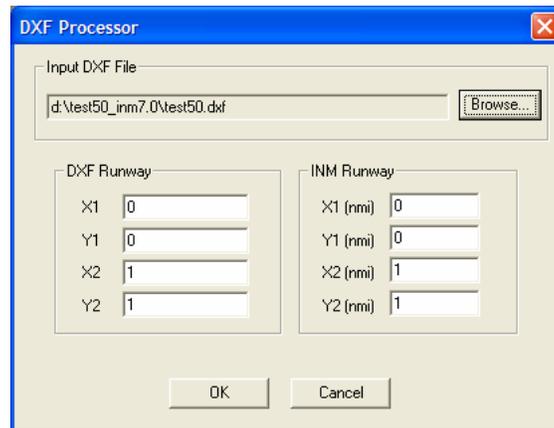
As a protection against loss of input data, INM automatically saves data that are in memory to disk files every few minutes. This time period can be changed using the *Window // Options* function.



### **3.5 Import Data into Study**

Menu Item: *File // Import Data into Study*

Use this function to import various kinds of data files. INM processes a variety of input files and creates INM compatible files that can be used in the study.



### 3.5.1 Import AutoCAD DXF File

Menu Item: *File // Import Data into Study // AutoCAD DXF File*

This function imports a CAD drawing into INM. The input file must be in *DXF* format. Most CAD application programs provide a *DXF*-file export option. AutoCAD® version R13 format is supported. If a later *DXF* version does not seem to convert properly, use AutoCAD or other CAD application to create a *DXF* file in an earlier version.

When importing a *DXF* file into INM, use a simple drawing of the runways, taxiways, and buildings instead of a complicated engineering drawing. A simple drawing makes the size of the *DXF* file small, keeps the converted file small, and allows INM to quickly display the airport overlay. A *DXF* file that is greater than one megabyte is probably too large.

To run the *DXF* Processor:

1. Use AutoCAD® or another CAD application that is compatible with *DXF* format files. Load your *DXF* drawing and find the X,Y coordinates of two runway ends, in whatever units that are presented. For example, runway end 05L is at (376071, 176139) and 23R is at (377738, 177418).
2. In INM, create runways using the *Setup // Study* or the *Tracks // Runway Ends and Helipads* window. Write down the runway end X,Y coordinates in nautical miles (converting from kilometers, if necessary). For example, runway end 05L is at (0.0, 0.0) and 23R is at (0.7451, 0.6252).
3. Use the Browse button to select the *DXF* file to convert.

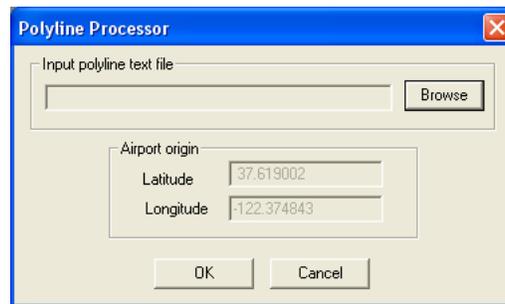
4. Fill out the bottom part of the form with the X,Y data that you collected.

For example:

<u>DXF</u>	<u>Runway</u>	<u>INM</u>	<u>Runway</u>
X1	376071	X1	0.0
Y1	176139	Y1	0.0
X2	377738	X2	0.7451
Y2	177418	Y2	0.6252

5. Press OK to start the conversion process. When the *DXF* Processor is finished converting the *DXF* file, a new CAD file will be put into the study directory. The output file is the same name as the *DXF* file, but with a CAD extension.
6. Use INM to look at the result in either the *Tracks // Input Graphics* or *Output // Output Graphics* window.

The CAD drawing should match the INM runway system almost exactly. If not, you may have made a mistake in the X,Y data, or the *DXF* file has complex structures that are not being properly converted, or your airport drawing may be distorted. An example *DXF* file and its CAD conversion are in the *INM70 \ EXAMPLES \ TEST50* subdirectory.



### 3.5.2 Import Polyline TXT File

Menu Item: *File // Import Data into Study // Polyline TXT File*

This function imports boundaries and other line-oriented graphics data that are given in latitude and longitude. The function reads a text file containing lat/long points and converts it into a binary file that is used by INM to display CAD layers. The output binary CAD file is in the same format as the one produced by the *DXF* Processor.

A polyline is a series of points that are connected together to form a continuous line. One or more polylines can be imported from a single *TXT* file. Each polyline is put into a separate CAD layer, and you can select and color layers in INM. The maximum is 200 layers.

To run the Polyline Processor:

1. Use the Browse button to select your input text file. Files with *TXT* extension are filtered for display, so it is convenient to name your input file with a *TXT* extension.
2. Press OK. INM converts the lat/longs into X,Ys relative to the study origin, and writes a *X.CAD* file to the study directory, where *X* is the name of your *TXT* file.

The Polyline *TXT* format is as follows:

```
LAYER LayerId
Lat Long
Lat Long
...etc...
LAYER LayerId
Lat Long
Lat Long
Lat Long
...etc...
```

where,

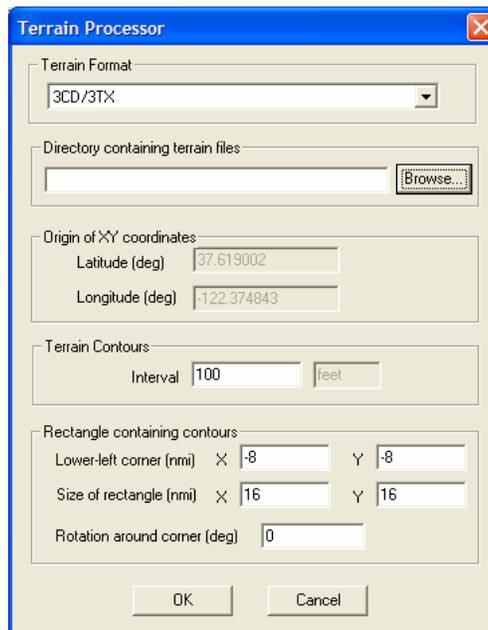
<i>LayerId</i>	Name of the layer (no blanks)
<i>Lat</i>	Latitude (decimal degrees)
<i>Long</i>	Longitude (decimal degrees)

The LAYER keyword is used to designate a new polyline. North latitude and east longitude are positive numbers; south latitude and west longitude are negative numbers. Latitude is first, separated from longitude by blanks. There can be any number of lat/long points per polyline.

A text line starting with the number-sign character (#) is ignored. You can use this method to place comments in your file.

The following is an example polyline *TXT* file. The complete example is in *INM70\PROCESS\TEXT\GCNP.TXT*.

```
LAYER Colorado_River
36.865307 -111.588455
36.861176 -111.594627
36.858429 -111.601608
36.853123 -111.606773
36.849697 -111.615456
```



### 3.5.3 Import Terrain Files

Menu Item: *File // Import Data into Study // Terrain Files*

This function imports terrain elevation data into INM to provide a terrain contour layer for display in *Output // Output Graphics*. The input data can be in one of the following formats:

- *3CD* binary format by Micropath Corporation. You can purchase a CD-ROM containing *3CD* files of terrain elevations (see Appendix A). Micropath data covers U.S. and International land areas.
- *3TX* text format, containing terrain elevations covering a one-by-one degree area. When *3TX* files are processed, INM creates the corresponding *3CD* binary files. The *3TX* format is described in this section.
- NED GridFloat format. This format can be freely downloaded from the USGS Seamless Data Distribution System and covers both U.S. and International land areas (see Appendix A).
- Digital Elevation Model (DEM) format. This format can be freely downloaded and covers both U.S. and International land areas (see Appendix A).

Terrain data files are used by the INM when the *Run // Run Options Do Terrain* box is checked. If this box is checked, you will again need to specify the terrain data type you would like to run. INM uses terrain elevations to adjust observer-to-aircraft distances when computing noise levels.

To run the Terrain Processor:

1. Select the terrain format type.
2. Use the Browse button to select the directory containing the terrain files of the specified type. NED GridFloat processing requires that all three file types (*.hdr*, *.flt*, *.prj*) reside in the same directory.
3. Input the contouring interval in the Contour Interval box. If your study uses English units, the terrain contour interval is in feet, otherwise the interval is in meters.
4. Input the parameters that define the rectangle in which the terrain contours will be computed. The lower-left corner X,Y is relative to the study origin. The width X and height Y define the size of the rectangle. The rectangle can be rotated around the lower-left corner. Counter-clockwise is positive degrees; clockwise is negative.

The rectangle definition parameters are the same as the parameters used to define the noise contour rectangle in the *Run // Grid Setup* function. Thus, you can make the terrain rectangle match the noise rectangle.

5. Press *OK*. The Terrain Processor checks to make sure there are enough terrain files to cover the specified terrain rectangle. If the required files do not reside in the terrain directory, an error message will be issued and the Terrain Processor will stop running. If there is sufficient terrain file coverage to run the Processor, the Terrain Processor reads the files, converts any *3TX* files to *3CD* binary format (if selected), and then produces a single *\_TERRAIN70.BIN* file, which contains terrain contour data that are used for display in an *Output // Output Graphics* window. The output file is put in the study directory.

The *3TX* file format is as follows:

```
Lat Long  
Elevation  
Elevation  
Elevation  
...etc...
```

where,

Lat	Latitude of SW corner (integer degrees)
Long	Longitude of SW corner (integer degrees)
Elevation	Terrain elevation MSL (integer meters)

The first line in the file defines the southwest corner of the one-by-one degree area. North latitude and east longitude are positive integers; south latitude and west longitude are negative integers. The SW corner must be on integer degrees.

There must be exactly  $1201 \times 1201 = 1442401$  lines following the first line. Each line contains one number – the elevation, in integer meters, of the terrain

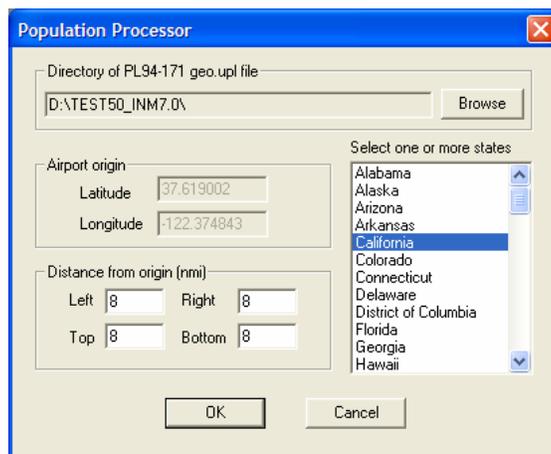
above mean sea level. The elevation of the SW corner is the first integer; the elevation that is 3 arc-seconds to the north is the next integer, and so on until the top edge (integer degree latitude) is reached. Then move 3 arc-seconds to the east, start at the bottom edge, put in another 1201 elevations while moving north, and so on until the file is filled.

The following is an example terrain elevation *3TX* text file. The complete example is in *INM70\EXAMPLES\TEST50\N37W123.3TX*.

```
37 -123
11
13
12
```

The *3CD* files that are created from *3TX* files use a special naming convention. The first letter is N or S, followed by two latitude digits, then E or W, followed by three longitude digits (for example, *N37W123.3CD*). The name of the *3CD* file is used by INM to locate the SW corner. Do not rename *3CD* files.

The encoded southeast corner field in a Micropath *3CD* file is no longer used by INM. However, the Micropath *3CD* file name is still valid (two digits for north latitude and three digits for west longitude of the southeast corner).



### 3.5.4 Import Census PL94-171 DBF Files

Menu Item: File // Import Data into Study // Census PL94-171 DBF Files

Use this function to import *DBF* data from US PL94-171 CDs/DVD and create:

- A binary file that is used to display population points in the *Output // Output Graphics* window.
- A *DBF* file that can be used with the *Run // Run Options Do Population Points* function to calculate noise levels at population points.

You can obtain PL94-171 data through the U.S. Bureau of the Census (see Appendix A).

To run the Population Processor:

1. Use the Browse button to select a *PL9417xx.DBF* file, where *xx* is a U.S. state code. The file can be on a CD-ROM or DVD-ROM. INM uses the file name to set the pathname to the *DBF* files; the actual state selected does not matter at this point.
2. Input the size of a rectangular box containing the streets.
  - If you want the population points to match the streets, use the same parameters as used in the TIGER Processor.
  - The dimensions of the box are left/right and top/bottom from the study origin, so that the center of the box does not have to be on the origin. For example, Left = 10 nmi, Right = 20 nmi, Top = 10 nmi, and Bottom = 10 nmi, makes a box that is 30 nmi wide and 20 nmi high, with the origin offset to the left of the center of the box by 5 nmi.
3. Select the U.S. state in which the airport resides. If the airport is near the state border, you can select more than one state. The program will ask you to input the appropriate CD-ROM if the states are not on the same CD-ROM.

4. Press OK to start the Population Processor. Two files will be written into the study directory: *\_CP.BIN* and *POP\_PTS.DBF*. If you want to run the Population Processor again for the same study, delete these two files before starting, or new data will be appended to the existing *\_CP.BIN* file.

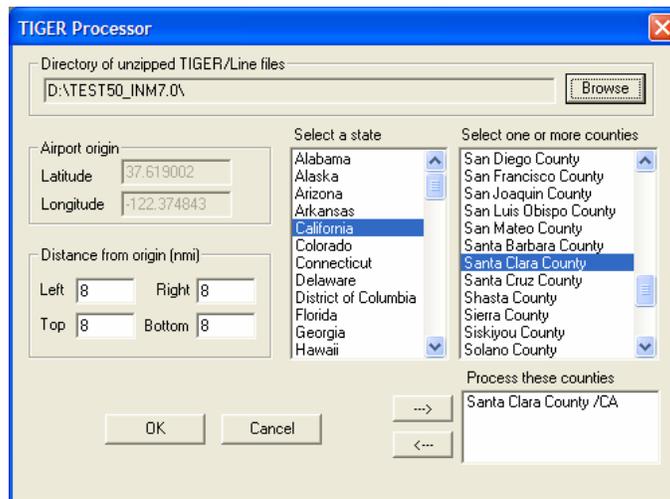
The population data on the PL94-171 CD/DVD are in dBase format, one *DBF* file for each U.S. state. The INM Census Processor scans a *DBF* file looking for records that have summary level 750, which indicates that the population count data on the record apply at the Census Block level. The following data are extracted from the record:

Description	Field Name	Field	Size
Block	BLCK	14	4
Block Numbering Area	TRACTBNA	16	6
County Code	CNTY	23	3
State FIPS Code	STATEFP	42	2
Land Area	AREALAND	56	10
Latitude	INTPLAT	62	9
Longitude	INTPLNG	63	10
Population Count	POP100	66	9

A 15-character population point identifier is used in INM. It is a concatenation of the above identifiers (including any blank characters), as follows:

INM Population Point Id = STATEFP + CNTY + TRACTBNA + BLCK

The State FIPS Code (a number) can be associated with a U.S. state by referring to the *FIPSTATE.DAT* text file in the *INM70\PROCESS\CENSUS* subdirectory.



### 3.5.5 Import Census TIGER Street Files

Menu Item: *File // Import Data into Study // Census TIGER Street Files*

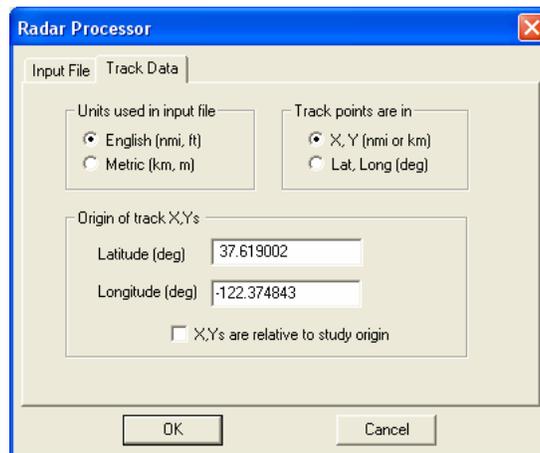
Use this function to import data from TIGER/Line street files and create two binary files that are used by INM to display streets, highways, hydrographic features, civil boundaries, etc.

TIGER line data is available for download from the U.S. Census Bureau. See Appendix A for more information.

To run the TIGER Processor:

1. Use a text editor to open the file *FIPSCODE.DAT*, which is in the *INM70\PROCESS\CENSUS* subdirectory. Look in this file and copy down the state numbers and county numbers that you plan to process. For example, Kansas - Ellsworth County is 20 - 053.
2. Use a utility program, such as WinZip, to unzip state/county files that are on the TIGER/Line CD/DVD. Unzip them to a disk directory.
  - The files you need are called *TGRxxyyy.ZIP*, where *xx* is the state code and *yyy* is the county code. For example, the Kansas Ellsworth County file is *TGR20053.ZIP*.
  - Do not unzip all the files contained in the *ZIP* file. You need only two files, which are the ones ending in 1 and 2. In the Kansas example when using 1995 TIGER, unzip the two files called *TGR20053.BW1* and *TGR20053.BW2*.
  - The *BW* file extension part changes for each new TIGER version, but the state/county codes and the ending numbers 1 and 2 stay the same.

3. Use the Browse button. In the *Open File* dialog List Files of Type box, select "TIGER Files" to filter on *TGR* files. Go to the directory where you put the unzipped *TGRxxxxxyy.vv1* and *TGRxxxxxyy.vv2* files. Select an example *TGR* file. INM uses this example file name to get the input directory pathname and the version extension code.
4. Input the size of a rectangular box containing the streets. A large box will contain a large amount of data and the resulting file will take longer to load into INM when displaying streets.
  - If you want the streets to match the population points, use the same parameters as used in the Population Processor.
  - The dimensions of the box are left/right and top/bottom from the study origin, so that the center of the box does not have to be on the origin. For example, Left = 10 nmi, Right = 20 nmi, Top = 10 nmi, and Bottom = 10 nmi, makes a box that is 30 nmi wide and 20 nmi high, with the origin offset to the left of the center of the box by 5 nmi.
5. Select the state in which your airport resides. If your study is on a border, you can process multiple states. Put the required *TGR* files into the input directory first.
6. For each state, select one or more counties by highlighting them, and then use the arrow button to move the county name into the lower list box.
7. Press OK to start the TIGER Processor. Two output files will be put in the study directory: *\_TIGER.BIN* and *\_TIGER.IDX*. If you want to run the TIGER Processor again for the same study, delete these two files before starting, or new data will be appended to the existing files.



### 3.5.6 Import Radar Tracks CSV File

Menu Item: File // Import Data into Study // Radar Tracks CSV File

Use this function to import a text file containing radar track data and convert it into a pair of binary graphics files that are used by INM to display radar track data.

The user-supplied text file can contain any kind of track data, but the intention is that the user processes raw ARTS radar track data, and writes the track data to a specially formatted text file. INM does not have a function that processes raw ARTS data.

To run the Radar Processor:

1. In the Input File tab, use the Browse button to select your input text file. Files with CSV extension are filtered for display, so it is convenient to name your input file with a CSV extension (although this is not a requirement).
2. In the Track Data tab, select English if your track data are in nautical miles for distance and in feet for altitude. Select Metric if your track data are in kilometers for distance and in meters for altitude.
3. Select X,Y if the track points are distance X east and distance Y north from a given latitude and longitude origin. Type in the lat/long of the origin.
  - If the radar track X,Y origin is the study origin, use the check box to automatically insert the study lat/long.
  - The radar track Y axis must be oriented on true north.
4. Select Lat,Long if the track points are given as latitude and longitude values.

The radar track CSV text format is as follows:

```
Code, FltId, AcType, OpType, ApFrom, ApTo, RwyId
, Time, X or Lat, Y or Long, Alt, Spd
, Time, X or Lat, Y or Long, Alt, Spd
...etc...
Code, FltId, AcType, OpType, ApFrom, ApTo, RwyId
, Time, X or Lat, Y or Long, Alt, Spd
, Time, X or Lat, Y or Long, Alt, Spd
, Time, X or Lat, Y or Long, Alt, Spd
...etc...
```

where,

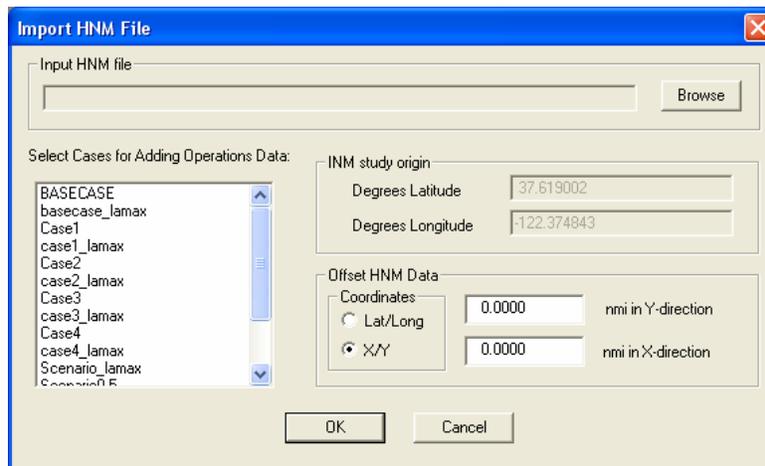
Code	Beacon or numeric code (0557) or 0000
FltId	Flight identifier (AAL1234)
AcType	FAA aircraft type id (B727)
OpType	Operation type: A = approach, D = depart, V = overflight, ? = unknown
ApFrom	From-airport (SFO) or ???
ApTo	To-airport (LAX) or ???
RwyId	Runway end (31L) or ???
Time	Time of radar return (decimal hours)
X or Lat	X value (nmi, km) or latitude (decimal deg)
Y or Long	Y value (nmi, km) or longitude(decimal deg)
Alt	Aircraft altitude MSL (ft, m)
Spd	Aircraft ground speed (kt, km/hr) or 0

Fields must be separated by commas. A comma must be in the first column of a track-point line. Blank lines and comments lines can be anywhere. There can be any number of tracks and points per track.

A line starting with the number-sign character (#) is ignored. You can use this method to document your file or to comment-out data sections.

The following is an example radar track CSV text file in X,Y format. The complete example is in *INM70\EXAMPLES\TEST50\TEST50.CSV*.

```
#EXAMPLE RADAR FILE TEST50.CSV
0012, SDU105, BA31, A, ???, SFO, ???
, 9.28833, 11.15063, -5.67526, 3500, 187
, 9.28972, 10.99544, -5.53952, 3500, 186
0016, UAL1287, B737, A, ???, SFO, ???
, 9.18444, 2.22314, -1.16763, 700, 169
, 9.18972, 1.67270, -0.85274, 400, 156
, 9.19222, 1.37155, -0.75014, 300, 152
, 9.19361, 1.26781, -0.60724, 300, 152
```



### 3.5.7 Import HNM Input File

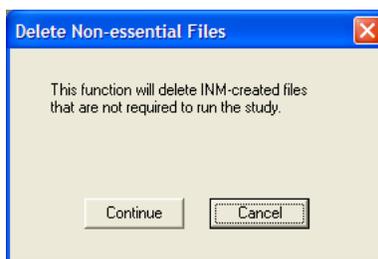
Menu Item: *File // Import Data into Study // HNM Input File*

Use this function to import an input file (\*.INP) created using Version 2.2 of the FAA's Heliport Noise Model (HNM). The input file contains Heliport, Helicopter and Operations data that are automatically converted for use in your INM study.

To import an HNM input file:

1. Use the Browse button to select your input (\*.INP) file.
2. Select one or more INM cases for adding operations data. INM will automatically populate the OPS\_HELO.DBF file for the selected cases with the helicopter operations data provided by the \*.INP file.
3. Enter the location of the Heliport relative to the original HNM origin. You may enter the values in degrees Latitude or Longitude or in X/Y nautical miles. The X/Y coordinates are relative to a grid with the study center placed at the (0,0) point. For example, if your heliport is 2 nautical miles east and 3 nautical miles north of your study airport, you would select X/Y under Coordinates and enter 2.0000 in the X direction and 3.0000 in the Y direction. Alternatively, you may enter the offset in decimal degrees.
4. Select OK.

INM will run the HNM Import function and populate the following files in your INM study: HELICOPTER.DBF, STUDY.CSV, TRACKS.DBF, TRK\_SEG.DBF, RUNWAY.DBF, RWY\_END.DBF, and OPS\_HELO.DBF (for each of the selected cases).



## 3.6 Delete Non-Essential Files

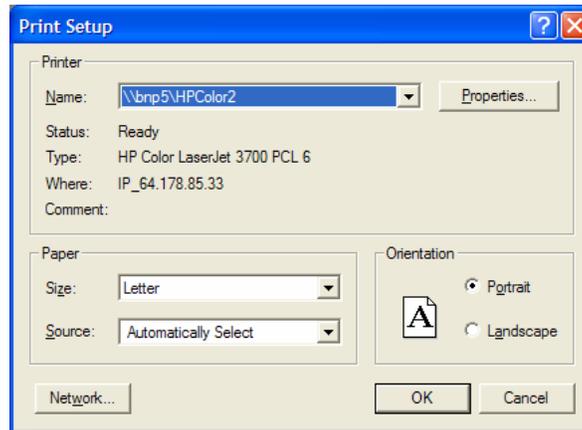
Menu Item: File // Delete Non-essential Files

Use this function to remove files from the active study that are not essential for computing or displaying results. This function provides a way to reduce the size of the study directory before zipping it to send to someone or to move to an archive.

The noise computation output files remain, so that the cases do not have to be re-run. Graphics options remain, so you do not have to reset colors, etc. Post-processed files are removed, so the NMPlot contouring processor does have to re-create contour-related data. Binary and text flight path files are removed. Scenario Run Input Reports are removed.

The following files will be deleted in study, scenario, case, and output directories when you press Continue in the dialog box:

- *\_INM.BIN*
- *CONR\_PTS.DBF*
- *CONTOURS.DAT*
- *FLIGHT.PTH*
- *FLIGHT.TXT*
- *FLT\_ERR.TXT*
- *NMPLLOT.GRD*
- *OPS\_CALC.DBF*
- *OPS\_ERR.TXT*
- *POP\_CONR.DBF*
- *REPORT.TXT*
- *STATUS.DAT*

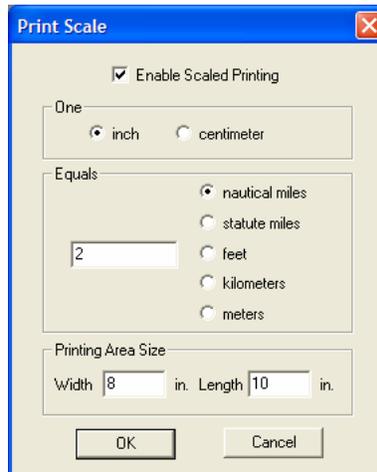


### **3.7 Print Setup**

Menu Item: *File // Print Setup*

Use this function to select the printer that you want to use and to set various printing options (for example, portrait vs. landscape mode). This is a standard Microsoft Windows function.

Printing a chart in landscape mode is done with this function or with the *File // Print // Properties* function.



### 3.8 Scaled Printing

Menu Item: *File // Scaled Printing*

This function is available when an input or output graphics window is open. Use this function to set up INM for scaled printing:

1. Check the Enable Scaled Printing box to turn on scaled printing.
2. Select a ruler unit (one inch or one centimeter).
3. Select the map distance units (for example, feet).
4. Input the map distance corresponding to the ruler unit (for example, one inch equals 1000 feet).
5. Press *OK*.

Scaled printing information is saved in separate files, so you have to fill out a *Scaled Printing* dialog box for *Tracks // Input Graphics* and for each *Output // Output Graphics* window.

To perform scaled printing, INM reads print area size and dots-per-inch data that are provided in your printer driver file (which is not part of INM). Usually, the printer driver provides all the data needed to do scaled printing. If so, you do not have to input data in the Printing Area Size box.

If the printer driver does not provide the required data to do scaled printing, INM displays a message box asking you to fill out the width and length of the printing area. Then, you do have to input data in the Printing Area Size box.

For example, a printer using 8.5 x 11 paper may have a print area that is only 7.98 inches wide by 10.76 inches long (it cannot print all the way to the edges).

You will have to determine these two numbers by experiment. Print a set of concentric circles, and adjust the width and length parameters until circle X and Y dimensions measure correctly with a ruler. Use the *View // Axis Ring Display* function to enable concentric circles.

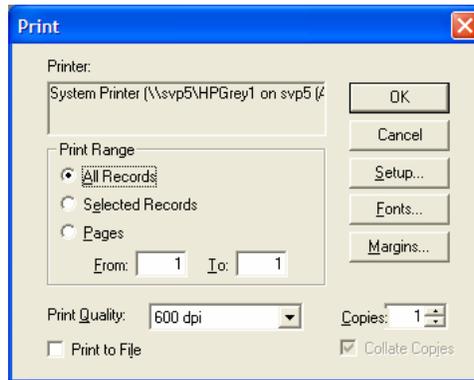
If you are printing in landscape mode, you must reverse the width and length parameters.

### **3.9 Print Preview**

Menu Item: *File // Print Preview*

Use this function to view on the screen how text or graphics will look on a printed page. It is a good idea to use this function before printing.

If a message is displayed about setting the printing area size in the *File // Scaled Printing* dialog box, input print dimensions as discussed above.



## 3.10 Print

Menu Item: *File // Print*

Use this function to print the contents of an active window, which can be any of the five types of INM windows:

- *DBF* window
- Noise Graph or Profile Graphs chart window
- Input or Output Graphics window
- View Calculated Flights or output table window
- Case Run Input Report text window.

*File // Print* is an adaptation of the standard Microsoft Windows *Print* function.

The current printer is displayed at the top of the dialog box. You can change printers by using the Setup button, which switches you to the standard *File // Print Setup* function. Consult Windows documentation to connect printers to your Windows system.

For *DBF*, table, and report printing, the Fonts function lets you change the printer font style and point size.

For *DBF* and table printing, the Margins function lets you specify the top/bottom and left/right margins. These settings remain in effect until you change them.

Print Range options:

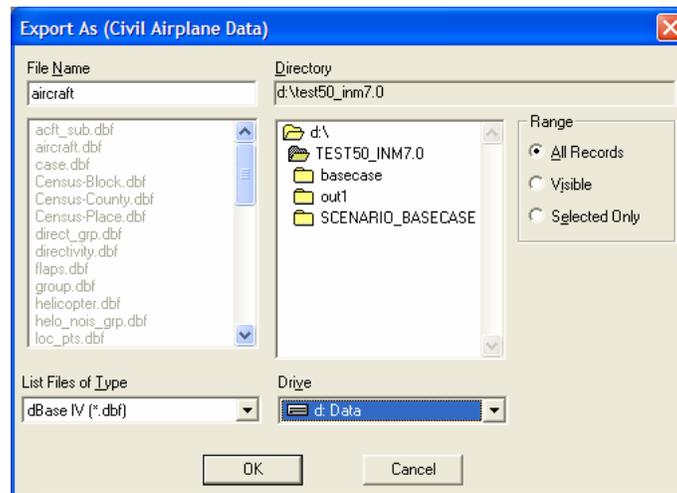
- Use the All Records button to print all records in a *DBF* or table window, including non-visible records.
- Select one or more records in the active window first, and then use the Selected Records option to print only the records you want.
- Use the Pages option to print a specified range of pages. For example, you can set the page range to print only the first page to see a sample of the output before printing the whole job.

The Copies and Collate options can also be used if your printer supports them.

If your printer is a Postscript printer, you can check the Print to File box and create a file containing Postscript text. If your "printer" is a HPGL plotter, you can create a HPGL text file by the same method.

Printing problems:

- Some printers cannot do color fill. These printers substitute black and white or gray hatch lines for the colors. INM will print solid colors inside noise contours if the printer driver supports color fill.
- If a message is displayed about setting the printing area size in the *File // Scaled Printing* dialog box, input print dimensions as discussed above in Section 4.8.



### 3.11 Export As

Menu Item: *File // Export As*

Use this function to create a file in *DBF* or text format. You "export" data in an active window as a file. Even data that are not showing in the window can be saved into the file.

1. In the INM main window, open a window showing the data to be exported. The window must be one of the following:
  - A *DBF* window (for example, *Tracks // Track Segments*), or
  - A table window (for example, *Operations // View Calculated Flights View Summary*), or
  - A chart (for example, *Civil // Profile Graphs*).
2. If you want to export only some of the records in a data window, select them before using the *Export As* function.
  - Select records in the left-hand list box in a *DBF* window, or select rows in a table window.
  - Use the usual Microsoft Windows mouse methods for item selection: individual Ctrl-clicks, or click-move-Shift-click.
3. In the *Export As* dialog box, select the directory where you want the file to be written by navigating the directory tree box on the right.
4. Select the type of file to be written by using the box in the lower-left. You have a choice of three types of export files:
  - dBase IV – standard *DBF* file format.
  - Fixed Length Text – one header line, columns separated by spaces; this is the most readable format.
  - Delimited Text – several header lines, commas between fields, quotes around strings.

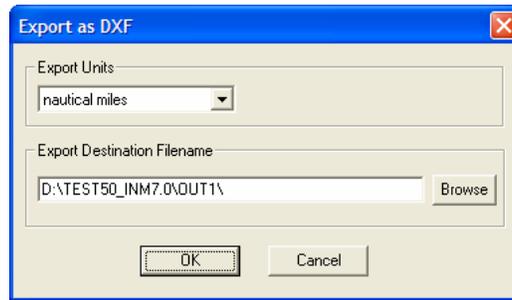
The fourth choice, All Files, is used to view all the files in a directory; it is not an exportable file type.

5. Input a file name or use the displayed default name. A file extension (*DBF* or *TXT*) is automatically added to the filename if you do not supply one.
6. Select a Range option:
  - All Records – write all records in memory. The number of records is on the status line at the bottom of the main window.
  - Visible – write records displayed in the data window.
  - Selected Only – write only those records that you selected in the data window.
7. Press *OK* after the directory, file name, file type, and range are correct.

Export *Civil* or *Military* or *Helicopter // Noise Graph* and *Civil* or *Military* or *Helicopter // Profile Graphs* as follows:

1. Use the *File // Export As* function to export data associated with the points displayed in a chart.
2. Use the *Edit // Copy Records* function to copy the chart to the Clipboard in Windows Metafile format (WMF). You can then Paste from the Clipboard into another application.

If you chose metric units for your study, the exported *DBF* and *TXT* files are written in metric units, rather than English units.



## 3.12 Export as DXF

Menu Item: *File // Export as DXF*

Use this function to export *Output // Output Graphics* to a *DXF* file. All layers that are displayed in the active *Output Graphics* window are written into the *DXF* file, except for the *CAD* layer. Turn off graphics layers that you do not want in the *DXF* file.

To export a *DXF* file:

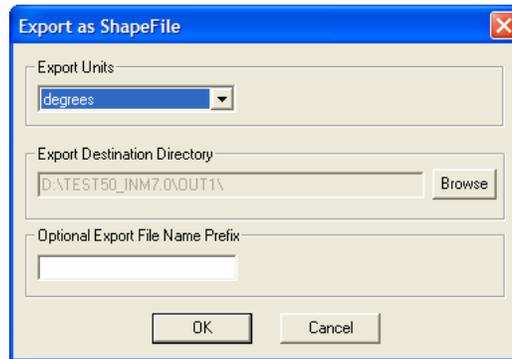
1. Select the X,Y distance units that you want written into the *DXF* file.
  - The units are nautical miles, statute miles, feet, kilometers, meters, and degrees.
  - If you choose degrees, the output is in decimal degrees. Longitude is in the X position and latitude is in the Y position.
2. Input the full pathname of the *DXF* file.
3. Press *OK*.

The following data are exported as *DXF* layers:

- four kinds of points-type tracks
- four kinds of points-type sub-tracks
- three kinds of vectors-type tracks
- track labels
- four kinds of radar tracks
- runways
- runway labels
- individual noise contours
- noise contour labels
- individual overlay noise contours
- overlay noise contour labels
- eight types of streets
- street labels
- population points
- population point labels (number of people)
- location points

- location point labels
- terrain contours
- terrain labels
- individual grids
- grid labels

Tracks and contours are exported as polylines so that they can be manipulated as objects. Objects are colored by layer. INM color numbers are translated to AutoCAD color numbers.



### 3.13 Export as ShapeFile

Menu Item: *File // Export as ShapeFile*

Use this function to export data from the *Output // Output Graphics* window to shapefiles that can be viewed using ESRI ArcView and other GIS programs that support the ESRI format.

To export to \*.SHP and \*.SHX files:

1. Select the X,Y distance units that you want written into the shapefiles. The units can be feet, meters, or decimal degrees.
2. Select the directory where you would like to export the shapefiles.
3. Enter an optional File Name prefix.
4. Press *OK*.

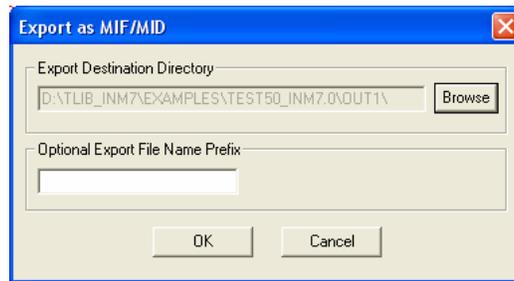
Output Graphic layers that are enabled (visible) are exported. Three pre-named files for each active graphics layer (\*.shp, \*.shx, and \*.dbf) are written to an existing directory that is selected by the user. For example, noise contours are exported to *NOISE-CONTOURS.SHP*, *NOISE-CONTOURS.SHX*, and *NOISE-CONTOURS.DBF* files. Using the optional File Name Prefix allows separate sets of noise contours to be differentiated from each other within the same directory.

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 for export.

Shapefiles (*SHP, SHX, DBF*)

---

Airport-Drawings.*	Noise-Contours.*
Airport-Runways.*	Overlay-Contours.*
Flight-Tracks.*	Population-Points.*
Grid-Points.*	Radar-Tracks.*
Locations-Points.*	Terrain-Contours.*
	Tiger-Lines.*



## 3.14 Export as MIF/MID

Menu Item: *File // Export as MIF/MID*

Use this function to export data from the *Output // Output Graphics* window to \*.MID and \*.MIF files that can be viewed using MapInfo and other GIS programs that support the MapInfo Data Interchange format.

To export *MIF/MID* files:

1. Select the directory where you would like to export the *mif/mid* files.
2. Enter an optional File Name prefix.
3. Press *OK*.

Output Graphic layers that are enabled (visible) are exported. Data associated with items visible in *Output Graphics*, such as population numbers at population points or noise levels at standard grid points, are also exported. Two pre-named files for each active graphics layer (\*.MIF and \*.MID) are written to an existing directory that is selected by the user. For example, noise contours are exported to *NOISE-CONTOURS.MIF* and *NOISE-CONTOURS.MID* files. Using the optional File Name Prefix allows separate sets of noise contours to be differentiated from each other within the same directory. Coordinates can only be exported as latitude/longitude decimal degrees. The table below lists the 11 MapInfo Data Interchange files that are available for export.

### MapInfo Files (.MIF, .MID)

Airport-Drawings.\*  
 Airport-Runways.\*  
 Flight-Tracks.\*  
 Grid-Points.\*  
 Locations-Points.\*  
 Noise-Contours.\*  
 Overlay-Contours.\*  
 Population-Points.\*  
 Radar-Tracks.\*  
 Terrain-Contours.\*  
 Tiger-Lines.\*

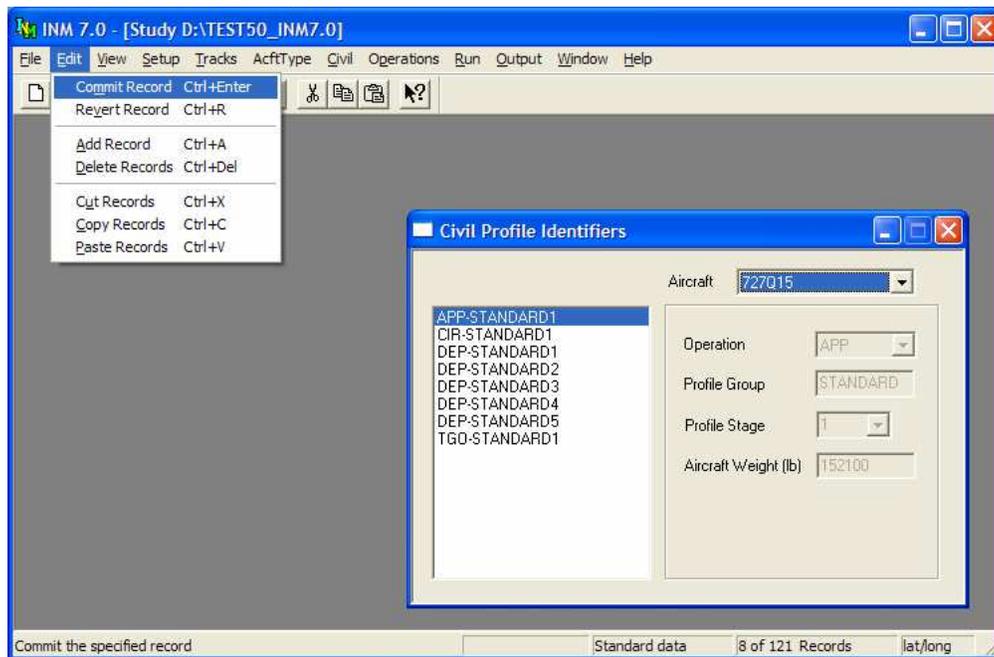
## **3.15 Exit**

Menu Item: *File // Exit*

Use this function to save and close the current study, and then quit the INM program.

You can also exit INM by:

- Double-clicking on the Microsoft Control box in the upper left-hand corner, or
- Single-clicking on the box and selecting Close, or
- Clicking on the upper right-hand box with the X in it.



## 4 EDIT MENU

The *Edit* menu depends on the type of window that is active. There are three kinds of *Edit* menus:

- *DBF* or table window (the *Edit* menu shown above)
- *Tracks // Input Graphics* window
- Message window.

This Section covers *DBF* window editing and Section 7.5 covers input graphical editing. Message-window editing is based on standard Microsoft dialog boxes, and it is not covered.

Individual *Edit* menu items are sometimes disabled because the operation is not allowed in the particular window.

INM supports a standard method of cut-copy-paste of text in *DBF* forms:

- Cut – highlight the text and press key combination Shift-Delete
- Copy – highlight the text and press key combination Ctrl-Insert
- Paste – put the cursor at the insert point and press Shift-Insert.

## 4.1 Commit Record

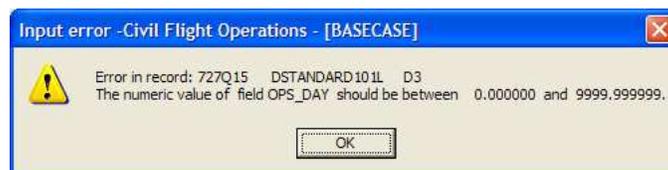
Menu Item: Edit // Commit Record

After you fill out data in a *DBF* form (the right-hand section of a *DBF* window), you must commit the record to save it in the database. There are several different ways to commit a record:

- Use the *Edit // Commit Record* function,
- Press the Check-mark button on the toolbar,
- Select a new record in the left-hand list box of the *DBF* window,
- Select a new set of records using the filter control box above the data form, or
- Close the *DBF* window.

If you use one of the implicit commit commands (for example, selecting another record) INM automatically commits the record. If you want INM to display a verification dialog box before committing a record, turn on the verification feature in the *Window // Options* function.

When you commit a record, INM verifies the data before allowing the record to become a part of the study. Numerical values must lie between minimum and maximum values, character strings must have valid characters, and enumerated members must belong to their sets.



If you try to commit an invalid record, INM displays a message window indicating which field is causing the problem. The name of the field and the acceptable range of numerical values are given in Appendix E. Fix the field (usually, a numerical value is out of range) and try committing the record again.

## 4.2 Revert Record

Menu Item: Edit // Revert Record

Use this function to revert back to the original record. If you edit data in a *DBF* window and then change your mind, this function puts the original data back into all of the fields.

This function will work only if you have not yet committed the new record. Once a new record is committed, you have permanently replaced the old record.

If you want the old record back, you will have to input the old data, one field at a time, and then commit it.

### 4.3 Add Record

Menu Item: Edit // Add Record

Use this function to add a record to a *DBF* file:

1. Select *Edit // Add Record* or press the *Add* button on the toolbar. The data input area in the active *DBF* window changes to a blank or a default value.
2. Input data in the active *DBF* window.
3. Select *Edit // Commit Record* or press the Check-mark button.

If you are adding one record after another, select *Add Record* again. The current record is automatically committed, and a new record with default parameters is presented for you to edit.

When you add a case, scenario, or output record, INM not only adds the record to the *CASE.DBF*, *SCENARIO.DBF* or *OUTPUT.DBF* file, but also creates a subdirectory in the study directory. Sometimes you will see a message saying that INM cannot create the subdirectory. This may be because you are trying to create a subdirectory with the same name as an existing subdirectory. Another reason may be that there is not enough disk space. INM checks for at least 500 kilobytes of disk space before allowing the *Add Record* operation for case or output records.

Do not create and delete INM scenario or case directories with a file manager because the subdirectory name that is recorded in INM and the subdirectory that is really on disk will not be consistent.

### 4.4 Delete Records

Menu Item: Edit // Delete Records

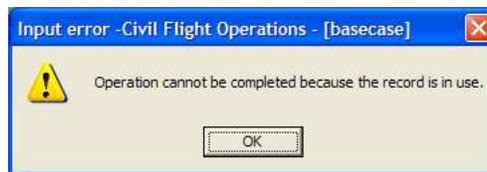
Use this function to delete one or more records.

1. Select a record to delete by clicking on it in the list box on the left-hand side of a *DBF* window. Multiple records can be selected by holding down the Ctrl key while selecting the records. The highlighted records are the ones that will be deleted.
2. Select *Edit // Delete Records* or press the Minus button on the toolbar.

3. A dialog box confirms that you want to delete the record or records.  
This dialog box can be turned off in the *Window // Options* function.

A record can be the "parent" of many "child" records. For example, an aircraft record is the parent of profile identity, fixed-point profile, procedural profile, flaps coefficient, and thrust coefficient child records. However, noise group and noise curve records are not child records because more than one aircraft may use them.

Deleting a parent record causes all child records to be deleted. This is necessary to maintain database integrity. INM will not allow the delete operation if the record is in use.



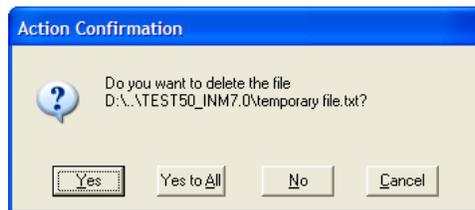
#### **4.4.1 Record in Use**

The delete operation may take a while because INM checks all files that may reference the deleted record. INM will not allow the delete operation if the record is in use. This is a safety measure to help maintain the integrity of the study database.

For example, you may want to delete aircraft 727Q15, but it is currently used in one or more flight operations records in one or more cases. INM presents a message window with a title that gives the name of the *DBF* window and the name of the case, and displays a message about "record in use". You need to delete all references to 727Q15 in *Operations // Airport Operations*, *Operations // Civil Flights*, and *Operations // Civil Runups* windows before you can delete 727Q15 itself.

#### **4.4.2 Delete a Subdirectory**

If you delete a scenario, case or output record, INM automatically deletes all INM-generated files in the associated subdirectory, deletes the scenario, case or output record in the *DBF* file, and deletes the subdirectory if it is empty.



INM does not delete the subdirectory if it contains non-INM files, such as your own special-purpose files or INM-exported files. INM asks whether you want to delete the file, and if you press Yes on each file, or press Yes to All, INM deletes the files and then deletes the subdirectory.

## 4.5 Cut Records

Menu Item: *Edit // Cut Records*

Use the *Cut Records* function with the *Paste Records* function to move a set of records to another place. You can select multiple records.

The *Cut Records* function is similar to *Delete Records*, except that the records are saved in two places:

1. Buffer in memory waiting for a *Paste Records* command
2. Microsoft Clipboard in text format.

A record that has been cut can be restored by pasting it back into the window, but this will work only if the data in the buffer have not been overwritten by another buffer operation.

INM checks all files that may reference the cut records and, like the *Delete Records* operation, INM will not allow the cut operation if one or more of the records are in use. You probably will not use the *Cut Records* function as much as *Copy Records*.

## 4.6 Copy Records

Menu Item: *Edit // Copy Records*

Use the *Copy Records* function with the *Paste Records* function to duplicate a set of records and put them in another place. As with the other multi-record functions, you can select several records at a time.

Instead of doing a copy/paste operation inside of INM, you may want to use the *Copy Records* function to copy a text image of the records into the Microsoft Clipboard so that you can paste them into another application.

## 4.7 Paste Records

Menu Item: *Edit // Paste Records*

Use this function in conjunction with *Cut Records* and *Copy Records* to complete the operation of moving or copying records to another place within INM, such as to a different identifier or to a different case.

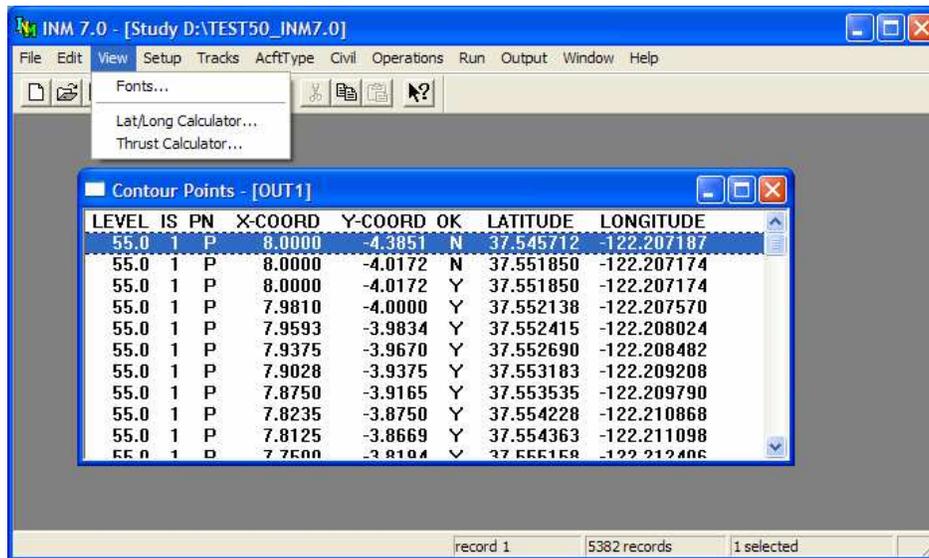
The following examples illustrate how to use cut/paste and copy/paste operations:

- Add a new noise identifier N23456 in the *Civil // Noise Identifiers* window. Go to the *Noise Curves* window, select 2CF650 and copy all of the NPD curve records. Select the new noise identifier N23456 in the *Noise Curves* window and paste the records. A copy of the 2CF650 NPD curves now exists under the new identifier, and you can modify the new records. Notice that each record is indicated as "User data" on the status bar at the bottom of the main window. The copy/paste function worked because you changed to a different noise identifier before pasting the records.
- Create a new profile DEP-USER-5 for aircraft 727Q15 in the *Civil // Profile Identifiers* window. Go to the *Civil // Procedural Profiles* window. Go to aircraft 727Q15, profile DEP-STANDARD-5, and copy step numbers 1 through 9. Change to the new profile DEP-USER-5 and paste the records. Now you can change the procedural profile data.
- Create a new case CASE2. Using the *Operations // Civil Flights* function, select both CASE1 and CASE2. Activate the *Civil Flights-[CASE1]* window and go to aircraft 727Q15 runway 09L. Copy all the flight operation records shown in the list box. Focus on the *Civil Flights-[CASE2]* window and go to the same aircraft and runway. Paste the records. Notice that the flight operation key identifiers did not change; however, the case subdirectory did change, and that is the reason that copy/paste worked.

Some paste operations are not possible due to programmed logic.

1. You cannot paste records that would duplicate records that already exist. If you attempt this, INM displays a warning message.
2. You cannot paste records containing data that are not valid in the new place.
3. You cannot paste records of one type of flight operation to another type.

Records with "STANDARD" in the name (such as standard profiles) will be automatically renamed "STANDAR\*" when pasted. INM does not allow the use of the word "STANDARD" when identifying user-modified data.



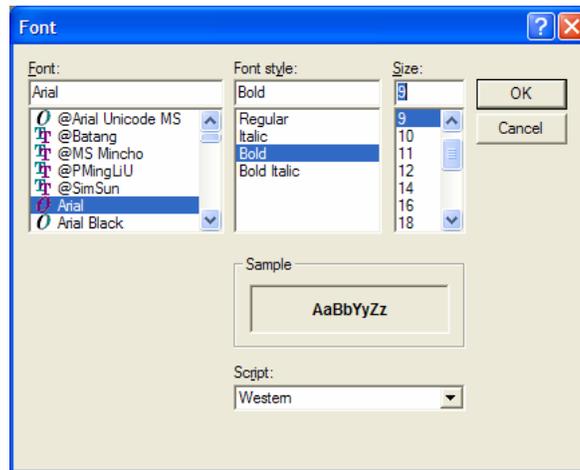
## 5 VIEW MENU

The *View* menu depends on the type of window that is active:

- Table window (shown above) – use the *View* function to change the displayed font style and size.
- *Input Graphics* or *Output Graphics* window – use *View* functions to zoom and change various graphics attributes. See Section 7.5 and 14.2 for details.

The *Lat/Long Calculator* and *Thrust Calculator* functions are always available on the *View* menu.

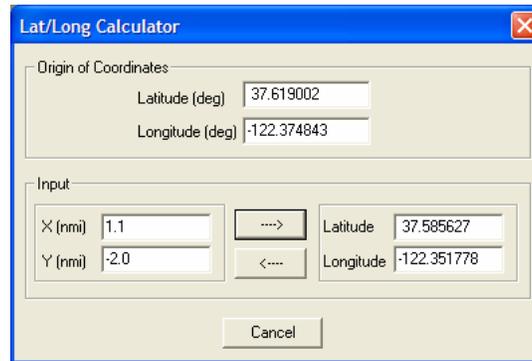
This section covers *Fonts*, *Lat/Long Calculator*, and *Thrust Calculator* functions.



## 5.1 Fonts

Menu Item: View // Fonts

Use this standard Microsoft dialog box to select one of several operating system-supplied fonts, and then select the font style and font size that is available for that particular font. These selections are saved in the INM.INI file, and they remain in effect until changed again via this function.



## 5.2 Lat/Long Calculator

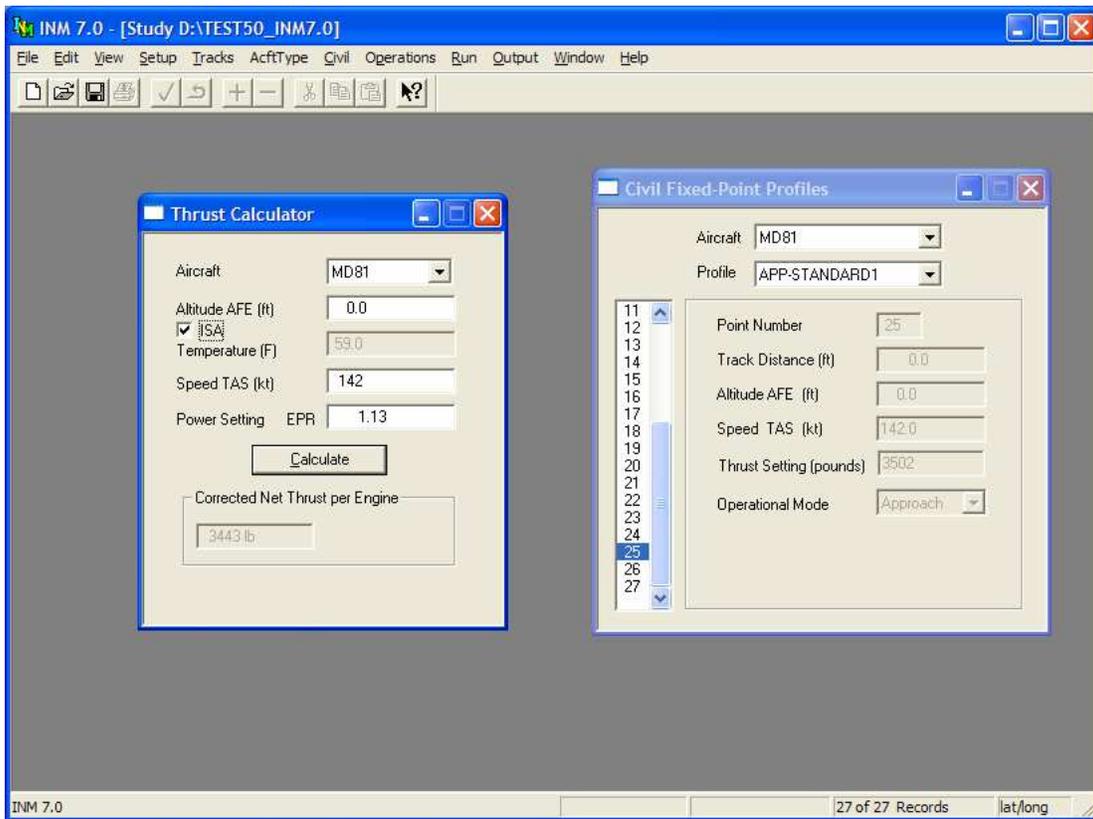
Menu Item: *View // Lat/Long Calculator*

Use this function to calculate the latitude and longitude values for given X,Y values. Or, you can calculate X,Y from lat/long.

To use the calculator:

1. Type the position values into one pair of boxes.
2. Press the arrow button to display the same position in the other pair of boxes.

The function automatically uses the study lat/long for the origin of the coordinate system. You can input a different origin, if you wish; this will not change the study origin.



## 5.3 Thrust Calculator

Menu Item: *View // Thrust Calculator*

Use this function when creating profile points in the *Civil // Fixed-Point Profiles* window. Fixed-point profiles are defined by a list of points. Each point has five parameters:

- Horizontal distance from an origin of a ground track
- Altitude of the aircraft above field elevation (AFE) at the point
- True airspeed of the aircraft at the point
- Thrust setting (corrected net thrust per engine) at the point
- Operational mode (approach, depart).

Sometimes, power-setting parameter EPR or N1 is available instead of corrected net thrust per engine. The Thrust Calculator is used to convert from EPR or N1 to corrected net thrust per engine. The *Thrust Calculator* window can remain open while adding records in the *Fixed-Point Profiles* window.

To use the calculator:

1. Fill out the boxes
  - Aircraft – INM jet aircraft that have general thrust coefficients
  - Altitude AFE – altitude of the aircraft above the airport
  - Temperature – temperature at the aircraft
  - Speed TAS – true airspeed

- Power Setting – EPR or N1 value.

2. Press Calculate.

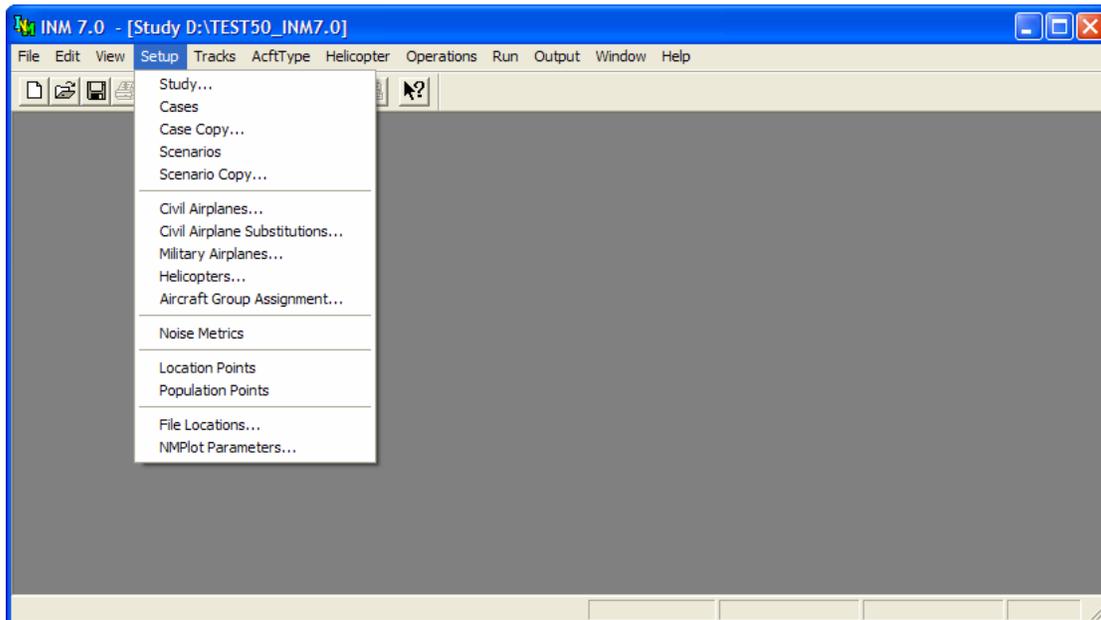
INM calculates and displays temperature if you check the ISA box. The calculated temperature is based on the airport temperature and the International Standard Atmosphere (ISA) lapse rate of 3.566°F per 1000 feet above the airport.

For those aircraft that have noise curves parameterized by percent of static thrust, the Thrust Calculator displays both pounds and percentage values. Use the percentage value in the *Fixed-Point Profiles* window.

To close the *Thrust Calculator* window:

- Use the upper-left button and Close function, or
- Press the upper-right X button.

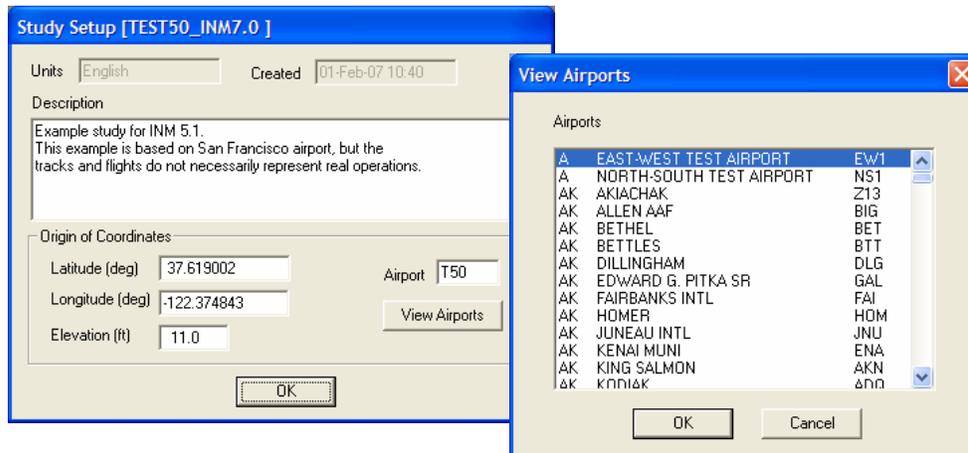
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## 6 SETUP MENU

Use the *Setup* menu to create a study. You can:

- Specify the study airport's latitude, longitude, and elevation
- Create or copy cases for analysis
- Create or copy scenarios for analysis
- Select INM standard airplanes, military airplanes, or helicopters to use
- Select INM standard airplane substitutions to use
- Assign group identifiers for all airplane types
- Define your own noise metrics
- Create location and population points for noise calculation
- Specify the terrain directory, ambient noise, and boundary file paths
- Set contouring parameters



## 6.1 Study Setup

Menu Item: *Setup // Study*

Use this function to change study setup parameters. INM automatically starts this function when you create a new study.

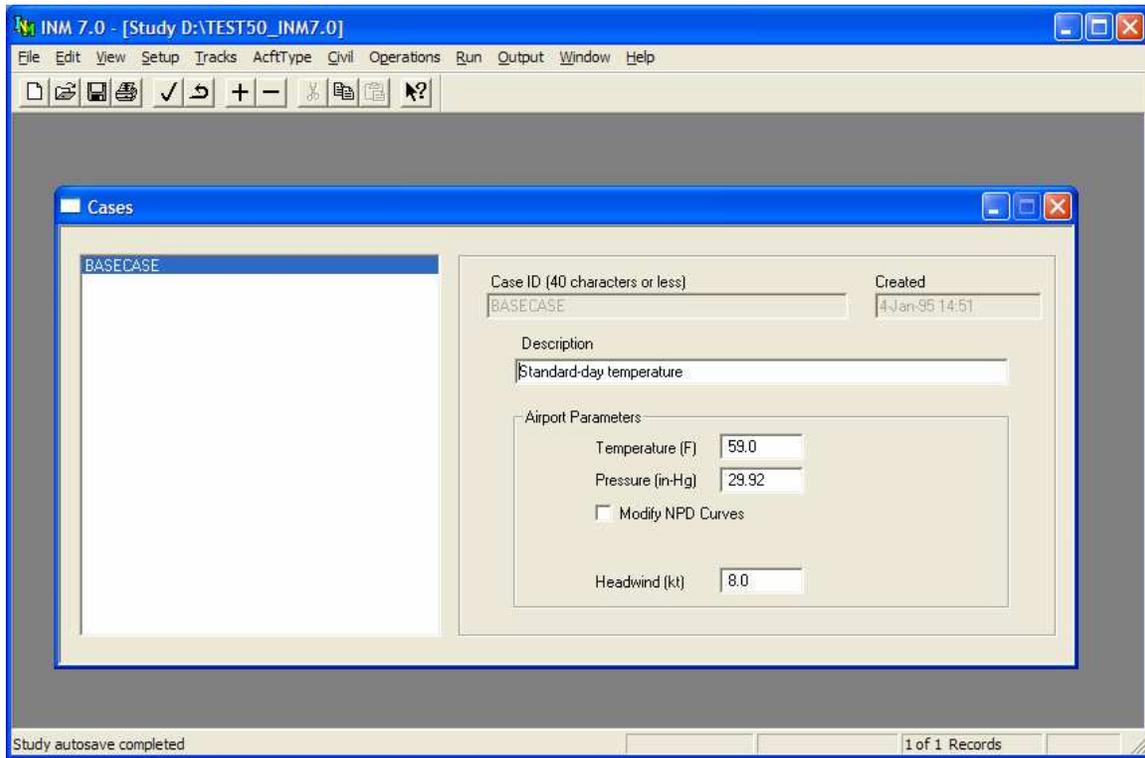
1. Fill out the study description.
  - The description can be up to 255 characters and span several lines.
  - The description can be edited at any time, not just when you set up the study for the first time.
  
2. Press the *View Airports* button to access a list of about 1136 airports in the U.S. that have 100 operations per day or more. Airports are arranged by state. When you press OK for a particular airport, INM performs three actions:
  - a. Geographical data for the airport are copied into the latitude, longitude, and elevation fields.
  - b. Runway and runway end records are automatically created for you. It is important to check the coordinates of the runway ends because occasionally there are errors.
  - c. Nav aids and fixes that are inside a box centered on the airport are copied into the *LOC\_PTS.DBF* file in the study directory. The north/south dimension of the box is 58 nmi and the east/west dimension is  $58 / \cos(\text{latitude})$  nmi.

The airport, navaid, and fix data are taken from the FAA's National Airspace Systems Resource Aeronautical Data (NASR) CD-ROM dated January 23, 2003.

3. Instead of using the *View Airports* function, you can input the latitude, longitude, elevation, and a four-character identifier of the airport.
  - Pick an airport lat/long that is near the center of the airport because INM graphical functions are centered on  $X = 0$ ,  $Y = 0$ .
4. Press OK to save study setup data.

If you change airport lat/long, certain graphical overlays (for example, terrain) will not be aligned to the new coordinates. You will have to reprocess source data that depend on the lat/long of the X,Y origin.

INM users outside of the U.S. can change INM data files to depict airports, nav aids, and fixes in their countries. Using a spreadsheet or database management program, delete the records in the *SYS\_APRT.DBF*, *SYS\_RWY.DBF*, and *LOC\_PTS.DBF* files, which are in the *INM70\USR\_DATA* subdirectory. Then, add your own country-specific records. See Appendix E for details about the database formats.



## 6.2 Case Setup

Menu Item: *Setup // Cases*

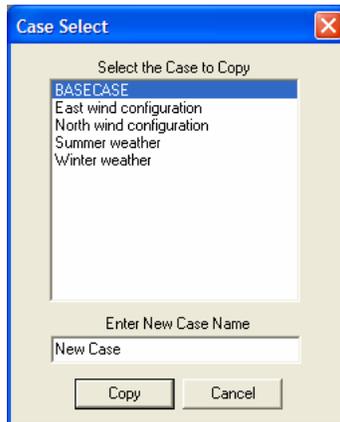
Use this function to create cases and their associated subdirectories. Cases are building blocks for scenarios. Each case defines flight operations and weather data.

To create a new case:

1. Use *Edit // Add Records* to make a blank record. INM automatically fills out the time and date that a case is created.
2. Input a case identifier, which is used as the subdirectory name. The subdirectory name can be up to 40 characters long and it can contain spaces.
3. Input a case description of up to 80 characters.
4. Input the average airport temperature. The default airport temperature is computed using the International Standard Atmosphere (ISA) equation for "standard-day" temperature versus altitude. ISA temperature is 59°F at mean sea level, and it gets progressively colder at higher airport elevations.

5. Input the average atmospheric pressure at the airport. The default airport pressure is 29.92 inches-Hg at all airport elevations, because atmospheric pressure is referred to sea level.
6. Check the *Modify NPD Curves* box if you want INM to adjust noise data based on user-defined temperature and humidity.
  - The default is no check mark in the box. INM uses the NPD noise levels displayed in the *Civil // NPD Data* window. These curves are calculated using the SAE-AIR-1845 atmospheric absorption coefficients (see Table B1 in SAE-AIR-1845).
  - If the box is checked, INM uses temperature and relative humidity parameters to calculate SAE-ARP-866A atmospheric absorption coefficients, which in turn are used to adjust INM standard NPD noise levels to user-defined airport conditions.
  - In most cases, user-defined atmospheric absorption results in slight reductions in noise levels compared to those shown in the *Civil // NPD Data* window. These reductions tend to increase with increasing observer-to-airplane distances and tend to be largest for low-humidity cases.
  - The NPD curves are modified at the time noise is computed, and they cannot be displayed.
7. Input the average relative humidity. If the *Modify NPD Curves* box is checked, the humidity edit box is displayed with a default relative humidity of 70 percent. Humidity is only used in calculating atmospheric absorption.
8. Input the average headwind on all runways. The default average headwind is 8 knots, which is the value used in the SAE-AIR-1845 equations. The average airport headwind can be modified for individual runways by specifying a percentage change from the airport average. INM uses temperature, pressure, and headwind when computing procedural profiles.
9. Use *Edit // Commit Record* to commit the case record. INM makes a new subdirectory under the study directory. You cannot change the name of the case subdirectory once it is created.

You can delete a case and the subdirectory of files by using the *Edit // Delete Record* function. If one or more scenario records reference the case that you are trying to delete, INM will not allow the deletion because the scenario(s) must have access to the case data in order to run. You must first delete the scenario record, or change the reference to the case by using the *Setup // Scenarios* function.



## 6.3 Case Copy

Menu Item: *Setup // Case Copy*

Use this function to create a new case by copying input files from an old case. You may want to do this if you plan to make only small changes to the new case (for example, only the airport temperature is different).

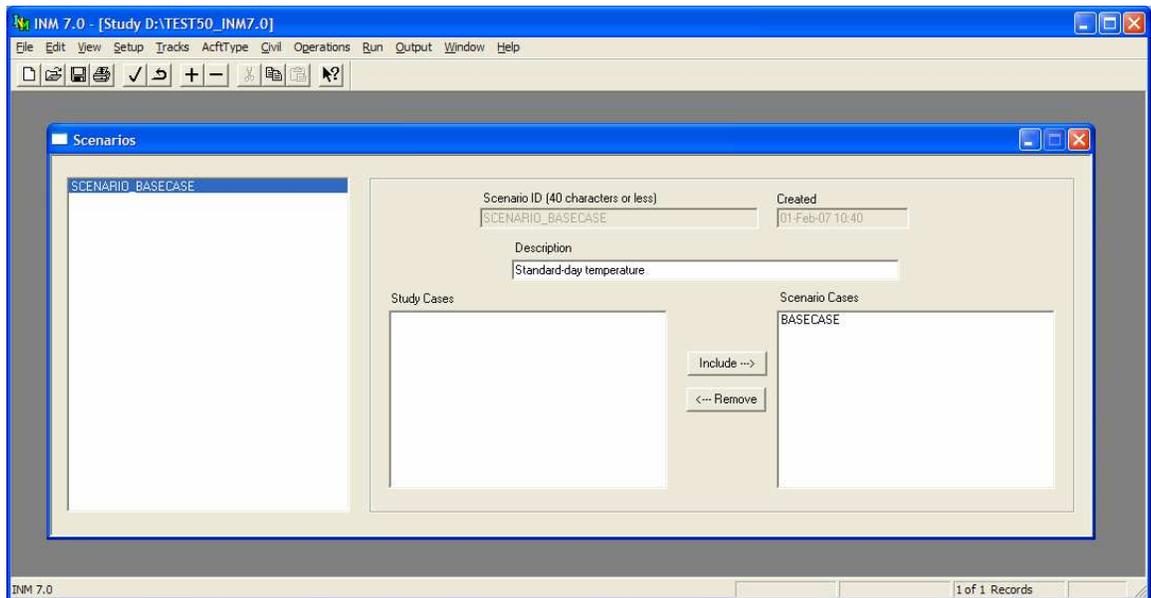
To use this function:

1. Select an existing case to copy.
2. Type in the new case name.
3. Press *OK*.

The DBF files that are copied to the new case subdirectory are:

*OPS\_APRT.DBF*  
*GRP\_PCT.DBF*  
*OPS\_FLT.DBF*  
*OPS\_RNUP.DBF*  
*MIL\_OPS\_FLT.DBF*  
*MIL\_OPS\_RNUP.DBF*  
*OPS\_HELO.DBF*  
*HELO\_GRP\_PCT.DBF*  
*MIL\_GRP\_PCT.DBF*

The case setup data associated with the old case are copied to the new case. These data can be changed in the *Setup // Cases* window.



## 6.4 Scenario Setup

Menu Item: *Setup // Scenarios*

Use this function to create scenarios. A scenario is composed of one or more cases. After study, scenario, and case input data are in place, you can “run” a scenario.

Each scenario has its own "run options" and these data are specified in the *Run // Run Options* window. Run options are really data fields in a scenario record; the records are accessed in two different windows:

1. *Setup // Scenarios* (this function)
2. *Run // Run Options*.

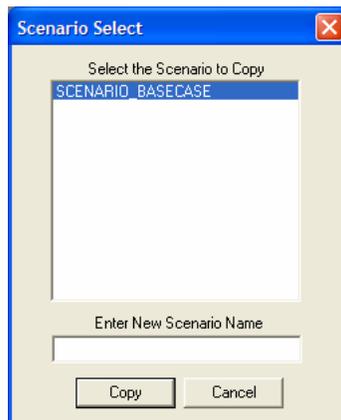
Only in the *Setup // Scenarios* window can you add or delete a scenario record. Add Record and Delete Records are disabled in the *Run // Run Options* window.

To create a new scenario:

1. Enter the scenario identifier (40 characters or less).
2. Enter a description of the scenario (80 characters or less).
3. Select one or more cases from the study to be included in the scenario.
4. Press the *Include* button. INM moves the selected cases to the right-hand list box. The cases in this list box will be part of your scenario.
5. You can do multiple case selections before committing the scenario record.

You can also remove cases from your scenario by reversing the process.

You can delete a scenario and the subdirectory of files by using the *Edit // Delete Record* function. If an output record references the scenario that you are trying to delete, INM will not allow the deletion because output post-processing functions access scenario data. You must first delete the output record, or change the reference to the scenario by using the *Output // Output Setup* function.



## 6.5 Scenario Copy

Menu item: *Setup // Scenario Copy*

Use this function to create a new scenario by copying files from an existing scenario. You may want to do this if you plan to make only small changes to the new scenario (for example, only the *Run Options* or *Annualization* parameters are different). All of the files in the original scenario are copied, so it is not necessary to re-run the scenario in order to view the output and change the *Annualization* parameters. However, you will need to create a new *Output // Output Setup* record in order to view the output.

To use this function:

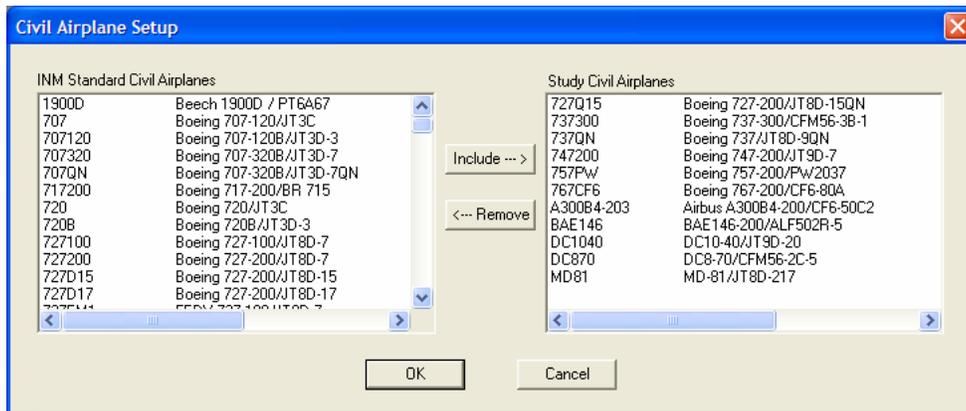
1. Select an existing scenario to copy.
2. Type in the new scenario name.
3. Press *OK*.

The *DBF* files that are copied to the new scenario subdirectory are:

*SCEN\_PAR.DBF*  
*GRID.DBF*

Additionally, all of the case subdirectories and associated output files, along with all other files in the scenario directory, are copied.

The scenario setup, grid setup, and run option data associated with the old scenario are copied to the new scenario. These data can be changed in the *Setup // Scenarios*, *Run // Grid Setup*, and *Run // Run Options* windows.



## 6.6 Civil Airplane Setup

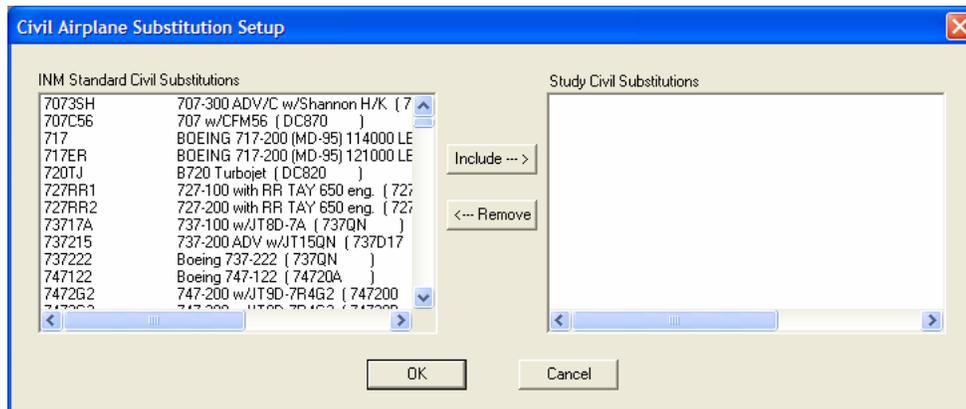
Menu Item: Setup // Civil Airplanes

Use this function to select INM standard civil airplanes for the study.

1. Select one or more airplanes in the left-hand list box.
2. Press the *Include* button. INM moves the selected airplanes to the right-hand list box.
3. You can do multiple selections before pressing *OK*.

You can also remove Airplanes from your study by reversing the process and using the *Remove* button. However, if these airplanes are being used in flight operations, you will have to delete the flight operation records first.

If you want to define your own Civil Airplanes, use the *Civil // Airplane Data* function, which is described in Section 9.



## 6.7 Civil Airplane Substitution Setup

Menu Item: *Setup // Civil Airplane Substitutions*

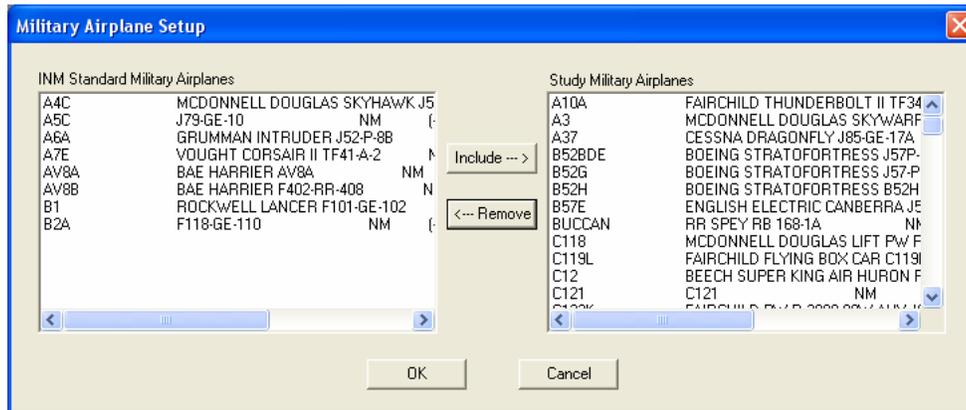
Use this function to add airplanes to a study when you cannot find an INM standard airplane that you need. Airplanes in the left-hand list box are FAA-approved substitutions that are associated with INM standard airplanes.

1. Select one or more substitution airplanes. The substitution list displays the associated INM civil airplane identifier and description. The corresponding substitution airplane identifiers are in parentheses, e.g., ( DC820 ).
2. Move the selected airplanes into the study with the *Include* button.
3. Press *OK*.

Use substitution airplanes when creating flight operations as though they were regular INM airplanes. Before calculating noise, INM automatically substitutes standard airplanes for substitution airplanes.

Similar to *Civil Airplane Setup*, you can also remove substitution airplanes from your study by reversing the process and using the *Remove* button. However, if these substitution airplanes are being used in flight operations, you will have to delete the flight operation records first.

If you want to define your own substitutions, use the *Civil // Substitutions* function, which is described in Section 9.



## 6.8 Military Airplane Setup

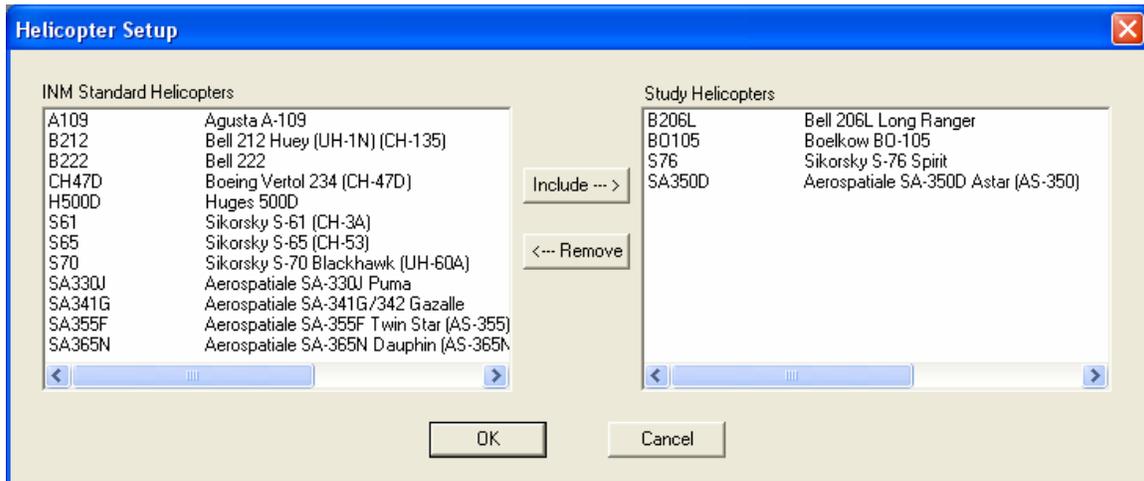
Menu Item: Setup // Military Airplanes

Use this function to select INM standard military airplanes for the study.

1. Select one or more airplanes in the left-hand list box.
2. Press the *Include* button. INM moves the selected airplanes to the right-hand list box.
3. You can do multiple selections before pressing *OK*.

You can also remove Military Airplanes from your study by reversing the process and using the *Remove* button. However, if these airplanes are being used in flight operations, you will have to delete the flight operation records first.

If you want to define your own Military Airplanes, use the *Military // Airplane Data* function, which is described in Section 10.



## 6.9 Helicopter Setup

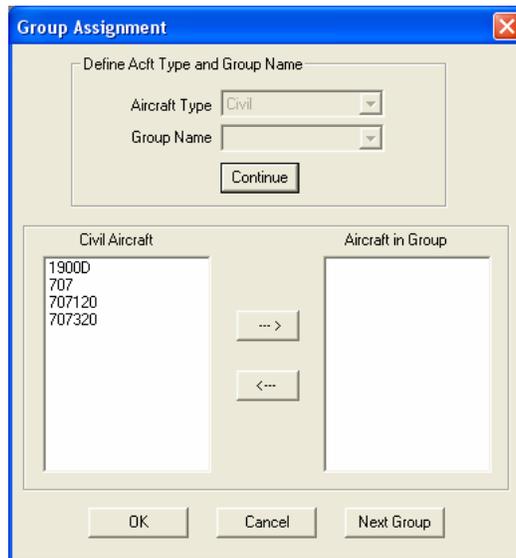
Menu Item: *Setup // Helicopters*

Use this function to select INM standard helicopters for the study.

1. Select one or more helicopters in the left-hand list box.
2. Press the Include button. INM moves the selected helicopters to the right-hand list box.
3. You can do multiple selections before pressing OK.

You can also remove Helicopters from your study by reversing the process and using the Remove button. However, if these helicopters are being used in flight operations, you will have to delete the flight operation records first.

If you want to define your own Helicopters, use the *Helicopter // Helicopter Data* function, which is described in Section 11.



## 6.10 Aircraft Group Assignment Setup

Menu Item: *Setup // Aircraft Group Assignment*

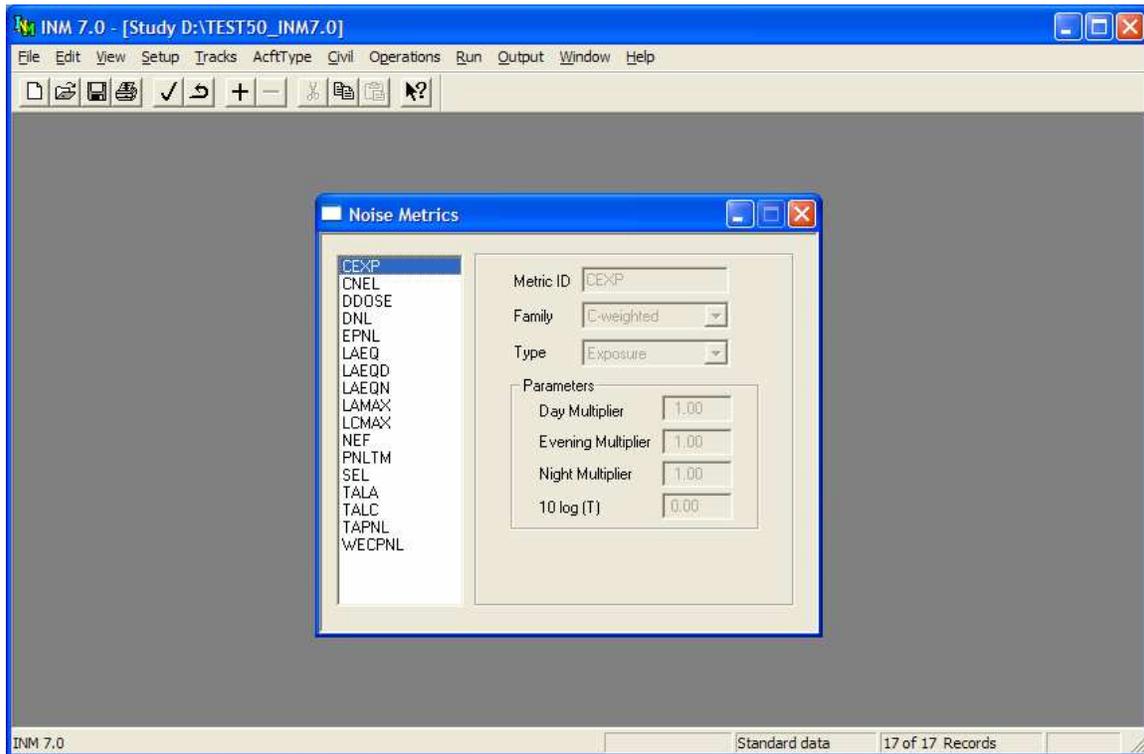
Use this function to assign group identifiers to groups of aircraft. Aircraft group identifiers are used when creating flight operations with the *Operations // Civil Group Percents*, *Operations // Military Group Percents* or *Operations // Helicopter Group Percents* menu items. The following criteria should be kept in mind, when assigning aircraft to a group:

1. An aircraft can only belong to one group.
2. An aircraft group can include aircraft from only one aircraft type (Civil, Military, or Helicopter).
3. If using any of the *Group Percent* menu items, all aircraft in the group must have consistent profile identifiers.

To enter a new aircraft group:

1. Select the Aircraft Type.
2. Enter a Group Name or select an existing one.
3. Press Continue.

Once you have selected Continue, the Aircraft list on the left becomes active and will contain all of the aircraft from the selected Aircraft Type that exist within the study. Select the aircraft to add to the group and hit the “→” arrow button. The *Aircraft in Group* list box contains all the aircraft that belong to the selected group. When you are finished adding aircraft to the selected group, you may add or select a new group by pressing *Next Group*, or if you are finished adding aircraft group records, press *OK* to commit your data.



## 6.11 Noise Metric Setup

Menu Item: *Setup // Metrics*

Use this function to view INM standard noise metrics or to create your own noise metric.

Standard noise metrics cannot be changed. However, you can add your own noise metric if you need one that is not on the list:

1. Use *Edit // Add Record*.
2. Type a metric identifier that is not already on the list.
3. Select a noise family.
4. Select a noise type.
5. Input day, evening, and night multipliers.
6. Input an averaging time as a decibel value (see discussion below).
7. Use *Edit // Commit Record*.

For example, the "Australian NEF" noise metric is defined with the following parameters:

<b>Australian NEF</b>	
Metric Id	ANEF
Family	Perceived
Type	Exposure
Day Multiplier	1.0
Evening Multiplier	4.0
Night Multiplier	4.0
10 log(T)	88.0

INM provides 16 pre-defined standard metrics in three noise families, plus two additional metrics used for calculating noise in National Parks:

1. A-weighted noise metrics:
  - DNL Day-night average sound level
  - CNEL Community noise equivalent level (California)
  - LAEQ Equivalent sound level for 24 hours
  - LAEQD Equivalent sound level for a 15-hour day
  - LAEQN Equivalent sound level for a 9-hour night
  - SEL A-weighted sound exposure level (multi-event)
  - LAMAX Maximum A-weighted sound level
  - TALA Time-above an A-weighted sound level threshold
  
2. C-weighted noise metrics:
  - CEXP C-weighted sound exposure level (multi-event)
  - LCMAX Maximum C-weighted sound level
  - TALC Time-above a C-weighted sound level threshold
  
3. Perceived tone-corrected noise metrics:
  - NEF Noise exposure forecast
  - WECPNL Weighted equivalent continuous perceived noise level
  - EPNL Effective perceived noise level (multi-event)
  - PNLTM Maximum PNLT sound level
  - TAPNL Time-above a PNLT threshold
  
4. National Parks metrics:
  - TAUD Time Audible
  - DDOSE Change in Exposure

The TAUD metric is not available for selection in the *Setup // Metrics* window unless a special ambient file has first been obtained from the FAA. The TAUD and DDOSE metrics are discussed in more detail in Appendix N.

There are three kinds of noise families:

1. A-weighted – metrics for standard noise analysis, where aircraft noise spectra are modified by A-weighting, which depresses noise levels in low and high frequency bands, approximating the frequency response of the human ear.
2. C-weighted – metrics for low-frequency vibration noise analysis, where aircraft noise spectra are modified by C-weighting, which depresses noise levels in low and high frequency bands, but to a lesser degree than A-weighting.
3. Perceived tone-corrected – metrics for noise analysis based on aircraft noise certification tests, where aircraft noise spectra are modified by the procedure defined in FAR Part 36, which depresses noise levels in low and high frequency bands, and elevates metric levels if there are tones in the spectra.

For A-weighted or C-weighted noise families, single-event SEL and LAMAX noise curves are used to calculate noise.

1. INM replaces A-weighting that is implicit in SEL and LAMAX noise levels with C-weighting by using an average noise spectrum that is associated with the aircraft and operation.
2. INM creates C-weighted NPD curves at the time noise is computed, and they therefore cannot be displayed

For the perceived tone-corrected noise family, single-event EPNL and PNLTM noise curves are used to calculate noise in the same manner.

There are three types of noise metrics:

1. Exposure – true noise exposure (mean-squared sound pressure multiplied by a time duration). Exposure is also used for "equivalent" or "average" noise levels that are derived from noise exposure.
2. MaxLevel – maximum noise level.
3. TimeAbove – the total number of minutes that noise levels are above a given threshold. The threshold value is not part of the definition of the metric. The threshold is defined in the *Run // Grid Setup* window. Noise events are assumed to be sequential and not overlap in time.

For Exposure metrics, the day, evening, and night multipliers and the time parameter are used as follows:

$$L_E = 10 \log( W_1 E_1 + W_2 E_2 + W_3 E_3 ) - 10 \log(T)$$

where,

$L_E$	Noise exposure level or average noise level (dB).
$W_1 W_2 W_3$	Weighting factors (multipliers) for day, evening, and night time periods. These are the number of equivalent airplane operations relative to one airplane operation during the day time. For example, in the DNL metric, one night-time operation is worth 10 day-time operations, so the weights are $W_1 = 1$ , $W_2 = 1$ , and $W_3 = 10$ (for DNL, the evening period is considered daytime).
$E_1 E_2 E_3$	Noise exposure ratios for day, evening, and night time periods. These ratios are computed by INM. The A-weighted or C-weighted sound exposure ratio is the time-integrated mean-square pressure, in units of $(\mu\text{Pa})^2\text{s}$ , divided by a reference sound exposure of $(20\mu\text{Pa})^2(1\text{s})$ . Perceived tone-corrected exposure ratio has a reference noise exposure of $(20\mu\text{Pa})^2(10\text{s})$
$10\log(T)$	Ten times the base-10 logarithm of the ratio of the averaging time over a reference time. For example, for a 24-hour averaging time in seconds and a reference time of one second, $10\log(24 \times 60 \times 60\text{s} / 1\text{s}) = 49.37\text{dB}$ For average-noise metrics derived from SEL, you must use a reference time of 1 second. For average-noise metrics derived from EPNL, you must use a reference time of 10 seconds. For true exposure metrics, set $10\log(T) = 0\text{ dB}$ .

For MaxLevel metrics, the day, evening, and night multipliers are used as follows:

$$L_{MAX} = \text{Max}( W_1 L_{MAX1} , W_2 L_{MAX2} , W_3 L_{MAX3} )$$

where,

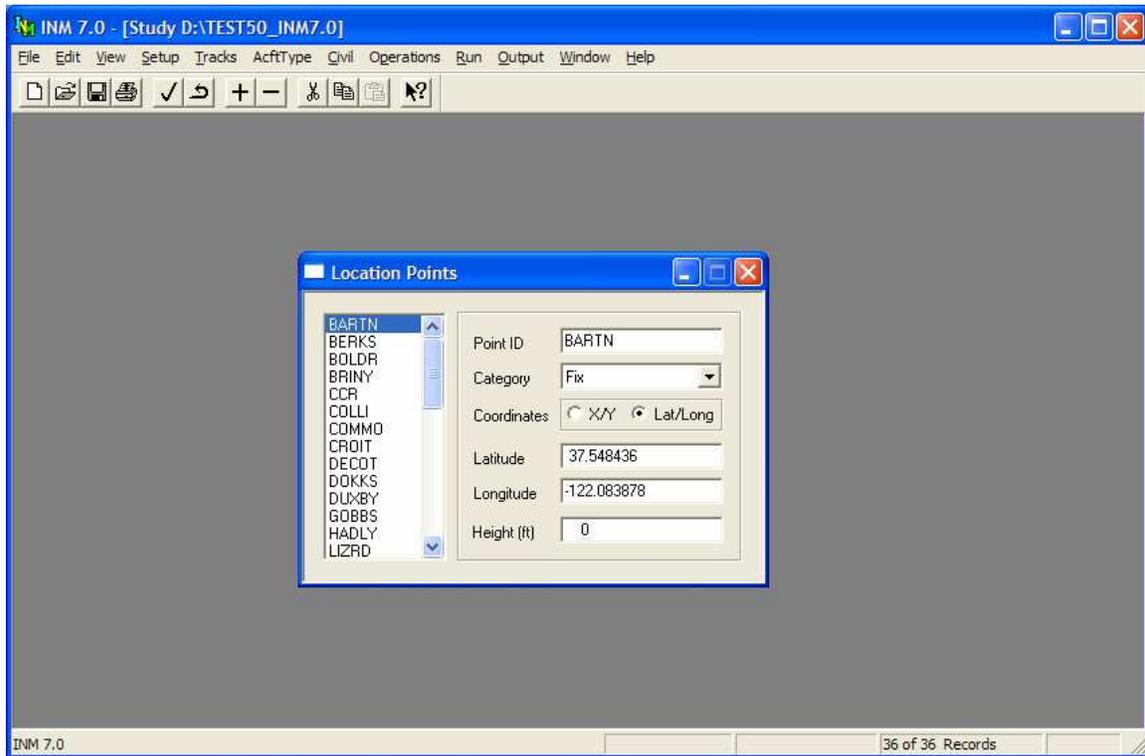
$L_{MAX}$	Maximum noise level (dB).
$\text{Max}()$	Function that returns the maximum of the three numbers.
$W_1 W_2 W_3$	Parameter "switches" that include a time period ( $W = 1$ ) or exclude a time period ( $W = 0$ ). The weights must be either 0 or 1. Use (1, 1, 1) to calculate the maximum level during all three time periods
$L_{MAX1,2,3}$	Maximum noise levels for day, evening, and night time periods. INM calculates these values.

For TimeAbove metrics, the day, evening, and night multipliers are used as follows:

$$T_A = W_1 TA_1 + W_2 TA_2 + W_3 TA_3$$

where,

TA	Time-above (minutes) for the time period defined by the weights.
$W_1$ $W_2$ $W_3$	Parameter "switches" that include a time period ( $W = 1$ ) or exclude a time period ( $W = 0$ ). The weights must be either 0 or 1. Use (1, 1, 1) to calculate the time-above metric during all three time periods.
$TA_{1,2,3}$	Time-above (minutes) for day, evening, and night time periods. INM calculates these values.



## 6.12 Location Point Setup

Menu Item: *Setup // Location Points*

Use this function to add and delete location points. Location points are special user-defined points around an airport at which noise levels may be evaluated. You may want to add location points so that you can display them in *Input Graphics* and *Output Graphics* windows, or because you may want to calculate noise at specific points.

If you used the *Setup // Study View Airports* button when you created the study, nav aids and fixes probably already exist in the *Location Points* window. If you want to remove the clutter of unwanted fixes, delete them with the *Edit // Delete Records* function.

To add a location point:

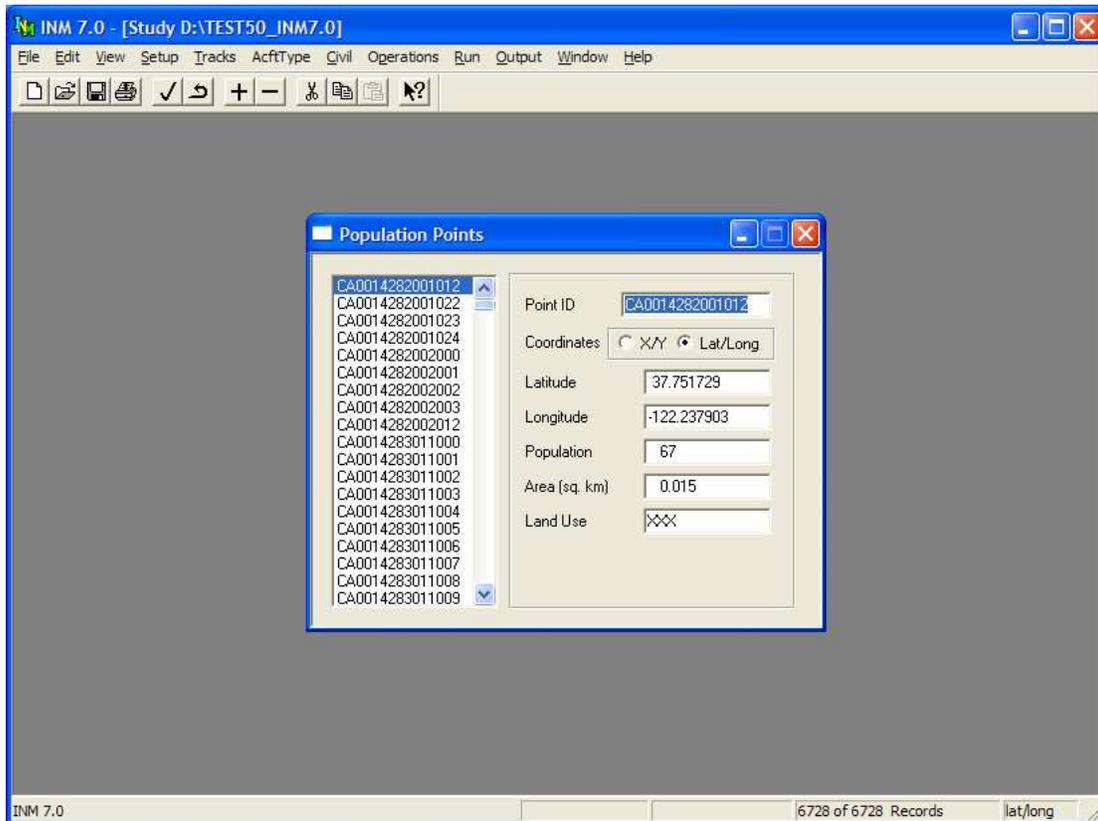
1. Use *Edit // Add Record* to make a blank record.
2. Fill out a six-character point name.
3. Input latitude and longitude of the point. Lat/longs are in decimal degrees; north and east are positive numbers and south and west are negative.

4. Input the height of the point above the ground. The height parameter is added to the terrain elevation value. If you want the noise calculated near the ground, use the default zero height value.
5. Use *Edit // Commit Record* to save the data.

You can create your own table of points by using a spreadsheet or database management program. Load the *DBF* template file *INM70\SYS\_DBF\LOC\_PTS.DBF* and fill out the data fields. The single-letter location codes are:

A	User-defined text (no associated symbol)
B	Building
C	Church, religious building
H	Hospital, medical facility
S	School, college, university
U	VOR
V	VORTAC
W	VOR/DME
T	TACAN
N	NDB
M	NDB/DME
F	Fix (air traffic control)
X	Other

The six types, U V W T N M, are collectively called "navaids", meaning electronic aids to airborne navigation. Use only the above capital letters because INM will not read a record that has an unknown enumerated type.



## 6.13 Population Point Setup

Menu Item: *Setup // Population Points*

Use this function to add, delete, or view population points. When the *Run // Run Options Do Population Point* box is checked, INM computes noise levels at population points. These noise levels can be used to find the number of people inside noise contours. The results are displayed in the *Output // Contour Area and Pop* table window.

- Population points can be created by using the *File // Import Data into Study // Census 2000 PL94-171 Files* function.
- One or more population points can be deleted by highlighting the population point record(s) and going to *Edit // Delete Records*.
- Population points may be viewed in *Output // Output Graphics* windows. Points are displayed as colored dots.

To create a population point:

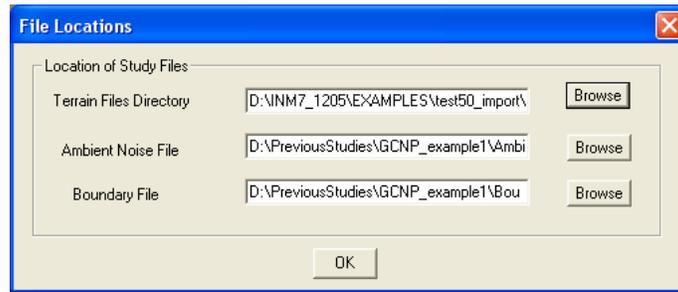
1. Use *Edit // Add Record* to create a blank record.

2. Fill out a 15-character point name. The name provided by the *Census PL94-171* processor is a concatenation of state code, county code, block numbering area, and block number.
3. Input the latitude and longitude of the point. Lat/longs are in decimal degrees; north and east are positive numbers and south and west are negative.
4. Input the number of people residing near the point in the Population field.
5. The last two fields – area in square kilometers and area code – are not used by INM and their default values do not have to be changed. You can use these fields for your own purpose.
6. Use *Edit // Commit Record* to save the data.

When INM calculates the number of people inside noise contours, it reads two files:

1. *POP\_PTS.DBF*, which is displayed in this *Setup // Population Points* window
2. *POP\_NOIS.DBF*, which is computed during a scenario run and displayed in the *Output // Noise at Pop Points* window.

An error message will be displayed while computing population if the numbers of records in the two files are not the same or if the records are not in the same order (order is based on point identifiers). If you get this error message, run the scenario again.



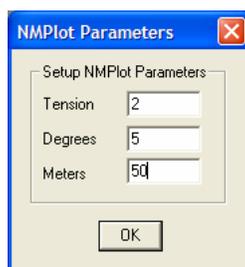
## 6.14 File Locations

Menu Item: *Setup // File Locations*

Use this function to tell INM where to find certain files. Most INM-related files are stored in the INM study directory. However, the following files can be stored anywhere:

1. Terrain files, which are used by INM when the *Run // Run Options // Do Terrain* box is checked.
2. An Ambient Noise file, which is used by INM when:
  - a. A scenario is setup to run a time-above metric in the *Run // Run Options* window.
  - b. The time-above run uses a grid record that has the Relative Threshold button selected in the *Run // Grid Setup* window.
  - c. Calculating Audibility.
3. A Boundary File, which is used by INM when running *Ambient Screening* and also can be used to define contour grid areas.

File location names are saved in the *STUDY .CSV* file; therefore these locations need to be defined for each INM study that intends to use these types of files.



## 6.15 NMPlot Parameters

Menu Item: Setup // NMPlot Parameters

Use this function to change parameters that are used by the NMPlot module when computing noise contours. The default values shown above work well for most contouring jobs. However, if the contouring area is small, you may want more points per contour so that contours look smoother.

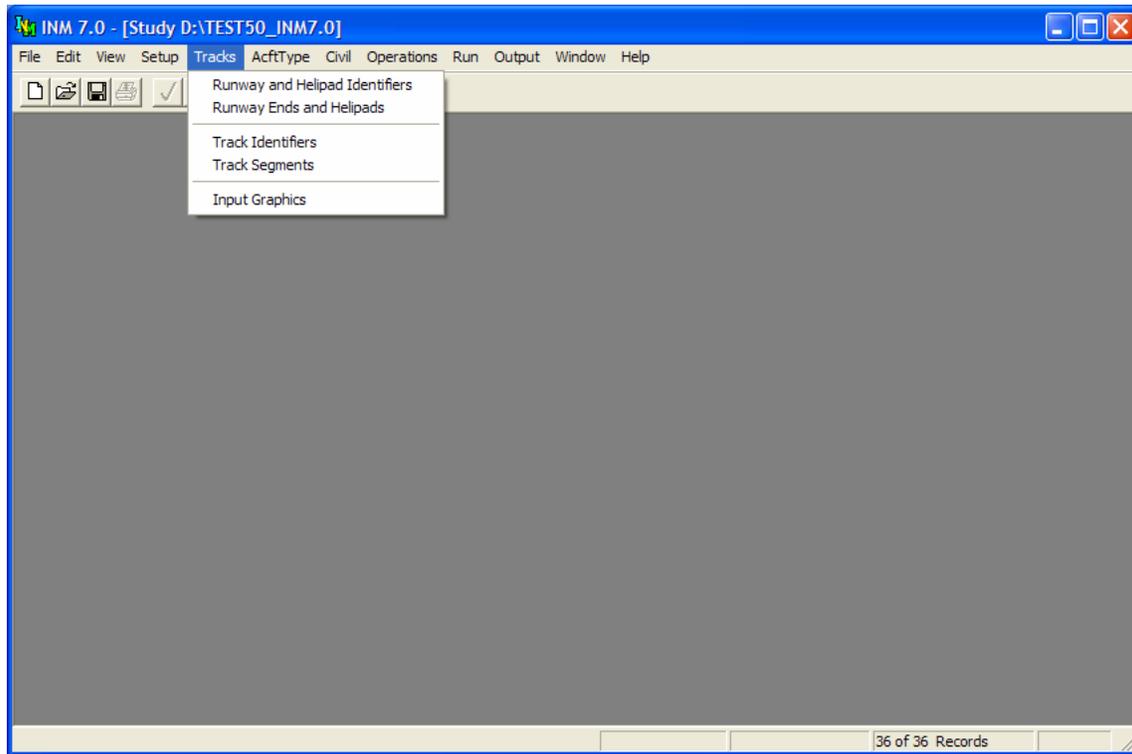
The NMPlot contouring parameters are:

1. Tension – a measure of how aggressively NMPlot smooths the contours. Smaller values result in greater smoothing, while larger values (above 30) result in no smoothing.
2. Degrees – the maximum allowed turn angle from one contour line segment to the next. A larger value reduces the number of points per contour and makes the contours change direction more suddenly.
3. Meters – the minimum length (in meters on the ground) for a contour line segment. A larger value reduces the number of points per contour. If the contours cover a large area, do not make this parameter a small number because a very large number of points will be generated and the *CONR\_PTS.DBF* file will be very large.

These parameters are saved in the *STUDY.CSV* file, so each INM study contains its own set of values for these parameters.

The NMPlot Windows application program is included in the INM directory.

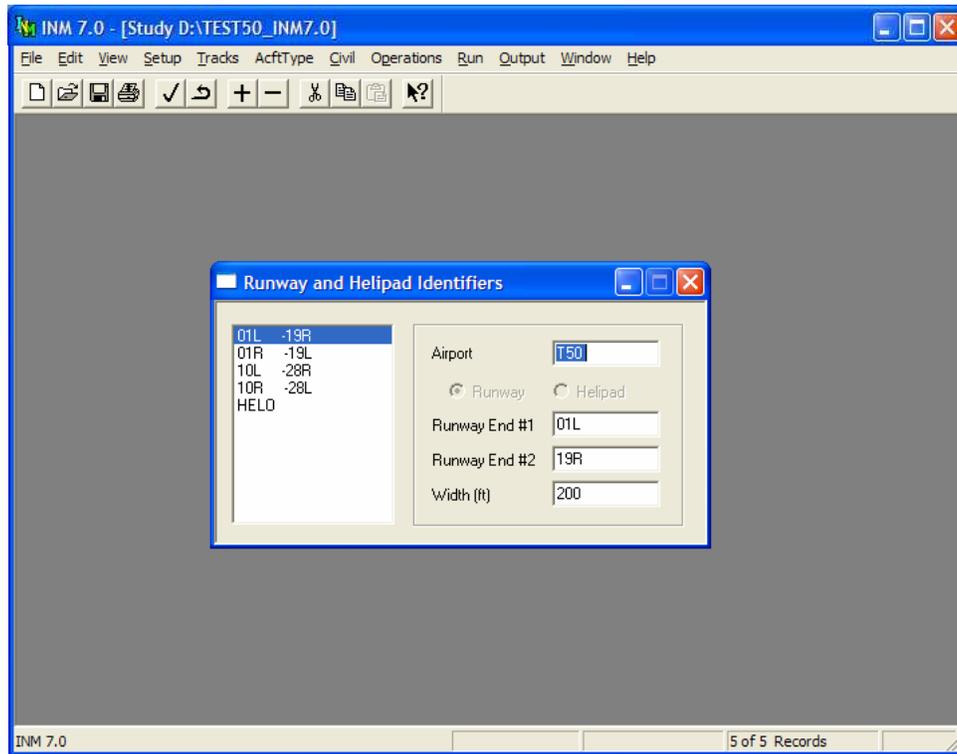
*This page intentionally left blank.*



## 7 TRACKS MENU

Use the *Tracks* menu to create runways, helipads, and ground tracks for your study. Points-type tracks must be added by point-and-click graphical methods, and vector-type tracks must be added by typing data in dialog windows.

Create runways and/or helipads before using the *Tracks // Input Graphics* function. This is most easily done by using the *Setup // Study // View Airports* function at the time you create your study. Or, you can manually create runway data in the *Runway and Helipad Identifiers* and *Runway Ends and Helipads* windows.



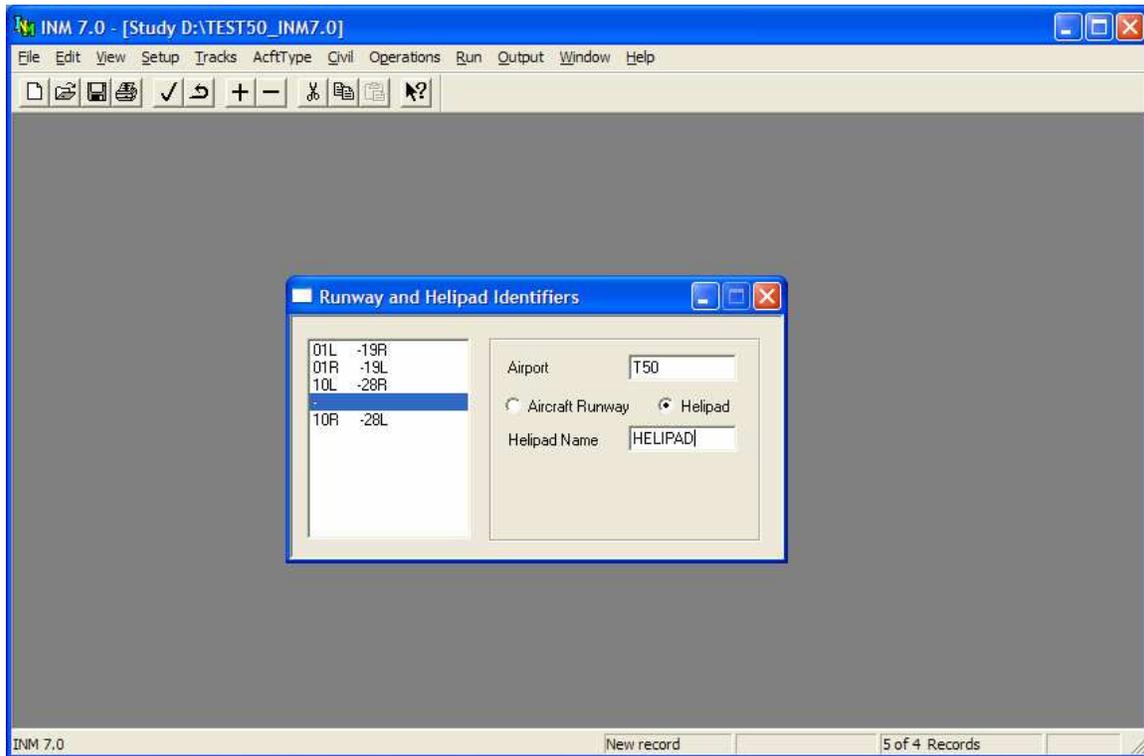
## 7.1 Runway and Helipad Identifiers

Menu Item: *Tracks // Runway and Helipad Identifiers*

Use this function to create a pair of runway end identifiers or a helipad. If you use the *Setup // Study View Airports* function, runway identifiers and runway end records are automatically created for you.

To create a runway:

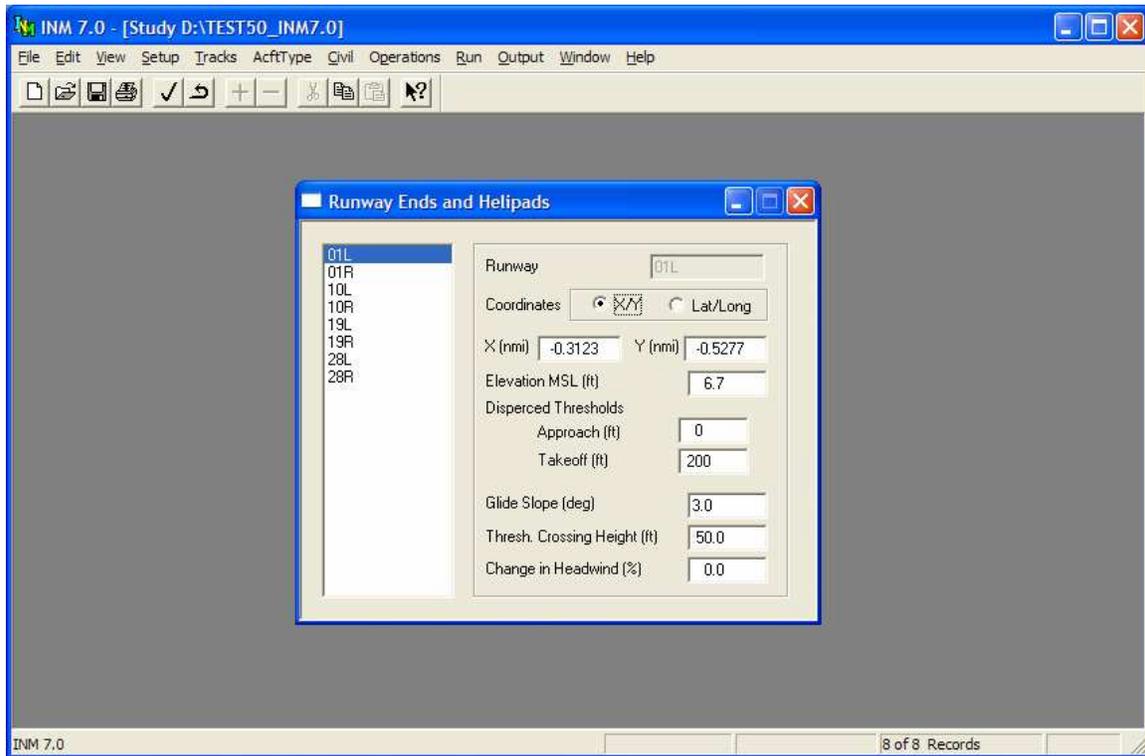
1. Use *Edit // Add Record* to create a blank runway record.
2. Select the *Runway* radio button.
3. Input an airport identifier to indicate which airport owns the runway.
4. Input the runway end identifiers. Each runway end must be uniquely named. INM does not use the airport identifier in distinguishing runway ends. If you have two identical runway end identifiers, change one of them.
5. Input the width of the runway.
6. Runway width is used when drawing the runway in the *Input Graphics* and *Output Graphics* windows. It does not affect any other calculations.
7. Runway length is calculated using the X,Y values assigned to the runway ends. Length is shown in the *Output // Case Run Input Report*.



To create a helipad:

1. Use *Edit // Add Record* to create a blank helipad record.
2. Select the *Helipad* radio button.
3. Input an airport identifier to indicate which airport owns the helipad.
4. Enter the helipad identifier. Each helipad must be uniquely named.  
INM does not use the airport identifier in distinguishing helipads. If you have two identical helipads identifiers, change one of them.

There are no size attributes (width, length, etc.) associated with a helipad record.



## 7.2 Runway Ends and Helipads

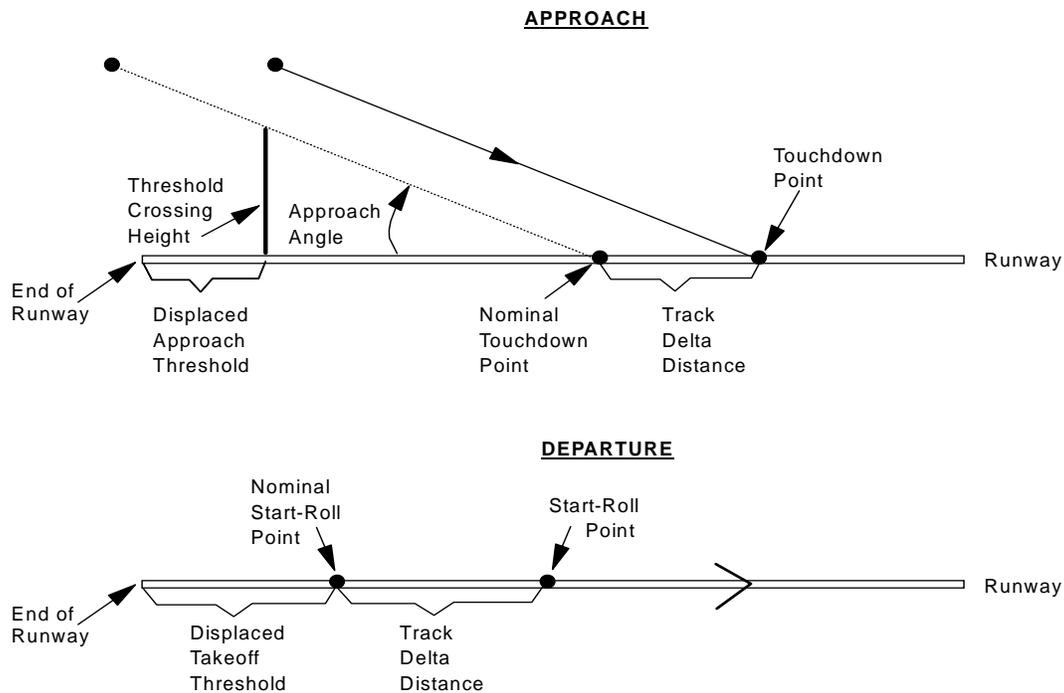
Menu Item: *Tracks // Runway Ends and Helipads*

Use this function to input data relevant to one end of a runway or a helipad. Runway end and helipad identifiers cannot be created or changed in this window; instead, use the *Tracks // Runway and Helipad Identifiers* window.

To input runway data, select a runway end from the list on the left, and then fill out the data-input form on the right:

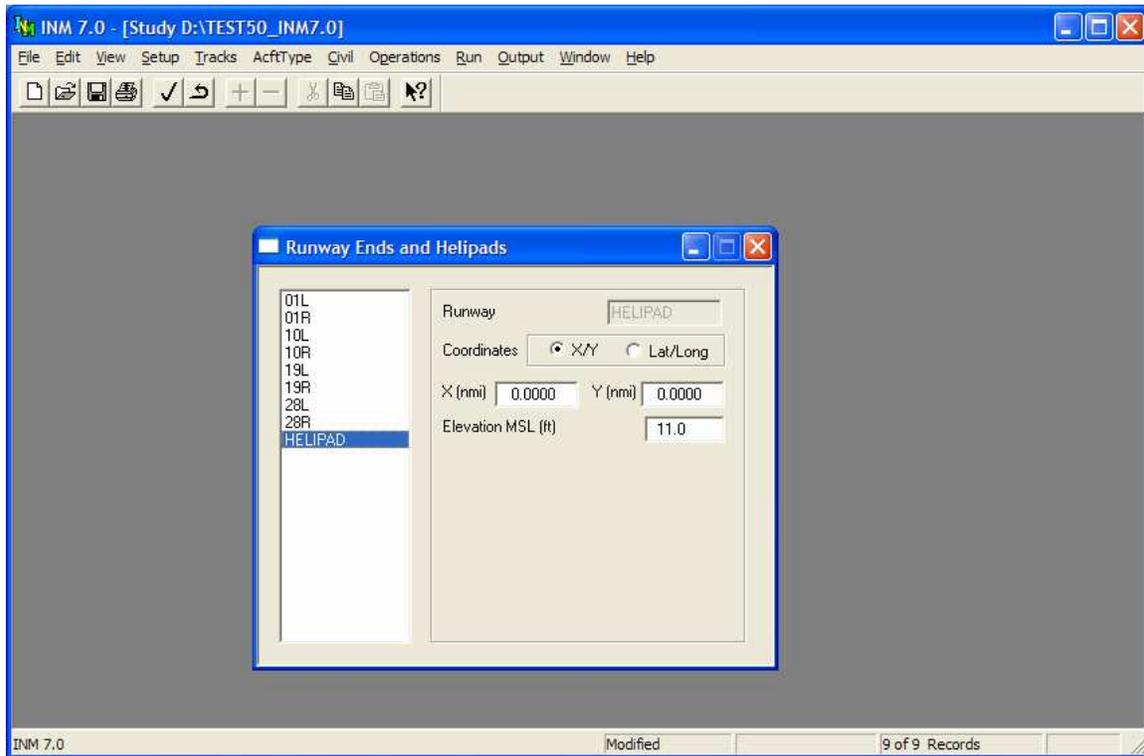
1. Choose the type of coordinates to be used by selecting either X,Y or Lat, Long.
2. Input the X,Y (or Lat, Long) position of the runway end. It is important to correctly input runway end points because the geometry of the study depends on them.
  - Even when INM supplies the NASR geographical positions of the runway end points, you should check them. The lat/long values are in the *USR\_DATA\SYS\_RWY.DBF* file.
3. Input the elevation of the runway end as a height above mean sea level. If this value is different for the two ends of the runway, INM computes a runway gradient (an uphill or downhill slope) and uses it to adjust takeoff-roll distance for procedural profiles. The INM also uses the

runway end elevation as the reference altitude when calculating flight paths to or from that runway end.



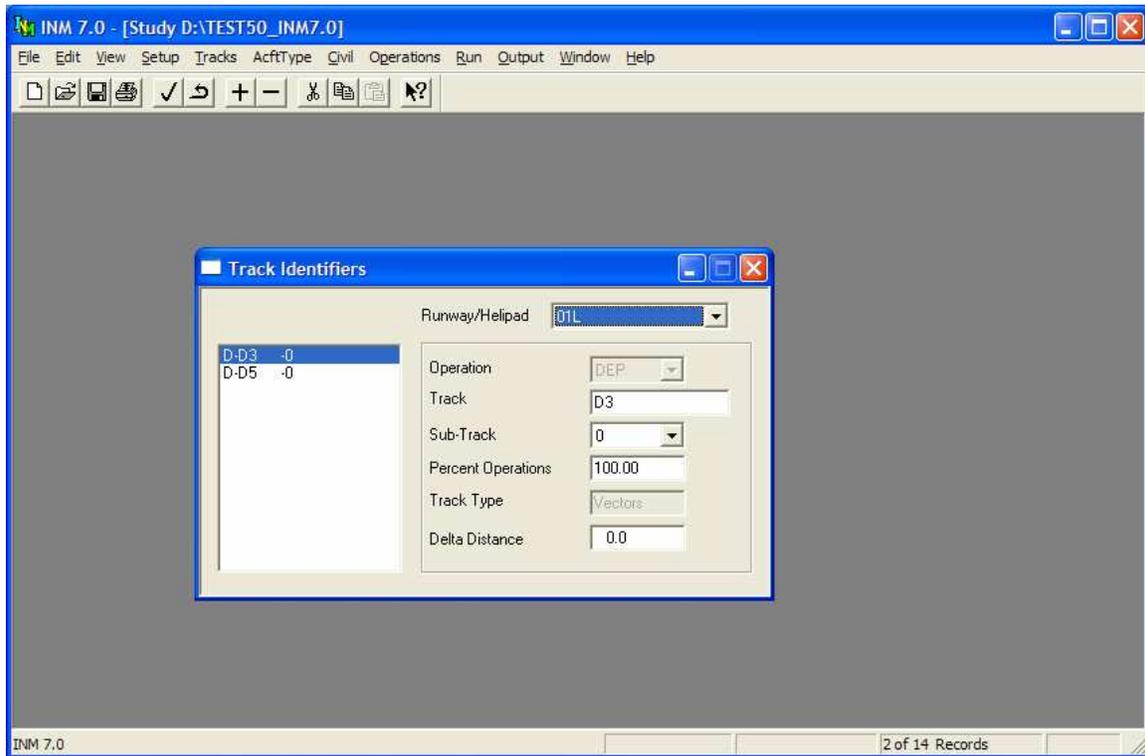
4. Input the distance values for displaced approach and displaced takeoff thresholds.
  - A displaced approach threshold is measured from the physical end of the runway to the threshold-crossing point (the point at which the "threshold crossing height" is measured), as illustrated in the previous figure. The threshold crossing point is usually at the end of the runway, so the displaced approach threshold is usually set to zero.
  - A displaced takeoff threshold is also measured from the physical end of the runway. It should be set to the average position of noise-producing engines at the start of takeoff roll, which is usually 100-200 feet from the physical end of the runway.
5. Input the glide slope, which is an approach angle for aircraft flying along an instrument landing system (ILS) electronic beam.
  - INM does not use this parameter in calculations; however, you can refer to it when designing approach procedure steps for aircraft that make ILS approaches.
  - Instead, INM uses a calculated approach angle that is determined by the altitude and distance of the approach descent step just prior to touchdown.
6. Input the threshold crossing height (TCH), which is the height above the runway at the runway approach threshold.

- TCH and glide slope are ILS parameters. TCH is nominally 50 feet and glide slope is nominally 3 degrees, but a specific ILS installation may use different values.
  - INM uses the TCH parameter to calculate a nominal touchdown point, as illustrated in the diagram. An approach track can be set up to deviate from the nominal touchdown point by using “track delta distance” (see Section 7.4).
7. Input the percent change in headwind, which is used to modify the airport average headwind value to allow for a variation in average headwind for each runway end.
- INM calculates the runway headwind by:  
$$(\text{Runway headwind}) = (\text{Airport headwind}) * (1 + \text{Percent}/100)$$
  - The default value of 0.0% means the runway uses the airport average headwind.
  - The airport average headwind is a case parameter. By changing one value on a case record, the headwinds for all runway ends are changed according to their percent change parameters.
  - The percentage change value is limited to -500% to 500%, and usually you should use values between -50% and 50%.
  - A value of -100% means that there is no headwind, and a value of -200% means that there is a average tail wind equal to the airport-average headwind. Normally, no runway would operate with an average tail wind (averaged over flight operations, not time), but INM can compute a tail wind, if you wish.
  - The SAE-AIR-1845 equations that are used to calculate procedural profiles are based on a nominal headwind of 8 knots. If the runway end headwind is different than 8 knots, INM adjusts the calculated profiles accordingly. For example, climb angles are larger for a headwind greater than 8 knots.



To input helipad data, select a helipad from the list on the left, and then fill out the data-input form on the right:

1. Choose the type of coordinates to be used by selecting either X,Y or Lat, Long.
2. Input the X,Y (or Lat, Long) position of the helipad's center.
3. Input the elevation of the helipad as a height above mean sea level. The INM uses the helipad elevation as the reference altitude when calculating flight paths to or from that helipad. Therefore you can specify that the helipad be located on the ground using an elevation similar to the study elevation, or you can account for the helipad being at a different elevation (for example, on top of a hospital building) by entering an appropriate elevation value that differs from the study elevation.



## 7.3 Track Identifiers

Menu Item: *Tracks // Track Identifiers*

Use this function to name ground tracks before defining their segments. INM uses ground tracks and vertical flight profiles to compute three-dimensional flight paths.

There are two kinds of tracks in INM:

- V-track – a vectors-type track is represented by an ordered list of track segments. Track segments are flight vectoring instructions, such as "fly straight", "turn left", etc.
- P-track – a points-type track is represented by an ordered list of X,Y points. These points are also encoded as track segments.

Both V-track and P-track names are displayed in this window, however:

- V-tracks are created and modified in this window.
- P-tracks are created and modified in the *Tracks // Input Graphics* window.

To create a new V-track:

1. Select a runway end, helipad, or OVF (overflight) from the *Runway/Helpad* dropdown list.
2. Use *Edit // Add Record* to create a blank record.

3. Select the type of operation that the track is used for. The available operation types depend on the selection made in the *Runway/Helipad* dropdown list. The single-letter codes listed below are used in *DBF* files, and the three-letter identifiers are used in dialog boxes and windows.

If a runway is selected, the available types are:

APP	A	approach
DEP	D	depart
TGO	T	touch-and-go

If a helipad is selected, the available types are:

APP	A	approach
DEP	D	depart
TAX	X	taxi

If OVF is selected, the available types are:

OVF	V	overflight
-----	---	------------

4. Input a track identifier, which can be up to eight characters. The track identifier must be unique for tracks of the same operation type on the same runway end. A full track identifier consists of the runway end identifier, an operation type, the 8-character track identifier, and a sub-track number. For example: 16R-DEP-TRK0028-0
5. Select a sub-track number. Usually, you will leave this as 0. See below for an explanation of sub-track groups.
6. Input a percentage of flights using the group of sub-tracks. Usually, you will leave this at 100% because there is only one track in the group.
7. The last item on the menu is *Delta Distance* if a runway is selected and *Direction (deg)* if a helipad is selected.
  - a. *Delta Distance* – Input the track delta distance. Usually, you will leave this at 0 because there is no need to adjust start-roll or touchdown points. See the discussion below for situations where you would want to adjust these points.
  - b. *Direction (deg)* – Input the track heading at the helipad. The direction is measured from true North in a clockwise direction. This setting determines the track's initial heading for departures, or the final heading for arrivals when calculating vector tracks.

Sub-Tracks:

- The reason for creating sub-tracks is so that you can assign flight operations to the group of sub-tracks as a whole, instead of specifying operations along each one.
- V-sub-tracks are created in this window with the same 8-character track identifier, but you should use different sub-track numbers. Sub-tracks with the same track identifier belong to the same group. V-sub-tracks do not have to be created in pairs, nor follow the left/right numbering scheme, as done for P-sub-tracks.

- V-sub-tracks are displayed in the *Input Graphics* window as normal tracks.
- P-sub-tracks are created in the *Input Graphics // Disperse Track* window.

Sub-Track Percentages:

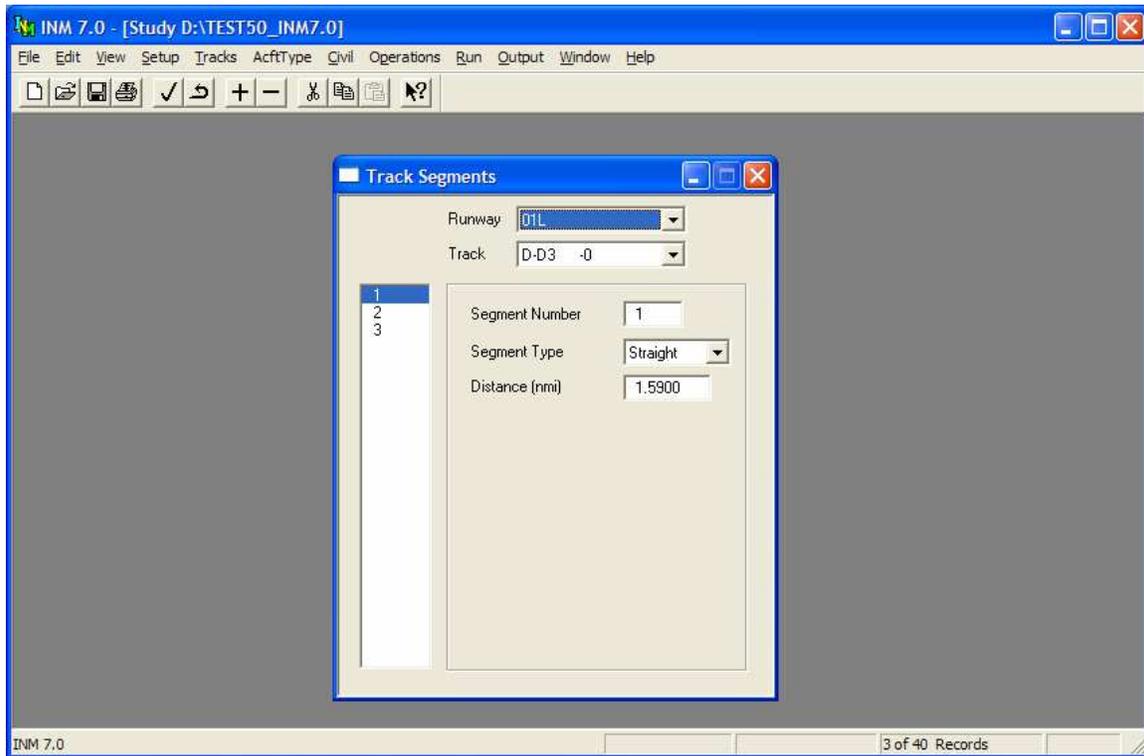
- V-sub-tracks – The percentage of operations assigned to sub-tracks must add up to 100 percent for all sub-tracks in a group. If there is only one track in the group (with sub-track number 0), input 100 percent.
- P-sub-tracks – The *Input Graphics* function assigns default sub-track percentages, which are based on a binomial probability distribution. You can change these default values in the *Track Identifiers* window or the *Input Graphics // Disperse Track* window.

Track Delta Distance:

- Track delta distance is used to adjust the takeoff start-roll point or the touchdown point on the runway for a particular track.
- Nominal start-roll or touchdown point is determined by parameters in a runway end record. The nominal point is used by all tracks that are associated with the runway end.
- Override the nominal start-roll or touchdown point by using a non-zero track delta distance parameter.
- The start-roll or touchdown point is moved relative to the nominal point, down the runway for positive delta, and back toward the end of the runway for negative delta. Typically, you will use positive deltas.

Example uses of the track delta distance parameter are wake turbulence avoidance and intersection takeoffs:

- If light aircraft use the same runway as heavier jets, they will usually land further down the runway than the jets to avoid dangerous wake turbulence. The problem is that INM creates a nominal touchdown point before jet touchdown because light VFR aircraft use a steeper approach angle over the threshold. In this case, you would input a positive delta distance on the approach track used by light aircraft to move the touchdown point further down the runway.
- For the case of intersection takeoffs, input a positive delta distance equal to the distance from the physical end of the runway to the intersection, less the nominal start-roll distance.



## 7.4 Track Segments

Menu Item: *Tracks // Track Segments*

Use this function to input V-track geometry. Also, you can view (but not edit) P-track segments, which are individual X,Y points.

Input V-track geometry by adding a series of track segments:

1. Select a runway end and a V-track name, which was previously created in the *Track Identifiers* window.
2. Use the *Edit // Add Record* function to create a new track segment record. INM displays the next segment number in sequence in the Segment Number box.
3. Select the type of V-track segment: straight, left turn, or right turn. You should start and end a track with a straight segment. You can follow a turn segment with either a straight segment or a turn in the other direction.
4. For a straight segment, input the distance the aircraft moves along the segment.
5. For a left or right turn segment, input the angle and radius of the circular arc representing the turn.
6. Use *Edit // Commit Record* to save the track segment record. You can automatically commit by adding another record.

A departure track starts at the displaced takeoff threshold on the runway or at the center of the helipad, and it finishes in terminal airspace. The first segment should be a straight segment. When the track is assigned to a runway, INM automatically lines it up with the runway. When the track is assigned to a helipad, the initial reference direction is set by the track direction defined in the *Track // Track Identifiers* window.

An approach track starts in terminal airspace and finishes at the displaced approach threshold on the runway or at the center of the helipad. The last segment should be a straight segment. When the track is assigned to a runway, INM automatically lines it up with the runway. When the track is assigned to a helipad, the final reference direction is set by the track direction defined in the *Track // Track Identifiers* window.

A touch-and-go track both starts and finishes at the displaced approach threshold on a runway or at the center of the helipad. Usually, there are five track segments in a touch-and-go track:

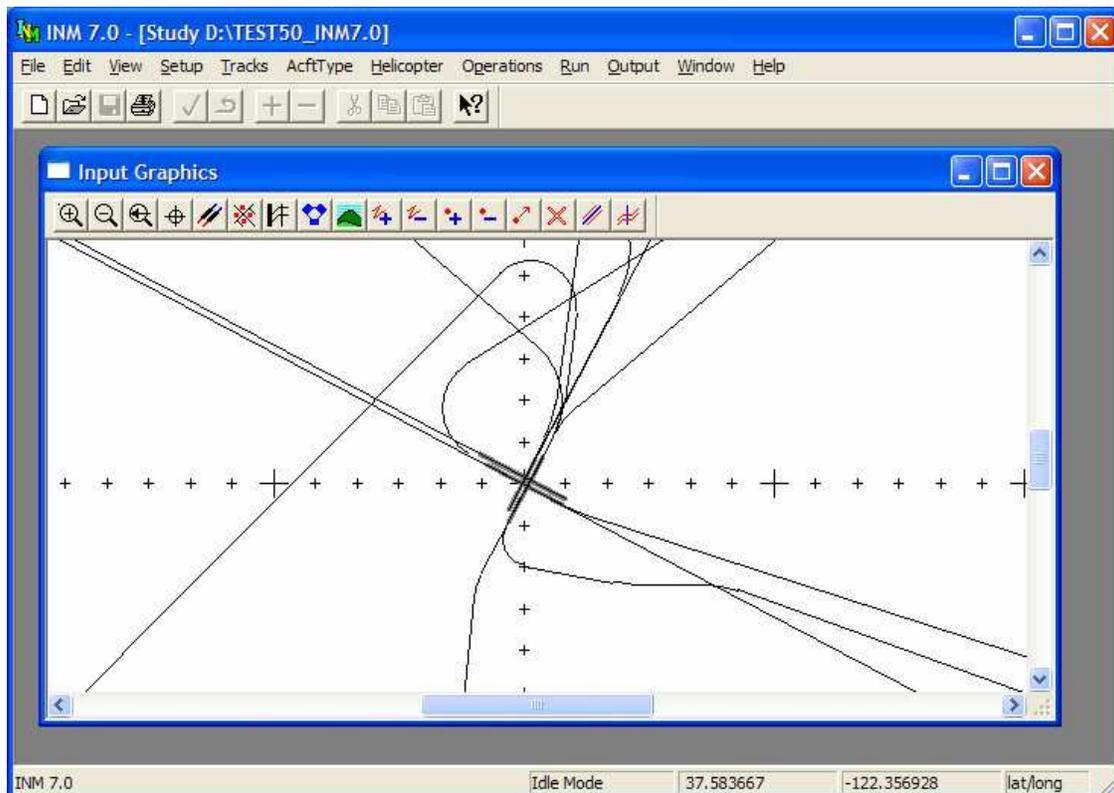
1. Start with a straight segment.
2. Turn left or right 180 degrees.
3. Go downwind on a straight segment.
4. Turn again 180 degrees onto final.
5. Finish with a straight segment.

Make sure that the sum of the starting and finishing straight segment distances equals the down-wind straight segment distance, so that the touch-and-go track is a closed loop.

An overflight track starts and finishes in terminal airspace. Overflight tracks are created only in the *Input Graphics* function (see Section 7.5) because they are exclusively points-type tracks.

A helicopter taxi track should begin and end on a helipad.

INM adds a 100-nmi straight segment to the last defined track segment so that tracks are made long enough for calculation purposes. Typically, the last two points are used as a straight line on which a new last point is created. Thus, departure and overflight tracks are extended out of the airspace area, and approach and touch-and-go tracks are extended straight down the runway. Unlike the other track types, helicopter taxi tracks are not extended by INM.



## 7.5 Input Graphics

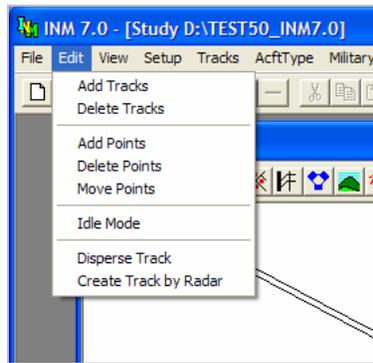
Menu Item: *Tracks // Input Graphics*

Use this function to graphically create and edit points-type tracks (P-tracks). A P-track is created in the *Input Graphics* window. It is an ordered sequence of X,Y points.

The other kind of track is a vectors-type track (V-track). It is created in the *Track Identifiers* and *Track Segments DBF* windows. During the noise calculation process, INM converts V-tracks into sequences of X,Y points like P-tracks.

You cannot edit V-tracks in the *Input Graphics* window, and you cannot edit P-tracks in the *DBF* windows.

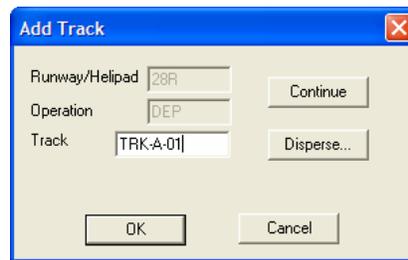
Graphics information can be entered or modified using several input modes. After the *Input Graphics* window is activated, the *Edit* menu changes to show the editing options that are available. For example, you can change to the add tracks input mode by using the *Edit // Add Tracks* function. When you change input mode, the name of the new mode is displayed on the status bar at the bottom of the main window.



The mouse buttons behave differently in different input modes:

- In the add tracks input mode, a left-button click creates a track point, a double-click creates the last track point, and a right-button click brings up an *Input Track Point* dialog box for typing in coordinates.
- In other input modes, the right-button is used to translate the graphics scene. Press the right-button, hold it down, stretch the "rubber band", and release the button at a new position. INM translates the scene in the direction, and for the distance, that you specify.
- In all input modes, you can move the graphics scene left, right, up, or down by using the scroll bars on the bottom and right side of the *Input Graphics* window.

A graphics toolbar is displayed at the top of the *Input Graphics* window. The graphics toolbar provides a short-cut method to access functions on both the *Edit* and *View* menus. The name of the function for each toolbar button is displayed under the toolbar when the mouse pointer is positioned on the button. The function name also appears on the status bar at the bottom of the screen.



### 7.5.1 Edit // Add Tracks

Use this function to create new P-tracks:

1. Select the *Edit // Add Tracks* function.
2. Start a track by clicking the left mouse button where you want the first track point.
3. Click the left mouse button for each track point. Track points should be created in the order that an airplane flies along the track. Try to keep the angle between adjacent track segments to less than 30 degrees.
4. Make the last point by double-clicking with the left mouse button.
5. INM displays the *Add Track* dialog box. Fill out the 8-character track identifier. The full name of the track is formed from three identifiers: the runway end identifier, the operation type, and the name that you type in.
6. Exit the *Add Track* dialog box by pressing one of four buttons:
  - *OK* – commit the new track to the study database.
  - *Disperse* – commit the track and immediately go to the *Disperse Track* function, where you can create multiple sub-tracks.
  - *Continue* – continue adding points (for example, you made a mistake in double-clicking to finish the track).
  - *Cancel* – delete the track (for example, you want to start over again).
- Departure Track: Click inside the circle at the end of the runway from which the takeoff starts. For example, if runway 33L is used for departures, make the first track point in the circle designating runway end 33L. Create the next point such that the departure track goes straight down the runway. Continue clicking with the left button to define the track. Double-click to finish the track and to bring up the dialog box.
- Approach Track: Start the track away from the airfield, and add points toward the touchdown end of the runway. The last line segment should line up with the runway. Make the last point on the end of the runway

by double-clicking inside the circle. Fill out the dialog box as you did for departures.

- **Touch-and-Go Track**: A touch-and-go track is a closed loop. It starts inside a runway circle and finishes inside the same circle. To be considered closed, the first and last points of the track must be located within 10 feet of each other. If they are not, you will receive an error message when INM attempts to utilize the track during a run. Make sure that the first and last track segments line up with the runway.
- **Overflight Track**: An overflight track starts and finishes in the airspace surrounding the airfield. It must not start or end inside a runway circle. INM automatically assigns OVF as the runway identifier to all overflight tracks. The *Edit // Add Tracks* function is the only available way to create overflight tracks.

There are some special uses of the mouse and keyboard while in the *Add Tracks* function:

- When you add points to a track, the right mouse button can be used to open a dialog box to type in the point coordinates, instead of clicking on the point. When you click the right mouse button, the *Input Track Point* dialog box pops up with default point data. If you previously set geo-units to lat/long, fill out the latitude and longitude values that you want. If you set geo-units to nautical miles, fill out X,Y values; and similarly for kilometers.
- Use the Esc key to undo the previous step.
- Since the zoom functions are not accessible while in the *Add Tracks* function, use the + or = key to zoom in, and use the - key to zoom out. The center of the zoom is the position of the mouse.

You can stay in the add track mode and add as many tracks of different operational types as you want.

### **7.5.2 Edit // Delete Tracks**

Use this function to delete existing P-tracks.

1. Select the *Edit // Delete Tracks* function.
2. Click on the track that you want to delete. INM changes the color of the selected track to black and presents a confirmation message box.
3. Press *OK*. INM checks all cases to see if the track is associated with group percent or flight operation records. This may take several seconds if flight operations are not already in memory.

If the track is associated with an operation, INM will not allow the track to be deleted. If you really want to delete the track, you must first delete all of the operations that use the track, and then delete the track.

### **7.5.3 Edit // Add Points**

Use this function to add new points to existing P-tracks.

1. Select the *Edit // Add Points* function.
2. Select a track with the left mouse button. INM changes the color of the selected track to black and displays squares at the point positions.
3. Click on the track segment where you want to add the point. This segment becomes a triangle that is anchored by the two points defining the segment.
4. Make a new point in one of two ways. Drag the apex of the triangle to a new position, and then:
  - Click once more to release the new point. INM takes a moment to commit the new set of points.
  - Or, use the right mouse button to bring up a dialog box to input the coordinates of the new point.

To add points to the end of a track, add them in between the last two points, and then move the last point (see below) to where you want it.

### **7.5.4 Edit // Delete Points**

Use this function to delete existing points in P- tracks.

1. Select the *Edit // Delete Points* function.
2. Select a track with the left mouse button. INM changes the color of the selected track to black and displays squares at the point positions.
3. Click on the point that you want to delete.
4. INM draws a circle around the point and then requests confirmation to delete.
5. Press Yes. INM takes a moment to commit the new set of point records.

You cannot delete a point from a track containing a single segment (only two points).

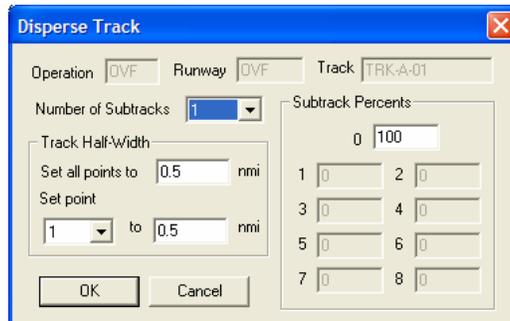
### **7.5.5 Edit // Move Points**

Use this function to move existing points in P-tracks.

1. Select the *Edit // Move Points* function.
2. Select a track with the left mouse button. INM changes the color of the selected track to black and displays squares at the point positions.
3. Click on the point that you want to move.
4. INM creates a black triangle using the two neighboring points as anchors.
5. Define the new point by one of two methods: Drag the point to a new position, and then:
  - Click once more to release the point.
  - Or, use the right mouse button to bring up a dialog box to input the coordinates of the new point.

### 7.5.6 Edit // Idle Mode

Use this function to change to the idle input mode. The idle mode is the default input mode, where the mouse cannot be used to enter or modify data but only to translate the graphics scene. Switching to this mode may be useful when you want to deactivate the behavior of the mouse while in another mode. You do not have to go through the idle mode to change from one mode to another.



### 7.5.7 Edit // Disperse Track

Use this function to create sub-tracks along side of a backbone P-track. The backbone track and its sub-tracks are collectively called a "dispersed" track.

A dispersed track is used to model deviations from a nominal flight path, thus distributing noise over a larger area than provided by a single track. INM automatically distributes flight operations across sub-tracks, so all you do is assign operations to the backbone track and INM takes care of the details.

To use the *Dispersed Track* function, click on the track that you want to disperse. INM displays squares on the point positions of the track and activates the *Disperse Track* dialog box.

You may also disperse a new P-track directly from the *Add Track* dialog box. When you press the Disperse button, INM displays the same *Disperse Track* dialog box.

In the *Disperse Track* dialog box, edit the following input parameters:

- Number of dispersed tracks – the backbone track plus sub-tracks. This is an odd number from 1 (only the backbone track) to 9 (the backbone track and 8 sub-tracks). A large number of sub-tracks will cause INM to run slower than with fewer sub-tracks, or none at all.
- Sub-track percentages – these data are used to distribute flight operations across the backbone track and its sub-tracks. INM sets default percentages. You can change these percentages, but make sure that the new numbers add up to 100 percent.

- Sub-tracks occur in pairs (for example, 1 and 2, 3 and 4, etc.), where sub-tracks to the left of the backbone track are odd numbers and to the right are even numbers, as shown below:

Left 7 5 3 1 0 2 4 6 8 Right

Left and right are determined by facing in the direction of flight along the backbone track. The backbone track is identified by "0".

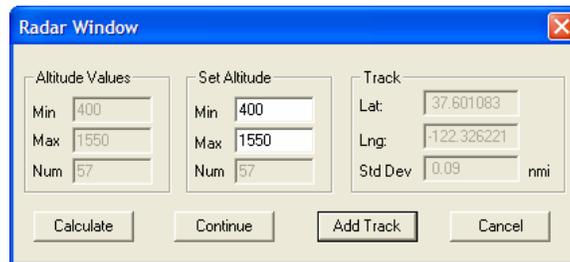
- Track half-width is the distance from the backbone track to the outside sub-track. Twice this parameter is the total width of the dispersed track.

A half-width parameter is associated with each backbone point. Therefore, you can change the shape of the dispersed track, point by point. When you first create a dispersed track, you can quickly set all of the points by using the *Set All Points* box. Or, you can set each point by selecting the point by number in the drop-down list box, and typing the value in the half-width box.

Once a track is dispersed and while you are still in the disperse track mode, you can change individual half-widths. Click on a backbone point (clicking on a segment produces no action). INM displays the *Disperse Track* dialog box with the point that you selected showing in the *Set Point* drop-down box. Type in a new half-width value for the point.

When you disperse an approach, departure, or touch-and-go track, you need to adjust the dispersion half-widths at each point to properly model the operation.

- Departure sub-tracks should have zero width at the first and second points so that all sub-tracks are on the runway. You need to change the half-widths on point-3 and greater.
- Approach sub-tracks should have zero width at the last point and small or zero half-width for points on final approach to the runway.
- If possible, you should disperse tracks based on radar data as described below. If radar data are not available, you should increase the half-width in proportion to the distance from the runway.



### 7.5.8 Edit // Create Track by Radar

You must be able to see radar tracks in the *Input Graphics* window to use this function. Section 3.5.6 explains how to import radar track data into a study. Use the *View // Tracks* function to make the radar tracks visible.

You create a track using radar data by specifying a set of "radar windows" along a bundle of radar tracks.

- Start a departure track near the takeoff end of a runway, where radar data start, and work outward along a bundle of radar tracks.
- Start an approach track in terminal airspace and work inward toward the touch-down end of a runway. You define the type of operation (for example, approach) later.
- The radar windows must be created in the same order that an airplane would fly along the track.

To create a radar window, or vertical plane inside which radar tracks are evaluated:

1. Click to the side of a bundle of tracks.
2. Pull a line across the bundle (perpendicular to the radar tracks).
3. Click again. The line defines the horizontal extent of the radar window.

After you draw a line across a bundle of radar tracks, INM displays the *Radar Window* dialog box:

- Altitude Values box – shows the lowest and highest altitudes of all the radar tracks that cross the line that you just specified.
- Set Altitude box – allows you to modify the vertical extent of the radar window. The default values are the lowest and highest radar track altitudes, thus allowing all radar tracks through the radar window.
- After you reset the altitude values, press the Calculate button.

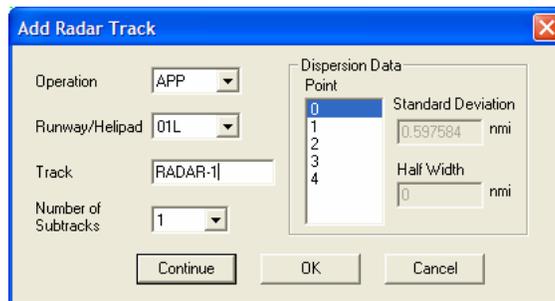
INM calculates the mean and standard deviation of the radar-track crossing points, which lie on the horizontal line. These statistics are displayed in the Track box. The statistics are in the geo-units that you specified in the *View // Geo Units* function. The track-point mean value is also displayed in the *Input Graphics* window as a small square.

If you do not change the altitude values, you do not need to press Calculate because the default values are already calculated.

Exit the *Radar Window* dialog by one of three ways:

- *Continue* – continue inputting points
- *Add Track* – finish specifying the track
- *Cancel* – delete the track and start over.

Continue creating points by pressing the Continue button. You create an INM track by repeating the *Radar Window* calculation at strategic places along the bundle of radar tracks. You should choose places where the radar-track bundle changes size or where it turns.



To finish the track, press the Add Track button. INM then displays the *Add Radar Track* dialog box:

1. Choose the operation that you had in mind when you specified the points (APP approach, DEP depart, TGO touch-and-go, OVF overflight).
2. Select a runway end or helipad.
3. Input a track identifier.
4. Select the number of dispersed tracks (the backbone track plus sub-tracks). Notice that when you change the point index number on the right, the dispersion half-width changes. This is because INM uses the calculated standard deviation to determine the track half-width.

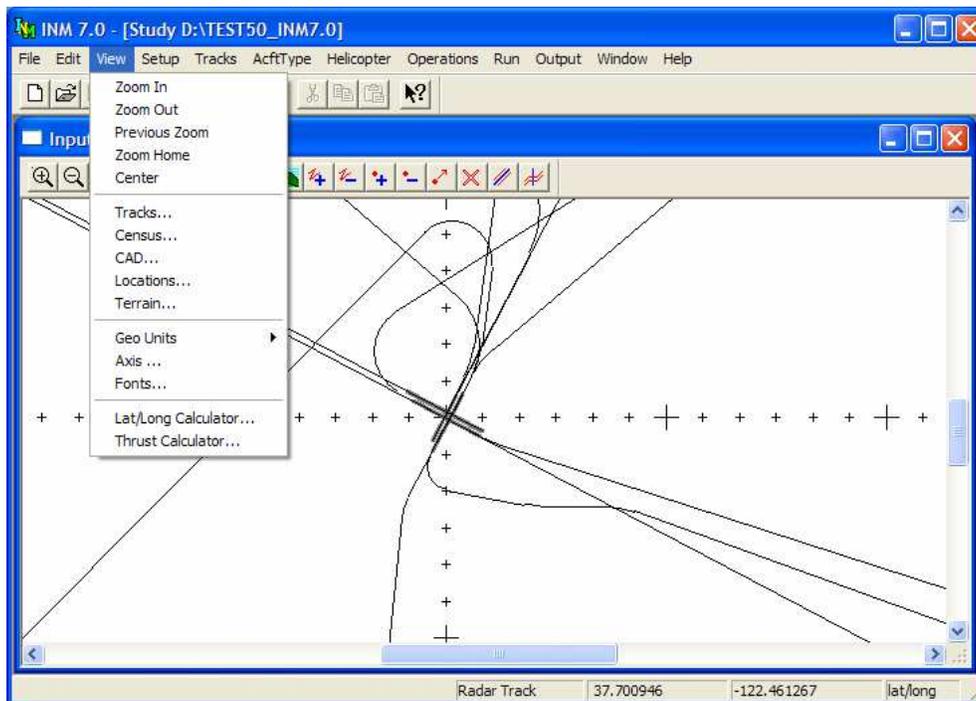
You can exit the *Add Radar Track* dialog box by one of three buttons:

- *OK* – commit the track to the database. You can change a radar-created track after it is committed by using the *Edit // Disperse Track* function.
- *Continue* – continue *Radar Window* input (for example, you made a mistake and did not want to finish the radar track).
- *Cancel* – delete the track and start over.

The table below shows default distances from the backbone track to individual sub-tracks. The distance is in terms of the number of standard deviations. The actual half-width is calculated by multiplying the number of standard deviations times the standard deviation at a point. For example, a 3-track half-width is 1.41 times the standard deviation at a point, and a 5-track half-width is 2 times the standard deviation.

The table also shows the default percentages that INM assigns to the sub-tracks. INM uses a probability distribution for the percentages defined in ECAC Document 29. The backbone track is assigned a sub-track identifier of "0".

Number of Tracks	Sub-track Identifier	Std Dev Multiplier	Percent on Sub-track
1	0	0.00	100.00
3	0	0.00	68.26
	1 & 2	1.41	15.87
5	0	0.00	38.6
	1 & 2	1.00	24.4
	3 & 4	2.00	6.3
7	0	0.00	28.2
	1 & 2	0.71	22.2
	3 & 4	1.43	10.6
	5 & 6	2.14	3.1
9	0	0.00	22.2
	1 & 2	0.56	19.1
	3 & 4	1.11	12.1
	5 & 6	1.67	5.7
	7 & 8	2.22	2.0



### 7.5.9 View // Zoom In

To zoom in:

1. Click with the left mouse button at the position where you want the center of the new window.
2. Move the mouse to create a rectangle that represents the border of the new window.
3. Click with the left mouse button again to enable the zoom operation. INM redraws the scene in a larger scale, making it appear that you are closer to the airport.

You can change the center of the zoom area by holding the right mouse button down and dragging the rectangle to a new position. Do this after establishing the rectangle, but before finalizing the zoom operation with the second left-mouse-button click.

### 7.5.10 View // Zoom Out

To zoom out:

1. Click with the left mouse button at the position where you want the center of the new window.
2. Move the mouse to create a rectangle that represents the area into which you want the old window displayed. Make a small rectangle to zoom out a long way.

3. Click with the left mouse button again to initiate the zoom operation. INM redraws the scene in a smaller scale, making it appear that you are farther away from the airport.

You can change the center of the zoom area by holding the right mouse button down and dragging the rectangle to a new position. Do this after establishing the rectangle, but before finalizing the zoom operation with the second left-mouse-button click.

#### **7.5.11 View // Zoom Home**

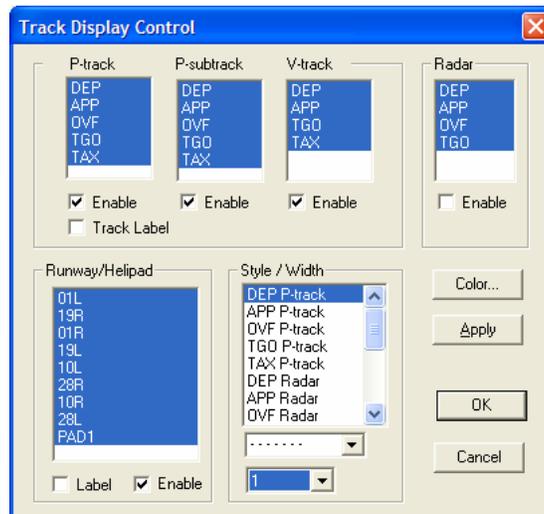
Use this function to center the display on the origin of the study coordinate system and reset the scale to the default value, which displays about  $\pm 20$  nautical miles of the X-axis.

#### **7.5.12 View // Center**

Use this function to re-center the scene so that the coordinate origin is in the center of the window. The current zoom scale is not changed.

#### **7.5.13 View // Previous Zoom**

Use this function to revert the graphics scene to the scale that was used previous to the current zoom scale.



### 7.5.14 View // Tracks

Use this function to turn on or turn off tracks and runways, label tracks and runways, and define colors.

Across the top of the dialog, there are four list boxes containing four categories of tracks:

- P-track            points-type backbone tracks
- P-subtrack        points-type sub-tracks
- V-track            vector-type tracks (both backbone and sub-tracks)
- Radar             radar tracks

Each list box has four or five operation types:

- DEP    departure tracks
- APP    approach tracks
- TGO    touch-and-go tracks
- OVF    overflight tracks
- TAX    taxi tracks (for helicopters only)

Click on an operation type to select or de-select the type of track.

A check mark in an Enable box activates the highlighted tracks in the associated list box. For example, to display only approach P-tracks:

1. Select APP in the P-track list.
2. De-select all other operation types in that list.
3. Put a check mark in the P-track Enable box.
4. Remove check marks from the other Enable boxes.

If you want to display track identifiers, put a check in the Track Label box.

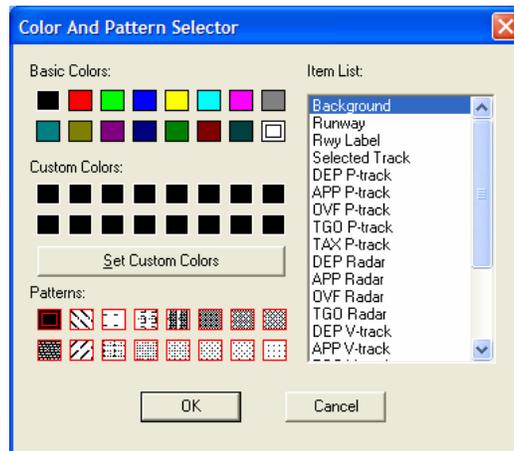
To change the style and width of tracks, select a track type (for example, DEP P-track) and then select a width number and line style type from the drop-down list boxes.

You can control the display of runways and helipads by enabling or disabling them as a group and/or by selecting and de-selecting individual runways or helipads. If you de-select a runway/helipad, the runway/helipad and its associated tracks are not displayed. If you simply disable all runways/helipads (but leave individual runways/helipads selected), all the runways disappear but the tracks stay. Runway/helipad identifiers can be turned on or off with the associated Label box.

The four buttons operate as follows:

- *Color* – go to the Color dialog box
- *Apply* – display changes without committing them
- *OK* – commit the current control settings and exit the dialog box
- *Cancel* – quit the *Track Display Control* dialog box without saving changes.

If you use Apply to display your changes, remember to exit by using OK because the Cancel button reverts any display changes to their original state.

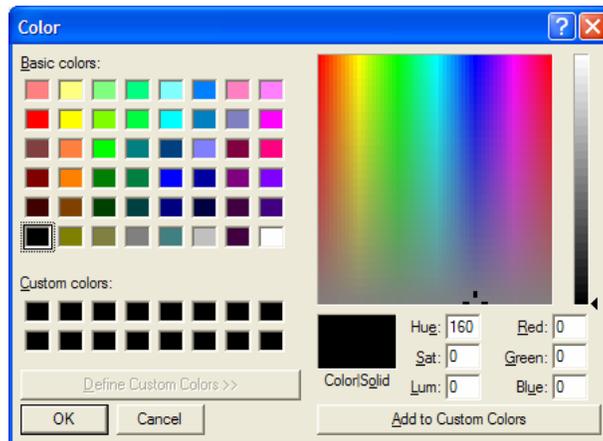


### 7.5.15 View // Tracks - Color

Use this function to change the colors of objects; in this case, tracks, runways, labels, and the graphics window background.

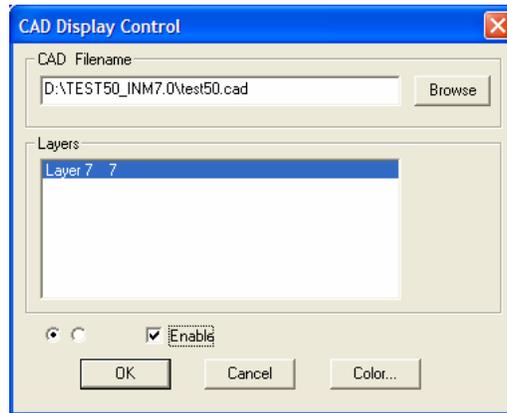
To change colors, press the Color button on the *Track Display Control* dialog box. The *Color and Pattern Selector* dialog box is displayed, letting you select an object to color.

1. Select an object from the Item List.
2. Select its color by clicking on the desired colored box on the left. A black square in the box designates the current color (sometimes the square is hard to see).
3. After coloring objects, press OK and then OK again in the *Track Display Control* dialog box to enable and save the new colors.



You can create your own colors by pressing the Set Custom Colors button. In the new dialog box:

1. Click on one of the 16 Custom Color boxes in the lower-left part of the dialog. The boxes are initially empty.
2. Select a Basic Color or click directly somewhere in the large multicolored box on the right.
3. Drag the slider-pointer on the far right to change the luminosity.
4. Press the Add to Custom Colors button.
5. Press *OK* to return to the Color and Pattern Selector dialog box, you will see that your new color is now in one of the boxes directly below the Basic Colors sequence. You can now select the new color.



### 7.5.16 View // CAD

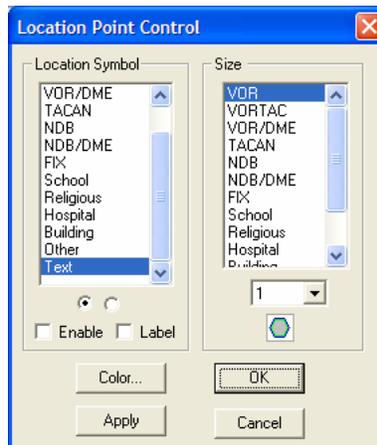
Use this function to display INM-formatted *CAD* files, typically a diagram of an airport.

You must first use the *File // Import Data into Study // AutoCAD DXF File* or the *Polyline TXT File* function to create an INM-formatted *CAD* file. Put the *CAD* files into the study directory.

To use *View // CAD Display Control* dialog:

1. Use the Browse button to select a *CAD* file from the study directory.
2. Select the *CAD* layers that you want to display. The left round button selects all layers; the right round button de-selects all layers.
3. Check Enable and press OK to display the *CAD* layers.

You can color individual *CAD* layers by using the Color function. It works the same as described above in *View // Tracks - Color*.



### 7.5.17 View // Locations

Use this function to display various kinds of location points, including nav aids and fixes. You must have already setup Location Points (which generates a *LOC\_PTS.DBF* file in the study directory) to display location points in the *Input Graphics* or *Output Graphics* windows.

You can create a *LOC\_PTS.DBF* file by a variety of methods:

- Automatically, by using the *Setup // Study* function during which INM automatically creates location points representing nav aids and fixes in the vicinity of any airport selected from those available in the INM standard database
- Interactively, by using the *Setup // Location Points* window
- With a spreadsheet, by using the *LOC\_PTS.DBF* template file in the *SYS\_DBF* system subdirectory.

To use the Location Points Control:

1. Select or de-select types of locations points by clicking on items in the left list box (for example, you can turn off all fixes by de-selecting Fix). You can select all location points by clicking on the left round button, and you can de-select all by clicking on the right round button.
2. Change the size of the location point symbols by selecting a symbol item in the right list box, and then selecting a relative size number in the drop-down list box. All types of location points have preprogrammed graphic symbols, except for Text type. You can use Text type to place a six-character label on your graphic.
3. Turn on location points for display by putting a check in the Enable box.
4. Display the six-character point identifiers by putting a check in the Labels box.
5. Use one of the buttons at the bottom of the dialog:
  - Color – sets the color of text labels, but not the color of the symbols themselves.

- *Apply* – applies your selections without closing the *Location Point Control* dialog box.
- *OK* – applies your selections and closes the dialog box.
- *Cancel* – reverts the display settings to the state that they were in when you opened the *Location Point Control* dialog box, and then closes the dialog box.

If you have a *LOC\_PTS.DBF* file, and if you check the *Run // Run Options Do Location Points* box, INM calculates noise levels at all location points (not just the ones selected for display) and presents tabular results in the *Output // Noise at Loc Points* window.

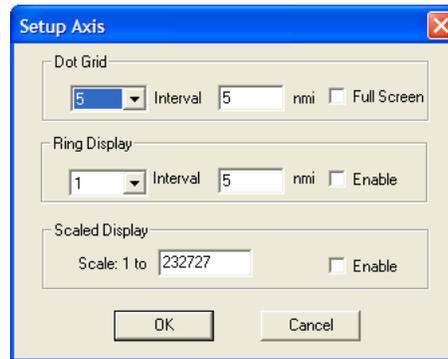
### **7.5.18 View // Geo Units**

Use the *View // Geo Units* function to select the kind of units that appear on the right-hand part of the status bar at the bottom of the main window. INM displays the geographical position of the mouse cursor in this area.

- nmi – X and Y in nautical miles
- km – X and Y in kilometers
- lat/long – latitude and longitude in decimal degrees.

After selecting new units with this function:

- The *Edit // Add Tracks Track Input Point* dialog box uses the new units
- The *View // Axis* function uses the new units.



### 7.5.19 View // Axis

Use this function to display two kinds of distance-measuring marks to help define the X,Y coordinates. The functions are called Dot Grid and Ring Display. The Scaled Display function lets you set the zoom factor to a given scale.

Use *Dot Grid* to change grid marks:

1. Specify the number of dots displayed between the plus signs. For example, to make the minor division marks 0.2 nmi apart (assuming that the major divisions are 1.0 nmi apart), select 4 dots because 4 dots makes 5 intervals.
2. Input the distance between the major divisions marks (the plus signs) on the X and Y axes. For example, type 1.0 in the Interval box to make the distance between plus signs 1.0 nautical mile, if you are using geo-units of nmi.
3. Check the Full Screen box to display grid marks in all four quadrants, in addition to being displayed on the X and Y axes.

Use *Ring Display* to display range rings around the origin of coordinates:

1. Specify the number of rings to be displayed. For example, to make 5 rings (at 5, 10, 15, 20, and 25 nmi), select 5 in the drop-down list box.
2. Set the distance between rings. For example, type 5.0 in the Interval box to make the distance between rings 5.0 nautical miles.
3. Check the Enable box and press OK to display the range rings. If you zoom in or out, the range rings get bigger or smaller, depending on the scale of the graphic scene.

Use *Scaled Display* to specify a given zoom factor. You might want to do this to make two graphics windows display at exactly the same scale.

1. Type a value in the Scale 1-to-X edit box.
2. Check the Enable box.
3. Press *OK*. The window zooms in or out to the requested scale. The width of the INM window (typically, about 12 inches) is used in calculating the zoom factor.

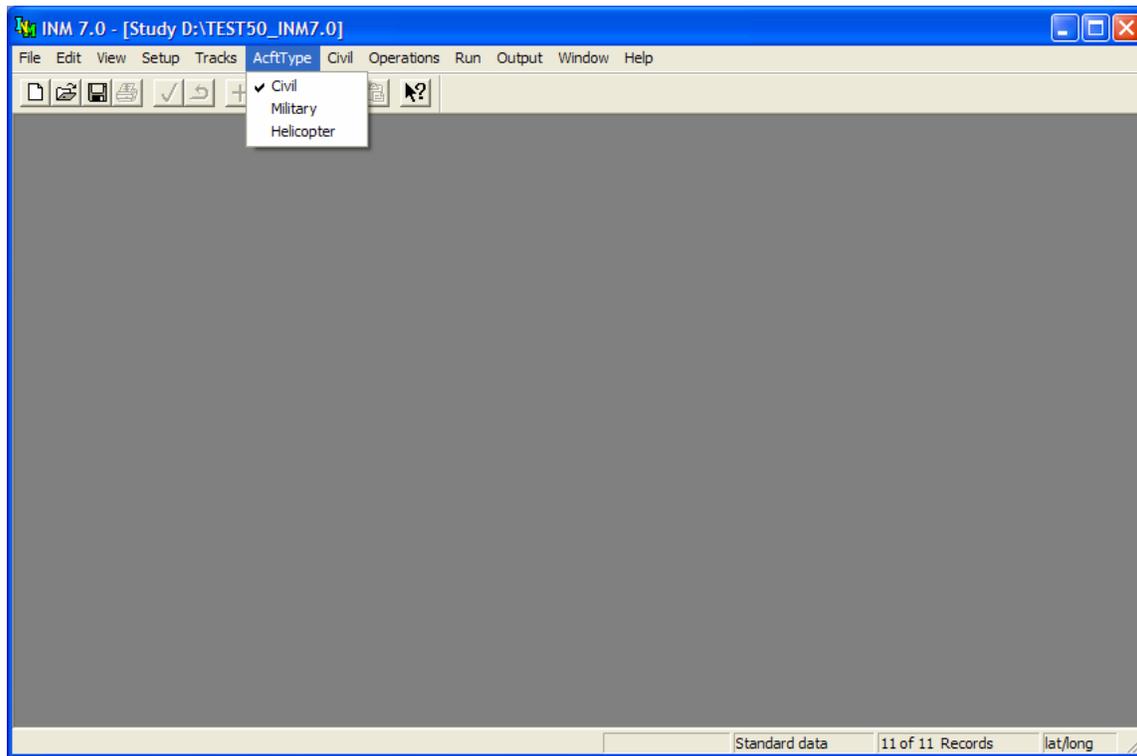
- If you use the Zoom function, the zoom factor will change and the 1-to-X scale will change. The current value of the 1-to-X scale is shown in the Scaled Display edit box.

### **7.5.20 View // Fonts**

Use this function to change the font style and point size of text labels (names, identifiers) that are displayed in a graphics scene. It is the same function as described in Section 5.1.

You can experiment to see which font looks best in the *Input Graphics* window, which will depend on the screen resolution that you are using. You may have to change the font setting before printing if your printer uses a different resolution.

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## 8 AIRCRAFT TYPE MENU

INM supports three different types of aircraft: civil airplanes, military airplanes, and helicopters. The AcftType menu is used to select one of the aircraft types for display in the Aircraft and Operations menus. The selected aircraft type is indicated with a check mark in the menu, and the Aircraft and Operations menus change to display information for the selected aircraft type.

The civil and military aircraft types differentiate airplanes whose source data was developed specifically for INM (civil airplanes) from those whose source data was obtained from the U.S. Air Force's NOISEMAP computer noise model (military airplanes). The INM database does contain a limited amount of military airplane data that was developed specifically for INM. As such, there are airplane types that would normally be considered military airplanes (for example the F4C) that are designated as civil airplanes in INM. The type and nature of the source data for these two different aircraft types necessitates that the available functionality and internal calculations of INM differ between them.

Selecting an aircraft type from the AcftType menu does not affect an INM study – only the INM menus change. See Sections 9 through 14 for more information on the menus affected by the selected aircraft type.



## 8.1 Civil

Menu Item: AcftType // Civil

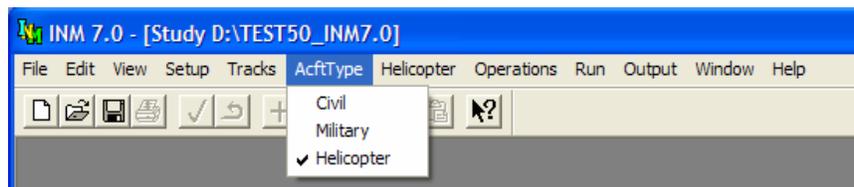
Selecting *AcftType // Civil* changes the aircraft menu title to read “Civil”. The Civil and Operations menus will display information for civil airplanes, but not military airplanes or helicopters.



## 8.2 Military

Menu Item: AcftType // Military

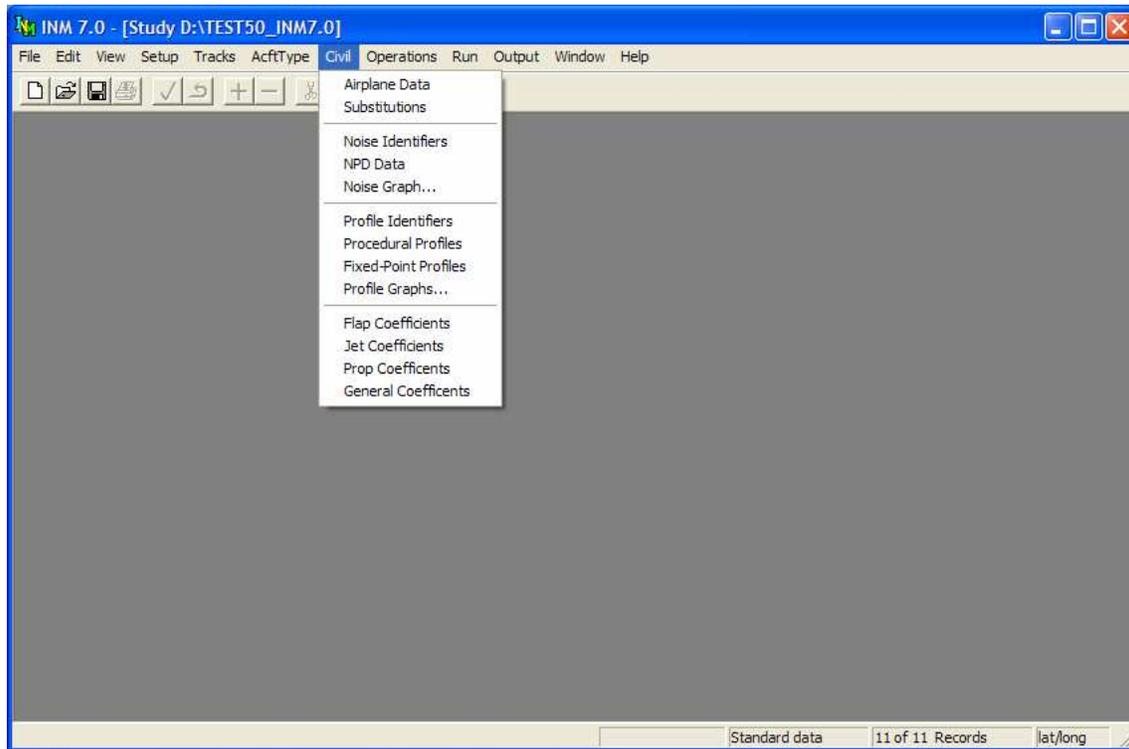
Selecting *AcftType // Military* changes the aircraft menu title to read “Military”. The Military and Operations menus will display information for military airplanes, but not civil airplanes or helicopters.



## 8.3 Helicopter

Menu Item: AcftType // Helicopter

Selecting *AcftType // Helicopter* changes the aircraft menu title to read “Helicopter”. The Helicopter and Operations menus will display information for helicopters, but not civil or military airplanes.

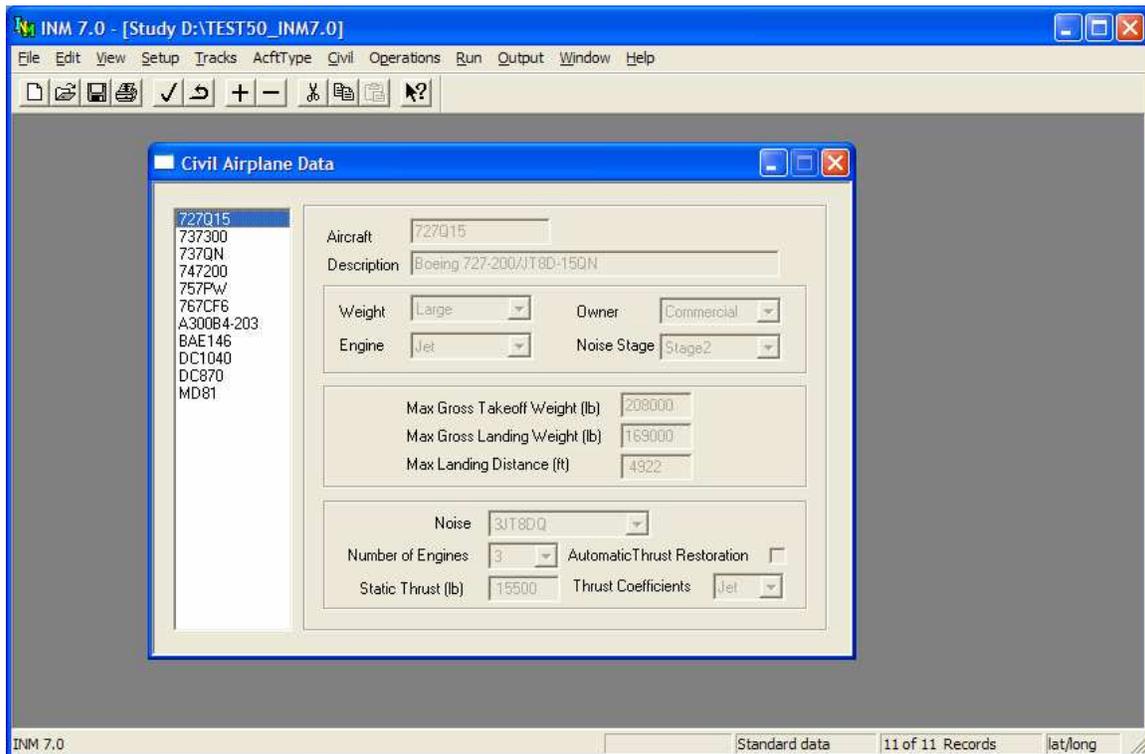


## 9 CIVIL MENU

Use this menu to input data used by civil airplanes such as:

- Aircraft definition data
- Aircraft substitutions
- Noise-power-distance noise levels
- Procedural flight profiles
- Fixed-point flight profiles
- Flight performance coefficients.

Civil Airplanes are defined at the study level and are selectively used in cases according to how you specify flight operations.



## 9.1 Civil Airplane Data

Menu Item: *Civil // Airplane Data* (also applies to *Military // Airplane Data*)

Use this function to view and create airplane records. The list on the left-hand side of the *Airplane Data* window displays airplanes that are included in the study.

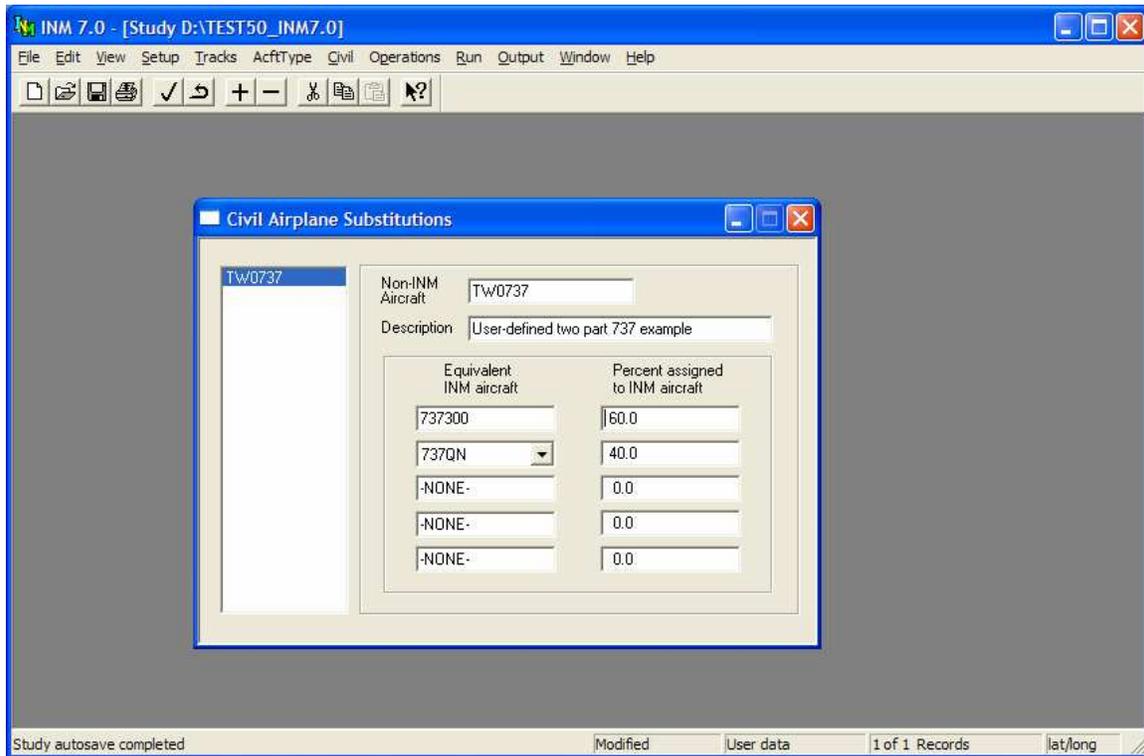
You can add airplanes to your study in three different ways:

- Add airplanes from the INM standard database using the *Setup // Civil Airplanes* function. Airplane data from the standard database are locked, so you cannot modify any of the parameters.
- Copy an existing airplane. Use *Edit // Copy Records* then *Paste Records*. INM displays a pop-up dialog box. Type a new airplane identifier and press *OK* to create a copy of the record and all its related records. The new airplane is unlocked, so you are free to edit any of the parameters.
- Create a new airplane using the *Edit // Add Record* function. Fill out the data, and then use *Commit Record*. You must also create profiles for your new aircraft using the *Civil // Profile Identifiers* and *Civil // Fixed-Point Profiles* windows.

Some airplane parameters are essential for computing noise contours and others are not. In the following list of 14 parameters, essential parameters are underlined.

1. Airplane identifier is used to associate an airplane with its profile identifiers, procedural profiles, fixed-point profiles, engine coefficients, and aerodynamic coefficients. Also, the identifier is used by airplane substitutions and various kinds of flight operations.
2. A forty-character description of the airplane and its engines is used to provide additional information.
3. Weight class is based on maximum gross takeoff weight:
  - Small – 12,500 pounds or less
  - Large – heavier than 12,500 but less than 300,000 pounds
  - Heavy – 300,000 pounds and heavier.
4. Owner category is Commercial, General Aviation, or Military.
5. Engine type is
  - Jet – turbojets
  - Turboprop – turbojet propeller-driven airplanes
  - Piston – piston-engine propeller-driven airplanes.
6. Noise stage is the FAR Part 36 noise classification number. Since some INM standard airplane types are composed of several real airplane types, noise stage is only representative of type and is presented here as a point of reference. This parameter is not used by INM.
7. Maximum gross takeoff weight is used to check for errors in profile weight when calculating procedural profiles.
8. Maximum gross landing weight is used to check for errors in profile weight when calculating procedural profiles.
9. Maximum landing distance is the FAR Part 25 field length required for maximum gross landing weight.
  - The distance is measured from the approach threshold (usually, the edge of the runway) and includes the in-air portion of the flight path before touchdown.
  - The in-air portion is nominally 954 feet for a 3-degree approach, and it is 572 feet for a 5-degree approach for a threshold crossing height of 50 feet. The distance parameters needed in the *Procedural Profiles* window for a deceleration step can be computed by using this maximum landing distance.
10. Noise identifier associates an airplane with its noise data. One or more airplanes can be associated with one set of noise data.

11. Number of engines is used to calculate engine-out thrust values for certain kinds of procedure steps. This is the only use of number of engines.
  - Noise levels associated with an airplane do not change if the number of engines is changed. This parameter is not connected to the noise data. Noise data implicitly account for the number of engines.
  
12. Static thrust is used to compute thrust for procedural profiles. Static thrust must be in pounds, even when working in the metric system. Static thrust is for sea level standard-day conditions. Two uses are made of this parameter, depending on the type of thrust setting:
  - Pounds – static thrust is used to compute pounds thrust from percentage values on deceleration procedure step records. For example, INM standard narrow-body jet airplanes use 40% static thrust for reverse thrust and 10% static thrust for taxi.
  - Percent – static thrust is used to convert percent thrust to pounds thrust when calculating procedural profiles.If an airplane exclusively uses fixed-point profiles, then static thrust is not used.
  
13. Automated Thrust Restoration System (ATRS) parameter is used in calculating procedural profiles. If the box has a check mark in it, it means that the airplane has ATRS. An ATRS airplane uses zero-gradient engine-out thrust on the thrust-cutback segment, whereas a non-ATRS airplane uses positive-gradient thrust, which depends on the number of engines. All INM standard airplanes are set to non-ATRS.
  
14. Thrust coefficient type:
  - Jet – jet thrust coefficients (and the associated SAE-AIR-1845 jet-thrust equation) are used to calculate the corrected net thrust per engine, which is the parameter used to access noise data.
  - Prop – prop thrust coefficients are used instead.
  - Many INM standard airplanes do not have thrust coefficients and their profiles cannot be computed. They are set to Jet or Prop, depending on their engine type, but the parameter is not used.
  - Most INM standard turboprop airplanes are classified Prop, but there are two that are classified Jet (DHC8 and DHC830).



## 9.2 Airplane Substitutions

Menu Item: *Civil // Substitutions*

Use this function to view and create civil airplane substitutions. The list on the left-hand side of the *Substitutions* window contains the substitutions that exist within the study.

To put a civil airplane substitution into your study:

1. Use the *Setup // Civil Airplane Substitutions* function to bring in INM standard substitutions. You cannot modify these records.
2. Use *Edit // Add Record* to create a new substitution record, input data, and then use *Commit Record* to save it.

Substitution identifiers are similar to airplane identifiers. Substitution identifiers appear in airplane lists when you construct flight operations. You can select substitutions as though they were regular airplane types.

INM standard substitutions (the ones on the *Setup // Civil Airplane Substitutions* list) are approved by the FAA for use in INM studies. If you are unable to find an airplane in the substitution database, refer to the contact provided in Appendix A for INM airplane substitutions.

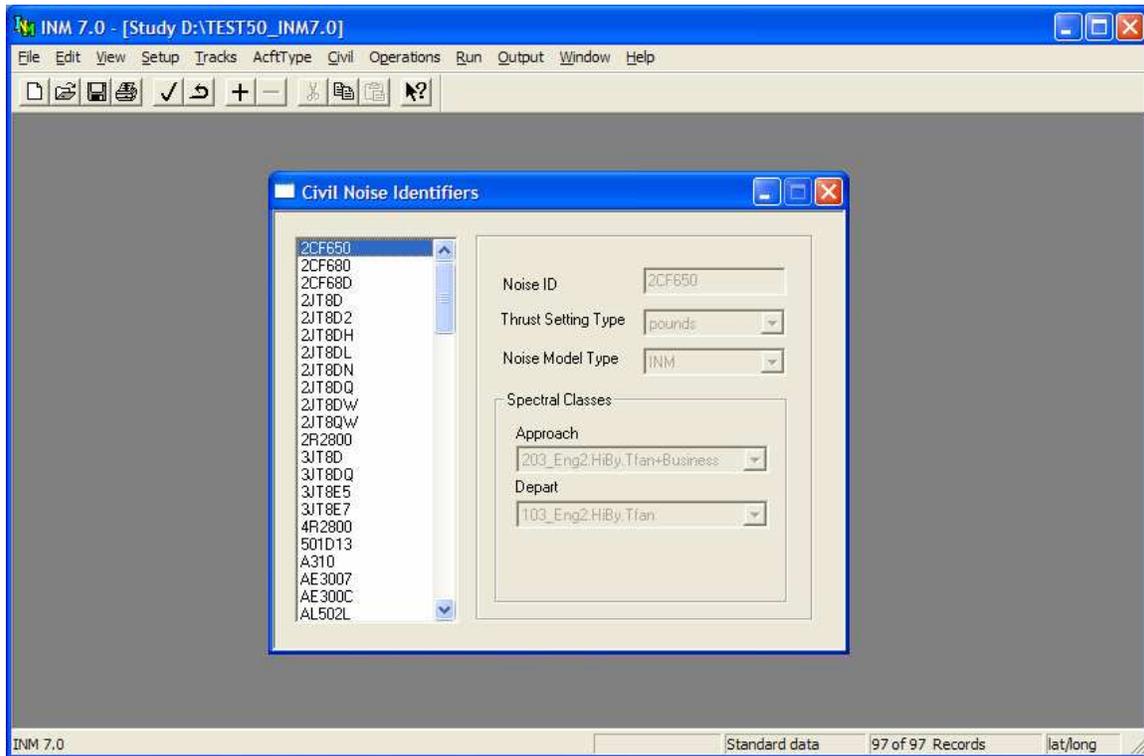
To create a new civil airplane substitution:

1. Use *Edit // Add Record* to create a blank record.
2. Input a twelve-character identifier and a 40-character description. The substitution identifier must be different from any civil airplane, military airplane, or helicopter identifier or other substitution identifier in the study.
3. Select from one to five study civil airplanes that will be used in place of the substitution airplane. If an airplane you need is not on the list, you can bring it into the study using the *Setup // Civil Airplanes* function.
4. If you want the substitution airplane to be represented by just one study airplane, select it in the top box, enter 100 in the percent box, and leave the other boxes with -NONE- and 0 in them.
5. If you want the substitution airplane to be represented by two or more (up to five) study airplanes, fill out the boxes accordingly and in order. Make sure that the percentages add up to 100 percent.

INM uses the specified study airplanes in place of the substitution airplane when calculating numbers of operations. The numbers of operations are assigned according to the percentage values.

For example, if you create a substitution airplane TWO737 equal to 60% 737300 and 40% 737QN, then 100 TWO737 operations are expanded to 60 737300 operations and 40 737QN operations. You can display the expanded operations using the *Operations // View Calculated Flights* function.

All study airplanes associated with a given substitution airplane must have the same profile identifiers, or else INM cannot correctly expand the operations. For example, if you create a DEP-CLOSE-1 flight operation for the TWO737 substitution, both 737300 and 737QN must have DEP-CLOSE-1 profiles. You can check the *FLT\_ERR.TXT* file in the case subdirectory for this kind of problem.



## 9.3 Noise Identifiers

Menu Item: *Civil // Noise Identifiers* (also applies to *Military // Noise Identifiers*)

Use this function to view and create noise identifiers for airplanes. A noise identifier is the name of a set of noise-power-distance (NPD) curves.

A noise identifier record contains:

- Twelve-character noise identifier
- Type of thrust setting used to identify the noise curves
- Type of noise model to apply
- Spectral classes for approach and depart operational modes.

### 9.3.1 Thrust-Setting Type

The types of thrust setting available for civil airplanes are Pounds, Percent, and Other. Only those airplanes associated with pounds or percent can have procedural profiles. This is because the equations for corrected net thrust per engine use coefficients related to pounds or percent of static thrust in pounds.

Airplanes associated with thrust-setting types other than “Pounds” or “Percent” (via the noise identifier field on the airplane record) do not show up in the airplane display list in the *Civil // Procedural Profiles* window. These airplanes must use fixed-point profiles.

### 9.3.2 Lateral Attenuation Model

INM distinguishes between noise model type INM for civil airplanes and NOISEMAP for military airplanes when computing lateral attenuation. The INM lateral attenuation model is documented in SAE-AIR-5662 and SAE-AIR-1845.

#### INM model

When the airplane is on the ground:

$$G(l_{seg}) = \begin{cases} 11.83 \cdot [1 - e^{-0.00274 \cdot l_{seg}}] & \text{for } 0 < l_{seg} \leq 914 \text{ m (3000 ft)} \quad (dB) \\ 10.86 & \text{for } l_{seg} > 914 \text{ m (3000 ft)} \quad (dB) \end{cases}$$

Where  $G$  is the ground-to-ground component of lateral attenuation (dB), and  $l_{seg}$  is the horizontal lateral distance to the airplane (meters).

When the airplane is airborne:

$$\Lambda(\beta) = \begin{cases} 10.86 & \text{for } \beta \leq 0^\circ \quad (dB) \\ 1.137 - 0.0229\beta + 9.72e^{-0.142\beta} & \text{for } 0^\circ \leq \beta \leq 50^\circ \quad (dB) \\ 0.00 & \text{for } 50^\circ < \beta \leq 90^\circ \quad (dB) \end{cases}$$

Where  $\Lambda(\beta)$  is the air-to-ground component of lateral attenuation (dB) and  $\beta$  is the elevation angle to the airplane (degrees).

The lateral attenuation adjustment for INM aircraft (both on the ground and airborne) is:

$$LA_{ADJ(INM)} = E_{ENGINE}(\varphi) - \frac{G(l_{seg})\Lambda(\beta)}{10.86}$$

Where  $LA_{ADJ(INM)}$  is the total lateral attenuation (dB),  $E_{ENGINE}(\varphi)$  is the engine installation adjustment (dB), and  $\varphi$  is the depression angle of the airplane (degrees).

#### NOISEMAP model

When the airplane is on the ground:

$$G(l_{seg}) = \begin{cases} 15.09 [1 - e^{-0.00274 \cdot l_{seg}}] & \text{for } 0 < l_{seg} \leq 401 \text{ m (1316 ft)} \quad (dB) \\ 10.06 & \text{for } l_{seg} > 401 \text{ m (1316 ft)} \quad (dB) \end{cases}$$

Where  $G$  is ground-to-ground attenuation (dB), and  $l_{seg}$  is the horizontal lateral distance to the airplane (meters).

When the airplane is airborne:

$$\Lambda(\beta) = \begin{cases} \left( \frac{21.056}{\beta} \right) - 0.468 & \text{for } 2^\circ \leq \beta \leq 45^\circ \quad (dB) \\ 0.00 & \text{for } 45^\circ < \beta \leq 90^\circ \quad (dB) \end{cases}$$

Where  $\Lambda(\beta)$  is the air-to-ground component of lateral attenuation (dB) and  $\beta$  is the elevation angle to the airplane (degrees).

The lateral attenuation adjustment for NOISEMAP aircraft (both on the ground and airborne) is:

$$LA_{ADJ(NOISEMAP)} = \frac{G(l_{seg})\Lambda(\beta)}{10.06}$$

$L = G$	$0 \leq \beta \leq 2$
$L = (G/10.06) \left( \left( \frac{21.056}{\beta} \right) - 0.468 \right)$	$2 < \beta \leq 45$
$L = 0.0$	$45 < \beta \leq 90$

Where  $LA_{ADJ(NOISEMAP)}$  is the total lateral attenuation (dB). There is no engine installation adjustment for NOISEMAP aircraft.

### 9.3.3 Maximum-Level Model

INM uses input data for LAMAX and PNLTM when they are available. However, when these maximum noise level data do not exist, INM uses equations to compute maximum levels. The equations were derived from linear regression analyses of standard noise data.

INM uses noise model type INM for civil airplanes and NOISEMAP for military airplanes when computing maximum noise levels:

- The INM maximum-level model:
 

LAMAX	=	SEL	-	7.19	-	7.73	log( D / 1000 )
PNLTM	=	EPNL	+	1.12	-	9.34	log( D / 1000 )
- The NOISEMAP maximum-level model:
 

LAMAX	=	SEL	-	7.48	-	6.06	log( D / 1000 )
PNLTM	=	EPNL	+	2.51	-	5.84	log( D / 1000 )

Where  $\log(x)$  is the base-10 logarithm function, and  $D$  is the distance to the airplane (feet).

Because of the derived relationship between maximum noise level and exposure level, you do not have to create both LAMAX and SEL curves (or PNLTM and EPNL curves). Instead, you can create one set of curves and INM will compute

the other. For example, you can input PNLTM values and INM will compute the EPNL values.

The maximum-level model is also known as an “effective time-duration correction” relative to 160 knots reference speed.

### **9.3.4 Spectral Classes**

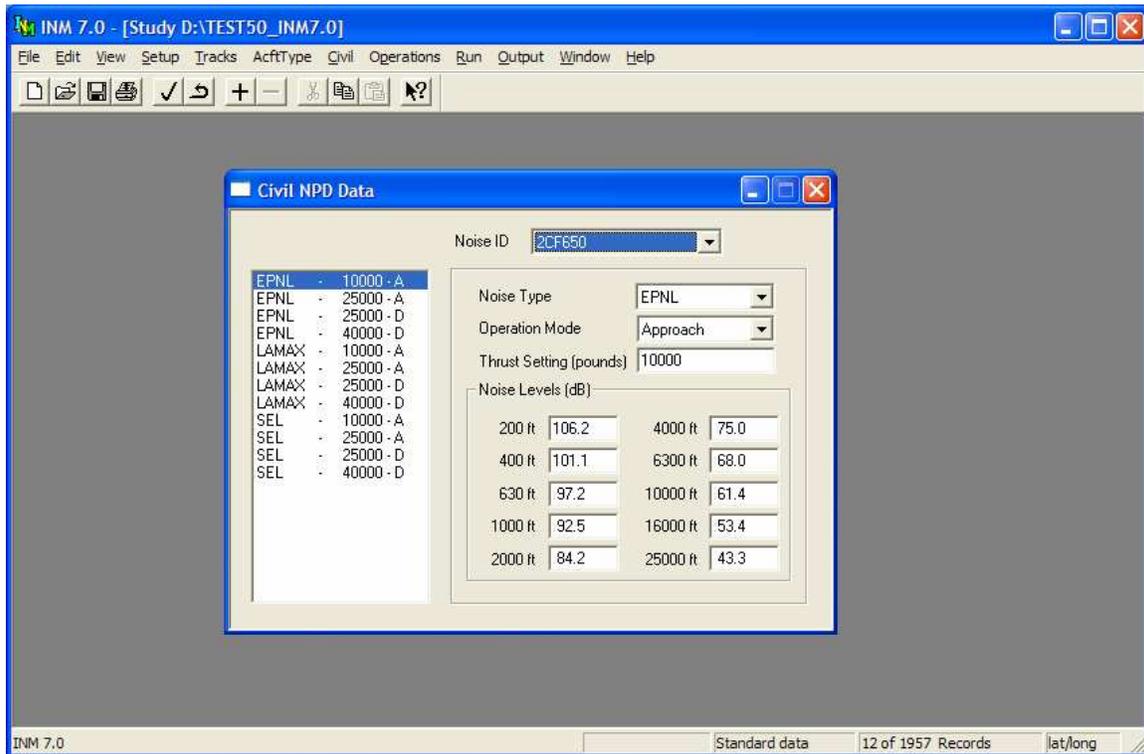
INM has a database of 34 approach noise spectra and 34 departure noise spectra, which are listed in Appendix H and contained in the *SPECTRA.BIN* file in the *SYS\_DATA* subdirectory.

These noise spectra are called "spectral classes", because they are average noise spectra from airplanes that have similar spectral shapes.

- An INM airplane is assigned a noise identifier
- A noise identifier is assigned approach and departure spectral class identifiers
- Some military aircraft noise identifiers are assigned an afterburner spectral class, which is usually the departure spectral class identifier.

Spectral classes are used to:

- Modify noise level curves for different atmospheric absorption models
- Modify A-weighted noise level curves to represent C-weighting
- Make adjustments to predicted noise levels based on lateral attenuation effects
- Calculate the time audible (TAUD) metric.



## 9.4 NPD Data

Menu Item: *Civil // NPD Data* (also applies to *Military // NPD Data*)

Use this function to view and create noise-power-distance (NPD) curves.

Appendix J cross references noise identifiers to the airplanes that use them. Note that more than one airplane can use a given set of NPD curves.

### 9.4.1 Noise Type

Noise types are:

- SEL – single-event Sound Exposure Level at a reference speed of 160 knots. It belongs to the A-weighted noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2(1 \text{ s})$ .
- LAMAX – maximum sound level. It belongs to the A-weighted noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2$ .
- EPNL – single-event Effective Perceived Noise Level at a reference speed of 160 knots. It belongs to the perceived, tone-corrected noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2(10 \text{ s})$ .
- PNLTM – maximum perceived noise level. It belongs to the perceived, tone-corrected noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2$ .

"A-weighting" and "perceived tone-corrected weighting" are two common methods of adjusting (weighting) a measured noise spectrum so that it better represents human perception of noise.

SEL and EPNL exposure levels are for aircraft flying at a reference speed of 160 knots, at a fixed thrust setting, along a straight and level overhead flight path. INM adjusts the exposure levels for the actual speed flown.

You do not have to create both SEL/LAMAX and EPNL/PNLTM sets. For example, if all you are interested in is A-weighted noise metrics, you can just create the SEL/LAMAX set of NPD curves. However, if you do this, only A-weighted noise metrics are valid, even though perceived-noise metrics may be computed. The reason is that aircraft that are associated with SEL-only noise identifier are missing EPNL-related data. Therefore, the perceived-noise metrics will not have noise contributions from those aircraft.

### **9.4.2 Operational Mode**

Noise operational modes are:

- Approach – NPD curves are based on a noise spectra representative of the approach and landing phase of flight. Gear and flaps are deployed and thrust settings are generally low.
- Depart – NPD curves are based on a noise spectra representative of the takeoff and departure phase of flight. Thrust settings are generally high.
- Afterburner – high thrust mode for military aircraft. INM currently uses departure spectra for afterburner operations.

Operational mode is used by INM to select which of three spectral classes (approach, depart, afterburner) to employ with the NPD curve.

Only approach and departure NPD curves are used in procedural profiles, because military/NOISEMAP aircraft (for which there are afterburner curves) do not have performance coefficients, and therefore they do not have procedural profiles. If you want to model afterburner noise for a military aircraft, you must create fixed-point profiles.

### 9.4.3 Thrust Setting

Thrust setting is used to parameterize the NPD curves. The thrust-setting parameter is typically "corrected net thrust per engine" for civil airplanes, whether it is in pounds thrust or percent of static thrust. Military airplanes use a wide range of thrust setting parameters other than "corrected net thrust per engine".

- "Corrected" means that the actual thrust setting at the aircraft altitude and ambient temperature is divided by the ratio of the ambient atmospheric pressure to the sea-level standard pressure. Thus, thrust is "corrected" back to sea-level standard day.
- Even though the NPD curves are identified by "thrust per engine", the noise levels include the contribution from all the engines.

Thrust-setting type for NPD curves determine thrust-setting values for procedure step records and profile point records.

- For example, if the NPD curves are in percent, then a fixed-point profile must use percent, not pounds.
- For thrust-setting type Other, thrust-setting values must be commensurate with the NPD curves.
- For example, if NPD curves are parameterized by 2, 4, 6, then a fixed-point profile would use thrust-setting values in a range of about 1.5 to 6.5 to prevent too much extrapolation when determining noise levels from the NPD curves.

Thrust settings for the approach, depart, or afterburner operational modes can have the same numerical value.

### 9.4.4 Noise Levels

The NPD curves are defined by 10 noise levels at 10 fixed distances.

- Exposure level distance – the distance from an observer to the closest point of approach along a straight flight path.
- Maximum level distance – the distance at which the maximum noise level is generated.

The 10 fixed distances are chosen so that they are approximately evenly spaced on a logarithmic scale:

200 ft	=	61.0 m
400 ft	=	121.9 m
630 ft	=	192.0 m
1000 ft	=	304.8 m
2000 ft	=	609.6 m
4000 ft	=	1219.2 m
6300 ft	=	1920.2 m
10000 ft	=	3048.0 m
16000 ft	=	4876.8 m
25000 ft	=	7620.0 m

Noise level must decrease as distance increases. If not, you will see a message about “monotonic decreasing” levels when you try to commit the record.

Noise levels for NPD curves are based on SAE-AIR-1845 atmospheric absorption coefficients. If you check the *Setup // Cases Modify NPD Curves* box, INM adjusts the NPD noise levels:

- The spectral class associated with the noise identifier and operational mode is used in the adjustment process.
- SAE-AIR-1845 atmospheric absorption losses are removed from the curves.
- SAE-ARP-866A atmospheric absorption losses are employed in the curves. Absorption is a function of temperature and relative humidity.
- INM does not display SAE-ARP-866A NPD curves.

If you select C-weighted noise metrics in the *Run // Run Options* window, INM changes SEL curves to CEXP and LAMAX curves to LCMAX:

- The spectral class associated with the noise identifier and operational mode is used in the adjustment process.
- A-weighting losses are removed from the curves.
- C-weighting losses are employed in the curves. The C-weighted curves are generally higher than the A-weighted curves.
- INM does not display C-weighted NPD curves.

#### **9.4.5 Interpolation and Extrapolation**

A computational set of NPD curves have the same noise identifier, noise type, and operational mode. For example, the CF66D-SEL-DEP computational set of curves consists of three records with thrust-setting parameters 20000, 28000, and 36000 pounds.

INM uses straight-line interpolation between points to calculate noise level at a given thrust setting and at a given distance.

- INM interpolates or extrapolates noise levels at thrust settings on flight paths and at distances from flight paths to observers.
- There must be at least two records (curves) per computational set so that noise levels can be interpolated or extrapolated.
- Noise level and thrust setting are interpolated on linear scales
- Distance is interpolated on a logarithmic scale.

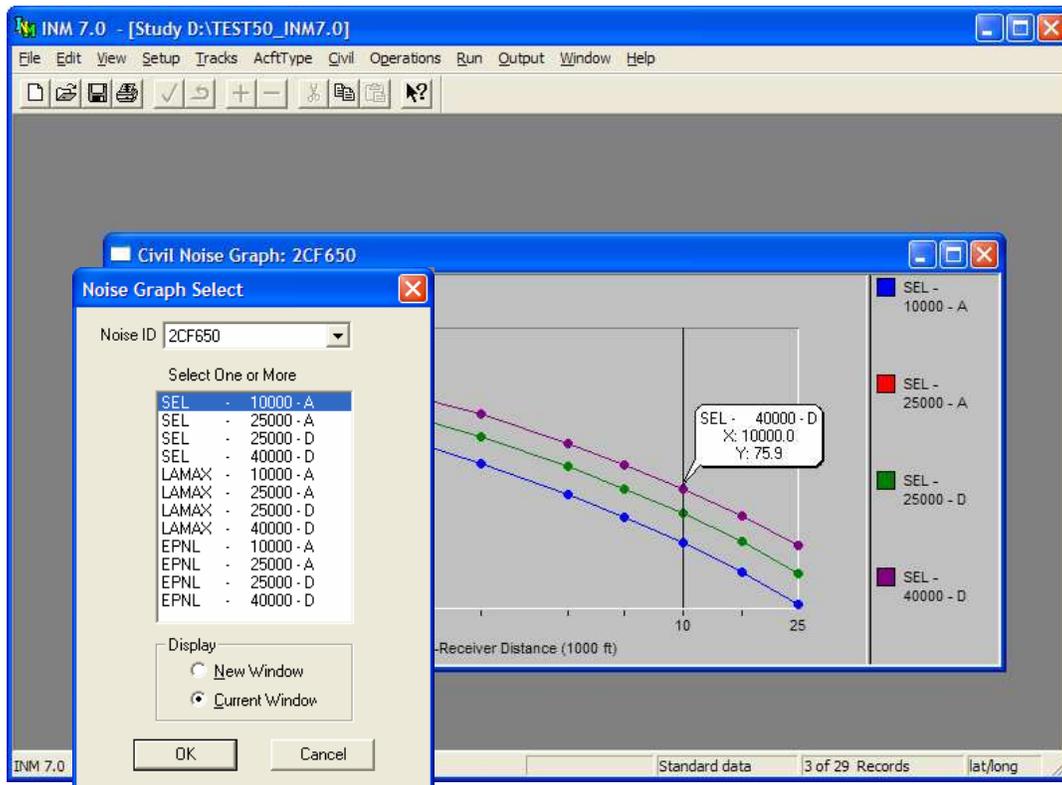
INM uses straight-line extrapolation from the two nearest curves to calculate thrust setting.

- For example, noise level at 36850 pounds is extrapolated from noise levels on curves 28000 and 36000.
- An extrapolated noise level is not allowed to be lower than the noise level of the lowest curve minus 5 dB.
- There is no upper limit on extrapolated noise levels relative to the noise level of the highest curve.

For distances less than 200 feet, INM uses -10 dB/decade for extrapolating exposure noise levels (for example, SEL decreases 10 dB when going from 20 feet to 200 feet). INM uses -20 dB/decade for extrapolating maximum noise levels for distances less than 200 feet.

For distances beyond 25,000 feet, INM uses the last two points (at 16,000 and 25,000 feet) for straight-line extrapolation on a logarithmic scale.

Standard INM military airplanes do not have afterburner NPD curves for more than one thrust setting, therefore INM does not interpolate afterburner curves. Instead, thrust values along an afterburner flight segment are read directly off the NPD curve, regardless of the afterburner thrust setting defined in the flight profile. Afterburner curves do not belong to computational sets.



## 9.5 Noise Graph

Menu Item: *Civil // Noise Graph*

Use this function to view a graph of noise levels versus distance:

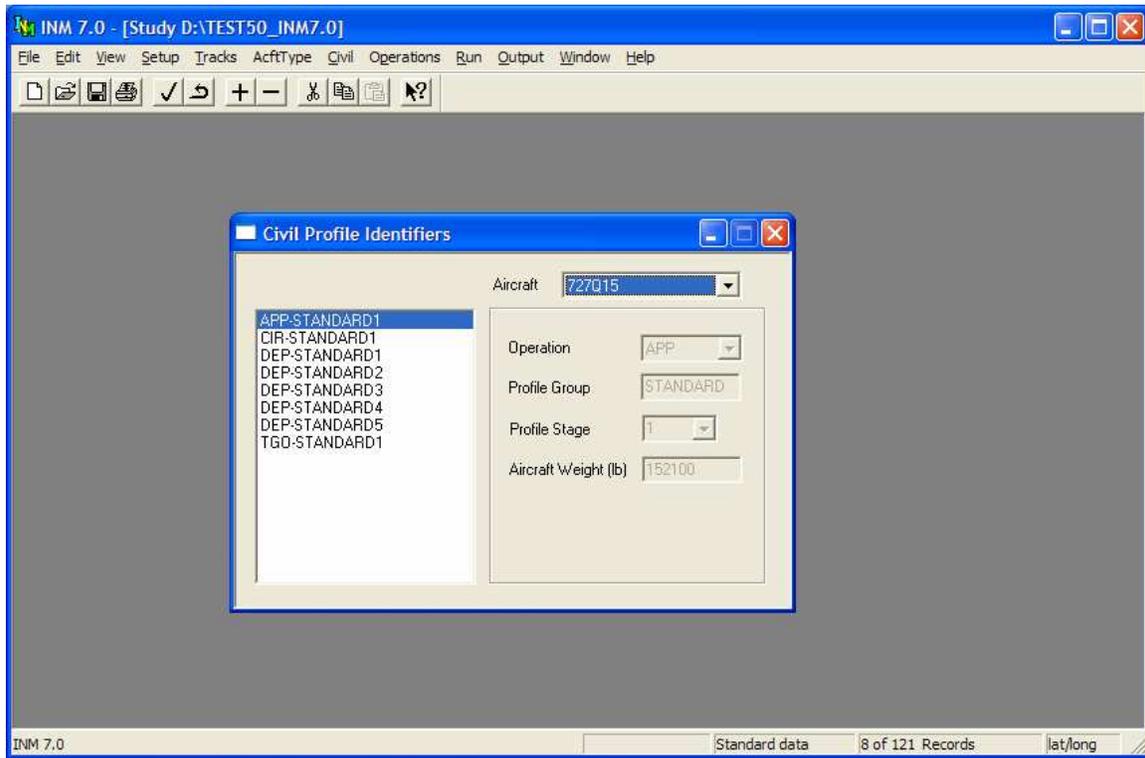
- In the *Noise Graph Select* dialog, select a noise identifier.
- Select one or more noise curves. Noise curves are identified by noise type (SEL, LAMAX, EPNL, PNLTM), thrust setting, and operational mode (A = approach, D = depart, X = afterburner).
- Select New Window to create another *Noise Graph* window.
- Select Current Window to overwrite data in the current *Noise Graph* window.

In a *Noise Graph* window, you can view the distance (X value) and the noise level (Y value) by double-clicking on a dot on the graph. A pop-up message bubble displays the X,Y values. You can remove the pop-up by clicking once anywhere.

You can watch noise curves being plotted as you commit each new NPD curve record. To do this, setup two windows side by side; first the *Noise Curve DBF* window and then the *Noise Graph* window. Each time you commit a new record from the *Noise Curve* window, a curve is plotted on the graph in the *Noise Graph* window.

There are three ways to export NPD data:

- While the *Noise Curve* window is active, use *File // Export As* to print a text file or *DBF* file of NPD data points.
- Or, while the *Noise Graph* window is active, use *File // Print* to print the NPD graph to a printer or to a file.
- Or, while the *Noise Graph* window is active, use *Edit // Copy* to copy the graphic to Windows Clipboard as a metafile (*WMF* format). The resulting data can be saved to disk, or directly pasted into another application that supports the Paste function.



## 9.6 Profile Identifiers

Menu Item: *Civil // Profile Identifiers* (also applies to *Military // Profile Identifiers*)

Use this function to view existing profile identifiers or to create a profile identifier before adding procedure steps or profile points.

To create a profile identifier:

1. Select an aircraft.
2. Use *Edit // Add Record* to create a new record.
3. Select a type of operation for the profile.
4. Input an eight-character profile group name.
5. Select single-digit profile stage number.
6. Input the weight of the aircraft during the operation.

You can use the profile stage numbers that are already defined by selecting them from the drop-down list, or you can create your own by typing a single digit (0 to 9) in the box.

### 9.6.1 Profile Operation Type

There are five types of flight profile operations:

APP	A	approach
DEP	D	departure
TGO	T	touch-and-go
CIR	F	circuit flight
OVF	V	overflight

INM has a circuit flight profile but no corresponding circuit flight track. A circuit flight profile uses a touch-and-go track.

### 9.6.2 Profile Group

The profile group name identifies profiles that belong to a group of similar procedures but of different weights or some other profile parameter. For example:

- DISTANT group may have four departure profiles of varying aircraft weights.
- LEVELAPP group may have two approach profiles using different level segments.

All INM standard profiles are identified by the name STANDARD. INM will not allow you to use this word to name your profiles. INM will also not allow the modification of any parameters associated with STANDARD profiles. Consequently, all parameters for STANDARD profiles are grayed-out in all INM windows.

### 9.6.3 Profile Stage Number

Profile stage is a one-digit number that distinguishes members in a profile group. It is called "stage" because it is used to identify stage lengths for departure profiles. Stage length is a range of trip distances. Departure stage lengths are defined as follows:

1	0	to	500	nmi
2	501	to	1000	nmi
3	1001	to	1500	nmi
4	1501	to	2500	nmi
5	2501	to	3500	nmi
6	3501	to	4500	nmi
7	4501	to	5500	nmi
8	5501	to	6500	nmi
9		over	6500	nmi

The idea behind using stage length is that the longer the trip, the heavier the average takeoff weight due to increased fuel requirements. Historically, it has been easier to obtain trip length data than average aircraft weight data, so stage length has been used as a surrogate for aircraft takeoff weight. However, given that aircraft weight directly affects the departure profile, you are encouraged to

obtain average takeoff weight if it is feasible. The reason is that a short-haul flight could carry a full load of passengers and ferry extra fuel, and you would under predict noise by using stage length.

Approach stage numbers are not related to trip distance. Approach stage numbers are just a way of distinguishing members in a group. For example, approach stage can mean different kinds of approaches.

- There is only one standard approach profile for most standard aircraft, and its stage number is set to 1.
- Some standard general aviation aircraft have both stage 1 and 2 approach profiles. Stage 1 is for 3-degree descent and stage 2 is for 5-degree descent.

#### **9.6.4 Profile Weight**

Profile weight is the weight of the aircraft during the operation. Aircraft fuel burn is not accounted for, so the weight remains constant over the entire operation.

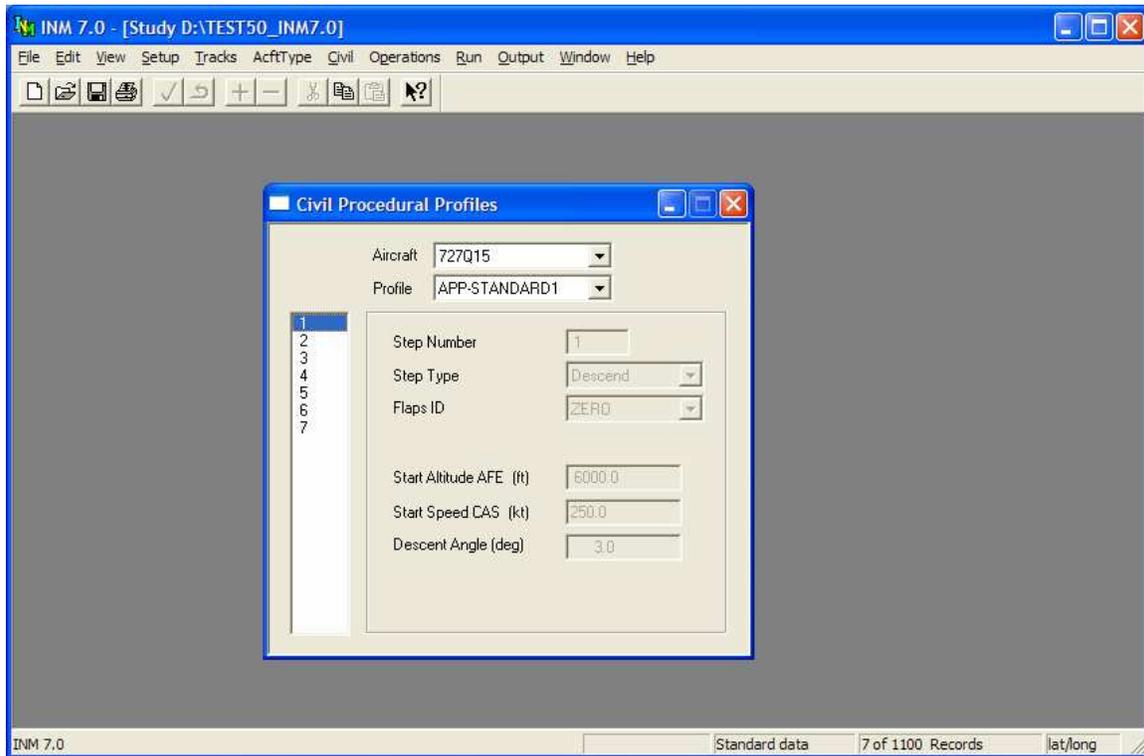
- If procedural profiles are used, departure profile weight influences the altitude that can be attained in a given amount of ground distance, thus affecting the noise produced by the airplane.
- For approach procedural profiles, weight influences the thrust required to maintain a descent profile, thus affecting the noise produced by the airplane.
- For fixed-point profiles, altitude and thrust are pre-computed and the weight parameter is used only for reference.

Approach and touch-and-go profiles have the following weight restrictions:

- To pass error-checking tests, weight must be less than maximum gross landing weight and must be greater than 75% of the maximum gross landing weight.
- Weight must be the same for TGO and CIR profiles that are used together in a touch-and-go operation.

Departure profiles have similar weight restrictions:

- To pass error-checking tests, weight must be less than the maximum gross takeoff weight and must be greater than 75% of the maximum gross landing weight.



## 9.7 Procedural Profiles

Menu Item: *Civil // Procedural Profiles*

Use this function to build procedural profiles by defining operational procedures for various phases of the flight.

Airplane profiles that are defined using procedural profiles (instead of fixed-point profiles) can adapt to study and case setup data (airport elevation, temperature, pressure, runway headwind and gradient). However, the development of procedural profiles is involved and requires knowledge of flight procedures. If the development of procedural profiles also includes new performance coefficients, data will have to be obtained from a manufacturer or operator having knowledge of airplane performance and SAE-AIR-1845.

A review of user-created procedural profiles is required for Federally funded INM noise analyses, as described in Appendix B "FAA Profile Review Checklist".

Most of the INM standard profiles are procedural profiles. The best way to learn how to create your procedural profiles is to view and study these standard profiles.

Airplanes must have performance coefficient data before building procedural profiles. Also, you need to create a profile identifier in the *Civil // Profile*

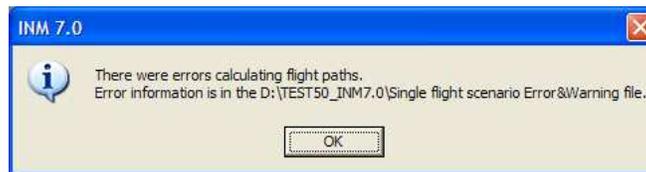
*Identifiers* window. Then, in the *Procedural Profiles* window, select the airplane and profile that you plan to use.

General rules for the *Procedural Profiles* window:

- Altitude is in feet (or meters) above field elevation (AFE).
- Distance is in feet (or meters) measured on the horizontal plane.
- Speed is in knots (or km/h) and is calibrated airspeed (CAS), not true airspeed (TAS), or ground speed. Speed is used in calculating sound exposure. You must input realistic speed values, based on the operational situation being modeled.
- Descent and climb angles are in degrees and are both positive.

Always check a newly created profile by using the *Civil // Profile Graphs* function. If there is a problem with the profile, you can usually see it on the chart much more easily than by examining the numerical data in the *Procedural Profiles* window. You can change procedure steps data and see the profile change in the chart window.

You can export a text file or *DBF* file of computed procedural profiles data by first using the *Civil // Profile Graphs* function to display the profile. Then, use the *File // Export As* function to create a file of profile point data.



### 9.7.1 Error and Warning Messages

INM displays an error message and stops computing profiles when climb and acceleration equations fail.

- The problem is mainly caused by a negative  $G_b$ -coefficient multiplying the altitude-squared term in the jet thrust equation. For a few problem airplanes, computed thrust is too small at high altitude (measured from sea level), or at high temperature (beyond the engine breakpoint temperature).
- The INM standard airplane performance coefficients used to calculate profiles were developed for a sea-level airport and standard-day temperature profile (59°F at sea level). They can be used in higher/hotter conditions, but with increasing chance of degraded accuracy.
- If your airport is at high elevation, or if you have a hot temperature case (regardless of airport elevation), you need to check all procedural profiles, even the INM-standard ones. Unrealistic profiles can be replaced with fixed-point profiles.

Even if INM does not display an error message and stop computing profiles, there still may be problems. Non-fatal warning messages are written to the *Error&Warning.txt* file in the scenario subdirectory.

Most warnings are from the following three types:

- Climb rate limit:  
PROFILE WARNING: A300 -D-STANDARD-5  
Accelerate step 3: climb rate 1688 fpm reset to 1518 fpm
- Altitude limit:  
PROFILE WARNING: DC1040-D-STANDARD-5  
Climb step 8: climb-to altitude 5500.0 ft reset to 6201.9 ft
- Takeoff distance limit:  
FLIGHT PATH WARNING: 747200  
Profile D-STANDARD-4 takeoff 7684 ft is too long for runway 01L available 6800 ft

Look in the text file to see the warning messages. Then, using the *Civil // Profile Graphs* function, look at the profiles that have warning messages and decide if they are acceptable to use.

### 9.7.2 Procedure Step Types

The five types of flight operations (APP, DEP, TGO, CIR, OVF) are created by using fourteen types of procedure steps:

- Takeoff – start-roll to takeoff rotation, or touch-and-go power-on point to takeoff rotation
- Climb – departure climb to final altitude at constant calibrated airspeed
- Cruise-Climb – climb at constant angle to final altitude and speed
- Accelerate – departure climb and accelerate to final speed
- Accel-Percent – departure climb and accelerate using a constant energy split between acceleration and climbing
- Level – maintain altitude and speed
- Level-Decel – maintain altitude and reduce speed
- Level-Idle – maintain altitude over a given distance with engines at idle
- Level-Stretch – special step used to designate where to stretch a circuit flight profile to fit a touch-and-go track
- Descend – descend at constant angle to final altitude
- Descend-Decel – descend while reducing airspeed
- Descend-Idle – descend at a constant angle with engines at idle
- Land – land and roll a given distance
- Decelerate – used on approach after touchdown, brake with starting thrust for a given distance

Appendix J shows the allowed transitions from one type of procedure step to the next, for each of the five types of flight profiles.

Certain procedure step types were newly added as enhancements for INM version 7.0. Currently no standard profiles make use of these new steps, but as aircraft manufacturers update their profiles they will likely use the new steps as well. These steps also allow more flexibility in creating user-defined profiles. These new procedure steps are listed below:

- Accel-Percent
- Level-Decel
- Level-Idle
- Descend-Decel
- Descend-Idle

### **9.7.3 Takeoff Step**

For a Takeoff step, select a flaps identifier and a thrust type. The flaps identifier should not have a U or D prefix because these coefficients were measured on descending flight paths.

You should usually select MaxTakeoff thrust for takeoff, but other thrust types are available:

- MaxClimb thrust means that an airplane takes off using reduced thrust, thus requiring a longer runway. If INM detects that a takeoff roll exceeds the runway length, a warning message is written to the *FLT\_ERR.TXT* file in the scenario subdirectory.
- UserValue thrust means that you supply the takeoff thrust value. The thrust value is the "corrected net thrust per engine" in pounds or in percent of static thrust. INM uses the input value at both the start-roll point and at the rotation point.

For MaxTakeoff and MaxClimb thrust, INM uses coefficients in the Jet Thrust (or Prop Thrust) window and SAE-AIR-1845 equations to compute thrust values. For jets, the start-roll thrust is computed at 0 knots, and the rotation thrust is computed using the takeoff speed, which comes from another SAE equation. For jets, the thrust is larger at start-roll than at rotation. For props, the thrust is the same at both points and equal to the thrust computed at the rotation point.

### **9.7.4 Climb Step**

For a Climb step, you select a flaps identifier, select a thrust type, and input the final altitude (the "climb-to" altitude). The final altitude must be higher than the initial altitude. The calibrated air speed on a climb segment is constant, and it is equal to the final speed used on the previous step.

INM computes the climb angle and the ground distance based on the airplane weight and average thrust that can be generated for the given conditions. If the computed climb gradient is too small (1%), INM stops with an error message.

Usually, you would select MaxTakeoff thrust for initial climb segments and MaxClimb thrust for later climb segments, but other thrust types are available:

- UserValue thrust can be assigned to the final climb-to point. INM does not adjust this input value for airport elevation, temperature, and pressure, so you need to account for these airport conditions when you input the value.
- UserCutback thrust can be assigned to the whole segment. The difference between UserValue and UserCutback is that INM applies the user-value-thrust to a point, whereas user-cutback-thrust is applied to a segment. For the cutback case, INM reduces the thrust over a 1000-foot segment, keeps it constant at the user-cutback value over the climb distance (less 1000 feet), and then returns it to normal thrust over a second 1000-foot segment. The input thrust is "corrected net thrust per engine", and INM does not adjust this value for airport conditions.
- MinimumThrust can be used when building Noise Abatement Departure Profiles (NADPs). This thrust type works the same as UserCutback, except that INM computes the cutback value instead of you supplying it:
  - If the *Civil Airplane Data* window has the Automatic Thrust Restoration System (ATRS) box checked, thrust value is computed for a zero-climb gradient with one engine inoperative.
  - If ATRS is not checked, the thrust value is computed for one engine inoperative and a climb gradient in accordance with FAR Section 25.111(c)(3): 1.2% gradient for 2 engines, 1.5% for 3 engines, and 1.7% for 4 engines.
  - The airplane for which you are building a MinimumThrust profile must have two or more engines. NADPs are used for turbojet airplanes with maximum gross takeoff weight of more than 75,000 pounds. INM does not produce error messages for engine type or airplane weight not meeting these criteria, because you may want to use the MinimumThrust option for other airplanes.

### 9.7.5 Accelerate Step

For an Accelerate step, you select a flaps identifier and a thrust type, and input the climb rate and final speed (the "accelerate-to" speed). The final speed must be larger than the initial speed.

INM uses these input parameters and the SAE-AIR-1845 equations to compute the change in altitude and the distance flown.

The climb rate should be consistent with a sea-level standard-day profile. If necessary, INM adjusts the climb rate to account for the actual airport elevation, temperature, and pressure. If this happens, a warning message is written in the *FLT\_ERR.TXT* file.

Zero climb rate is a valid input. INM computes a zero change in altitude, and the thrust is used to accelerate the airplane more quickly.

The five climb thrust types discussed above for the Climb step are also available for an acceleration segment.

### **9.7.6 Accel-Percent Step**

For an AccelPercent step, select a flaps identifier, and input the thrust type, energy-share percentage, and final airspeed.

Energy-share comes from the notion that all available thrust is divided between acceleration and climbing. Unlike steps that maintain a constant airspeed while climbing, this step holds the energy-share constant for a given amount of thrust. Enter the percent thrust dedicated to acceleration in the Accelerate Percent box. An input of 70, for example, would result in 70% of thrust going to acceleration and the remaining  $100\% - 70\% = 30\%$  of thrust going to climbing.

### **9.7.7 Cruise-Climb Step**

For a CruiseClimb step, select a flaps identifier (usually ZERO), and input the final altitude, the climb speed, and the climb angle for the segment.

INM calculates the distance flown, based on the change in altitude and the climb angle. INM calculates the corrected net thrust per engine by using the SAE-AIR-1845 descent equation with a positive angle, rather than a negative angle.

The difference between Climb and CruiseClimb is that you select the thrust for Climb (by selecting MaxTakeoff, MaxClimb, etc.), whereas INM calculates thrust for CruiseClimb based on the input climb angle. Climb thrust is larger than CruiseClimb thrust. Climb steps are used after takeoff when near-maximum thrust is applied. During cruise, less thrust is used in climbing from one altitude to another.

### **9.7.8 Level-Stretch Step**

For a LevelStretch step, select a flaps identifier. A Level Stretch step is used to create circuit flight profiles. Its purpose is to define where to put a variable-length segment so that a CIR profile fits on top of a TGO track.

- There can be only one Level Stretch step in a CIR profile.
- A Level Stretch step must have a Level step before it and after it. This pair of Level steps should have the same altitude and speed values.

### **9.7.9 Level Step**

For a Level step, select a flaps identifier and input the altitude, speed, and distance flown along the segment. The flaps identifier should be ZERO, or perhaps one with a U prefix (meaning that the landing gear is up).

Make sure that altitude and speed parameters make sense for segments before and after a Level segment.

- For example, a previous Climb final altitude must equal the Level altitude.
- Also, the Level altitude must equal the next Descend start altitude.
- INM catches most of these kinds of problems when it tries to compute the profile. For each such problem, INM writes a warning message or, in some cases, displays an error message box and stops the run.
- INM computes the amount of thrust needed to maintain level flight at constant speed for the given flaps configuration.

The difference between a Level step and a zero-climb Accelerate step is that the Level step uses a constant speed on the segment, and it uses a smaller value of thrust (and thus, lower noise level) than the Accelerate step. If speed changes during level flight, use a zero-climb Accelerate step.

#### **9.7.10 Level-Decel Step**

For a Level-Decel step, select a flaps identifier and input the altitude, initial airspeed, and distance flown along the segment. Unlike the Level step, airspeed is not held constant but allowed to decrease over the segment. INM computes the amount of thrust needed to maintain level flight while decelerating.

The Level-Decel step is subject to the same airspeed and altitude considerations as the Level step, e.g. a preceding climb segment has to end at the same altitude as the Level-Decel step.

#### **9.7.11 Level-Idle Step**

For a Level-Idle step, input the altitude, initial airspeed, and distance flown along the segment. Airspeed is allowed to decrease over the segment. Unlike Level and Level-Decel steps, thrust is calculated using idle thrust coefficients rather than a force balance.

The Level-Idle step is subject to the same airspeed and altitude considerations as the Level step, e.g. a preceding climb segment has to end at the same altitude as the Level-Idle step.

#### **9.7.12 Descend Step**

For a Descend step, select a flaps identifier and input the starting altitude, starting speed, and the descent angle for the segment.

If a Level or Descend step follows the Descend step, it must have a lower altitude. The following step can have the same or a different speed.

#### **9.7.13 Descend-Decel Step**

For a DescendDecel step, select a flaps identifier and input the starting altitude, starting speed, and the descent angle for the segment. The DescendDecel step

differs from the Descend step in that it more explicitly accounts for deceleration effects during thrust calculations.

If a Level or Descend step follows the DescendDecel step, it must have a lower altitude. The following step can have the same or a different speed.

#### **9.7.14 Descend-Idle Step**

For a DescendIdle step, input the initial airspeed, initial altitude, and descent angle. The DescendIdle step does not require that a flap setting be specified. The other Descend steps that require flap settings utilize a force balance equation to calculate thrust, but this step calculates the aircraft idle thrust directly from engine idle thrust coefficients.

#### **9.7.15 Land Step**

For the Land step, select a flaps identifier and input the touchdown rolling distance, which is the distance that the airplane moves before reversing thrust and/or braking.

The last Descend step and the Land step must both use a flaps identifier that has a D prefix (meaning that the landing gear is down).

INM computes the touchdown speed by using a SAE-AIR-1845 equation.

#### **9.7.16 Decelerate Step**

For a Decelerate step, input the segment distance, the starting speed, and the percent of static thrust at the start of the segment. When applicable, the percent of static thrust at the start of the segment represents the level of reverse thrust.

INM uses the percent value and the airplane static thrust to compute a thrust-setting value for accessing the NPD curves. For those airplanes that use percent-type noise, the percent value is used to access the NPD curves.

#### **9.7.17 How to Build an Approach Profile**

You can use the *Procedural Profiles* window to view standard approach procedures to see how to build new ones.

INM standard approach procedures generally have four Descend steps, a Land step, and two Decelerate steps, as follows:

- The four Descend steps start at 6000, 3000, 1500, and 1000 feet AFE. They bring an airplane from zero-flaps configuration, terminal-area entrance speed, down to landing-gear/flaps configuration, final-approach speed.
- For most INM airplanes, a 3-degree descent angle is used to model IFR approaches. For single-engine piston airplanes and for BEC58P, a 5-degree descent angle is used to model VFR approaches.

- For the Land step, the touchdown-roll distance is 10% of the total roll-out distance. For those airplanes using 3-degree approaches, the relationship between the total roll-out distance and the input parameter in the *Airplane Data* window is:

$$(\text{Roll-out distance}) = 0.9 (\text{Max landing distance}) - 954$$

- For those airplanes using 5-degree approaches, the 954-foot value is replaced with 572 feet (the angle is steeper, so the in-air portion of the flight path after crossing the end of the runway is shorter).
- The first Decelerate distance is 90% of the total roll-out distance. The starting speed is less than the touchdown speed. The starting percentage thrust is 40% for narrow-body jets, 10% for wide-body jets, and 40% for props. The first deceleration segment represents reverse thrust action.
- The second Decelerate distance is zero, indicating the end of the profile. The starting speed is 30 knots, representing taxi speed. The starting percentage thrust is 10% of static thrust, representing taxi thrust.

### 9.7.18 How to Build a Departure Profile

You can use the *Procedural Profiles* window to view standard departure procedures to see how to build new ones.

INM standard departure procedures for civil jet airplanes tend to follow a pattern (but there are exceptions). A typical civil jet departure profile consists of the following procedure steps:

1. Takeoff using MaxTakeoff thrust and extended flaps.
2. Climb to 1000 feet using MaxTakeoff thrust and takeoff flaps.
3. Accelerate 10-20 knots using MaxTakeoff thrust, takeoff flaps, and 2/3 of the initial climb rate.
4. Accelerate 15-30 knots using MaxTakeoff thrust, reduced flaps, and 1/2 of the initial climb rate.
5. Accelerate to Vz<sub>f</sub> (zero-flaps minimum safe maneuvering speed) using MaxClimb thrust, minimal flaps, and 1000-fpm climb rate.
6. Climb to 3000 feet using MaxClimb thrust and zero flaps.
7. Accelerate to 250 knots using MaxClimb thrust, zero flaps, and 1000-fpm climb rate.
8. Climb to 5500 feet using MaxClimb thrust and zero flaps.
9. Climb to 7500 feet using MaxClimb thrust and zero flaps.
10. Climb to 10000 feet using MaxClimb thrust and zero flaps.

A standard departure profile for propeller-driven civil airplanes also tends to follow a pattern of procedure steps:

1. Takeoff using MaxTakeoff thrust and takeoff flaps.
2. Accelerate 10-15 knots using MaxTakeoff thrust, takeoff flaps, and a standard rate of climb.
3. Climb to 1000 feet using MaxTakeoff thrust and takeoff flaps.
4. Accelerate to Vz<sub>f</sub> using MaxTakeoff thrust, takeoff flaps, and a standard climb rate.

5. Climb to 3000 feet using MaxClimb thrust and zero flaps.
6. Climb to 5500 feet using MaxClimb thrust and zero flaps.
7. Climb to 7500 feet using MaxClimb thrust and zero flaps.
8. Climb to 10000 feet using MaxClimb thrust and zero flaps.

An INM standard airplane usually has more than one departure profile. INM profiles are distinguished by profile stage numbers from 1 to 9. Departure procedure steps are almost the same for all profile stages. Usually, the change is in the Accelerate step where the final speed value increases for heavier airplanes and the climb rate decreases for heavier airplanes.

### **9.7.19 How to Build NADPs**

An INM standard departure procedure can be used to create Close-in and Distant Noise Abatement Departure Profiles that conform to FAA Order AC91-53A. The following methods are not official and they utilize the absolute minimums allowed for under the advisory circular. Actual airline NADPs will be at or above these minimums and will most likely be defined in terms of EPR reductions rather than engine-out gradient specifications. It is your responsibility to coordinate with the FAA before using NADP profiles for environmental impact studies. Appendix I shows examples of Close-in and Distant NADPs.

Close-in NADP:

1. Create a new departure profile identifier CLOSEIN. Use standard stage and weight.
2. Copy standard departure procedure step records and paste them into the new profile (usually 9 or 10 records).
3. In the new profile, change step-2 altitude from 1000 to 800 feet.
4. For step 3, Climb to 3000 feet using ReduceThrust and takeoff flaps.
5. For steps 4, 5, and 6, Accelerate in increments to Vz<sub>f</sub> using MaxClimb thrust. Use the same schedule for flaps and climb rate as used in the standard procedure steps. You may have to reduce the first two climb rates because MaxClimb thrust may not be large enough to accelerate and climb at the given rate.
6. For steps 7, 8, and 9, Climb in increments to 10000 feet using MaxClimb thrust. Use the same altitude schedule as in the standard procedure steps (5500, 7500, 10000 feet).

Distant NADP:

1. Create a new departure profile identifier DISTANT. Use standard stage and weight.
2. Copy standard departure procedure step records and paste them into the new profile (usually 9 or 10 records).
3. In the new profile, change step-2 altitude from 1000 to 800 feet.
4. Change step-6 (sometimes step-5) MaxClimb to MinimumThrust, and Climb to 3000 feet using MinimumThrust and zero flaps.
5. Leave all other steps as they are.

### **9.7.20 How to Build Touch-and-Go Profiles**

You build a complete touch-and-go flight operation by creating five objects:

- TGO track
- TGO profile
- CIR profile
- Flight operation using the TGO track and TGO profile
- Flight operation using the TGO track and the CIR profile.

You can use INM standard TGO and CIR profiles as examples of how to model touch-and-gos.

How to build a TGO profile:

1. The first step is Level at the pattern altitude and at a speed consistent with your choice of flaps. Use a small value for the distance parameter (for example, 500 feet).
2. Add one or more Descend steps using a flaps/speed schedule that ends with landing flaps, gear down, and final approach speed.
3. Land using a touchdown roll distance that represents the distance traveled before power is applied to takeoff again.
4. Takeoff using MaxTakeoff thrust, takeoff flaps, and a starting power-on speed that is 10-20 knots less than the touchdown speed. INM computes the distance needed to accelerate from power-on speed to takeoff speed.
5. Climb (or Accelerate and Climb) to pattern altitude in a manner similar to a departure procedure.
6. If necessary, Accelerate with zero climb rate at pattern altitude to the speed used in the first step.
7. The last step is Level at the pattern altitude at the speed used in the first step. Make this segment 1000 feet long (it will be divided into two 500-foot segments when INM detects the discontinuous change in thrust from the Accelerate step to the Level step). INM creates a Level segment on the down-wind leg that connects the Level departure segment (this last step) to the Level approach segment (the first step).

How to build a CIR profile:

1. Takeoff using MaxTakeoff thrust and takeoff flaps.
2. Climb (or Accelerate and Climb) to pattern altitude in a manner similar to a departure procedure.
3. If necessary, Accelerate with zero climb rate at pattern altitude to the speed used in the first step of the TGO procedure.
4. Add a Level step using pattern altitude, speed, and flaps that were used in the TGO procedures. Use a small value for the distance parameter (for example, 500 feet).
5. Add a LevelStretch step using the TGO flaps identifier. INM calculates the distance that is added to the profile so it fits the TGO track.
6. Again add a Level step at pattern altitude and speed. Use a small value for the distance parameter.
7. Add one or more Descend steps using a flaps/speed schedule that ends with landing flaps and final approach speed.

8. Land using a touchdown distance that represents the distance traveled before reverse thrust is applied.
9. Add two Decelerate steps in a manner similar to the approach procedure.

A circuit flight must have one, and only one, Level–LevelStretch–Level sequence of steps. The two Level steps must be at the same altitude and speed. All three steps should use the same flaps identifier.

Always check your TGO and CIR profile by using the *Civil // Profile Graphs* function. When you try to do this, you may see an error message about the profile being too long for the TGO track. If you are sure that the ground track is realistically sized, you need to change the profile.

Options for shortening a TGO or CIR profile:

- Make the two Level-step distance parameters smaller.
- Make the descent angle slightly larger (for example, change 3.0 to 3.5 degrees).
- Use MaxTakeoff thrust in later climb segments instead of MaxClimb thrust.
- Reduce the airplane weight so that it climbs to pattern altitude in less distance (make sure that both TGO and CIR weights are the same).
- Lower the pattern altitude, if operationally realistic.

The INM database contains touch-and-go and circuit flight profiles for almost all airplanes that have approach and departure performance coefficients. These TGO and CIR database profiles are not considered standard. Instead, they are generic profiles that you should modify for specific airport operational conditions.

The INM database touch-and-go and circuit flight profiles were developed using the following rules:

- Profiles are designated TGO-STANDARD-1 and CIR-STANDARD-1.
- TGO and CIR profile weight is standard stage-1 departure weight.
- Pattern altitude for small piston airplanes is 900 feet and for all other airplanes is 1500 feet AFE.
- Pattern speed is the standard stage-1 departure accelerate-to speed for the first acceleration segment.
- Pattern flaps are the standard stage-1 departure flaps for the first acceleration segment.
- Descent angle for small piston airplanes is 5 degrees and for all other airplanes is 3 degrees.
- Approach speeds are scaled to profile weight.
- TGO landing roll distance, before applying takeoff power, is twice the standard approach roll distance before applying reverse thrust.
- TGO power-on speed is the smallest of: 95% of the landing speed, the standard approach decelerate speed, or 90% of the takeoff speed.
- CIR deceleration steps are the same as standard approach steps.

### **9.7.21 How to Build an Overflight Profile**

An overflight profile can be built with one procedure step. For example: Level using ZERO flaps, at 5000-foot altitude, at 250 knots, for a distance of 300,000 feet (about 50 nmi).

Make sure that an overflight profile is long enough to extend across the noise calculation area because INM does not extend profiles (INM does extend ground tracks). An airplane flight path starts at the beginning of an overflight track and continues until the profile ends. Noise is not produced before the start of the track or after the end of the profile, even though the ground track may continue on.

### **9.7.22 Flight Path Construction**

INM calculates profile points using procedure step data and SAE-AIR-1845 equations. After profile points are calculated, a three-dimensional flight path is constructed.

INM constructs a three-dimensional flight path by merging a two-dimensional profile (a set of distance vs. altitude points) with a two-dimensional ground track (a set of X,Y points) using the following method:

- Wherever there is a track point, a Z-value is computed by interpolating between two points on the profile.
- Wherever there is a profile point, X,Y values are computed on the ground-track segment under the profile point.

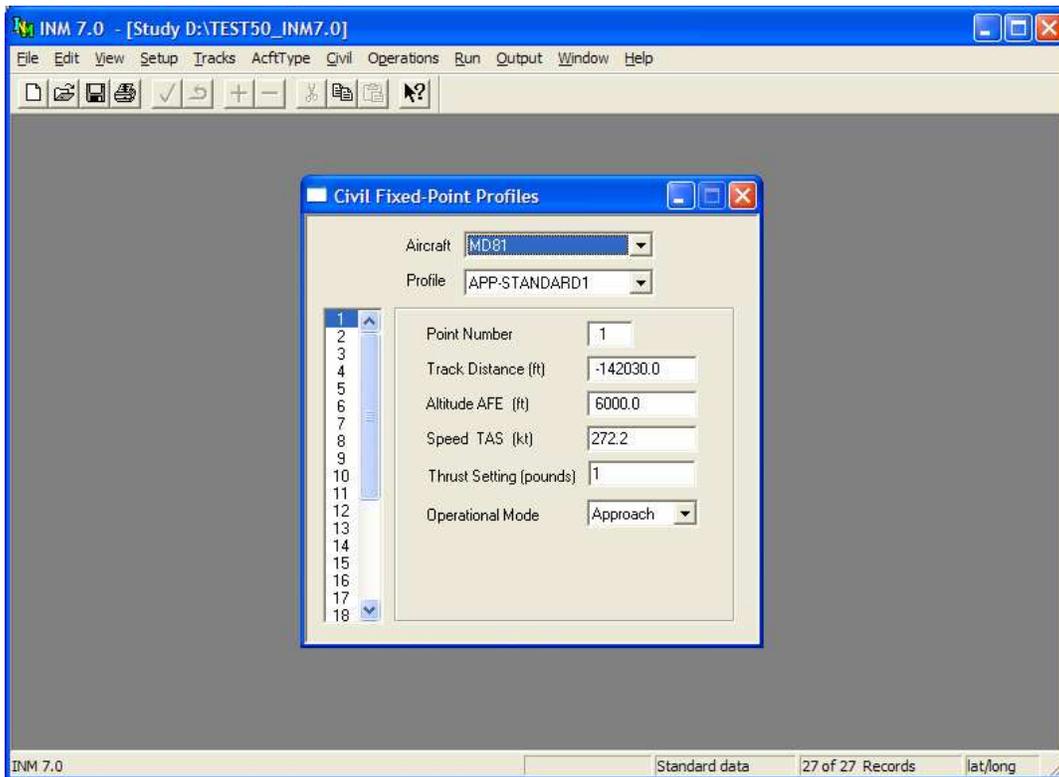
The result of this construction is an ordered set of X,Y,Z points and associated data describing the flight path. Thus, a flight path is a set of flight path segments, and each segment contains the following data:

- Segment starting point (X,Y,Z)
- Unit vector pointing along the segment in the direction of flight
- Segment length
- Segment starting speed, and change in speed
- Segment starting thrust setting, and change in thrust setting.

During flight path construction, INM automatically extends ground tracks so that a profile has a track under it. However, INM does not extend profiles, so the airplane “disappears” after the last profile segment, and does not contribute to the noise calculation after that.

The last flight path segment is constructed by using the last profile point and the second-to-last segment. The last segment length is set to one foot.

The *Output // Flight Path Report* function writes a text file of flight path data to each case subdirectory in a scenario.



## 9.8 Fixed-Point Profiles

Menu Item: *Civil // Fixed-Point Profiles* (also applies to *Military // Fixed-Point Profiles*)

Use this function to create a fixed-point profile in terms of distance, altitude, speed, and thrust-setting values at multiple points.

Airplane profiles that are defined using fixed-point profiles (instead of procedural profiles) can be controlled in detail. However, fixed-point profiles remain static and do not adapt to changes in study and case setup data (airport elevation, temperature, pressure, runway headwind and gradient).

A review of user-created fixed-point profiles is required for Federally funded INM noise analyses, as described in Appendix B "FAA Profile Review Checklist".

When developing fixed-point profiles, make sure that:

- Thrust-setting values are consistent with airplane altitude and temperature at altitude.
- Altitude vs. distance represents realistic climb or descent performance under assumed thrust, altitude, temperature, and wind conditions.

To create a fixed-point profile:

1. Select an airplane and a profile identifier.
2. Use the *Edit // Add Record* function to create a new profile point record.
3. Tab through the fields, entering data as you go.
4. Continue adding profile points until the profile is finished.

The point numbers keep the records in order. The point number should start with 1 and increment by 1 for each new record. A given fixed-point profile can have as many as 999 profile point records. After a record is completed, use the *Edit // Commit Record* function. You can also commit a record by adding another new one.

Thirty INM standard civil airplanes use fixed-point profiles:

707120	A300-622R *	CNA20T
707	A310-304 *	DC820
720	A319-131 *	MD11GE *
727200	A320-211 *	MD11PW *
737800 *	A320-232 *	MD81 *
747100	A321-232 *	MD82 *
757300 *	A330-301 *	MD83 *
767400 *	A330-343 *	PA28
777200 *	A340-211 *	PA31
777300 *	CNA206	SABR80

\* Fixed point profile for approach only

You can use these profiles as examples for how to build fixed-point approach and departure profiles.

Always check a newly created profile by using the *Civil // Profile Graphs* function. If there is a problem with the profile, you can usually see it in the chart window much more easily than by examining the numerical data in the *Fixed-Point Profiles* window. You can change profile point data and see the profile change in the chart window.

If a profile identifier is defined as both a fixed-point profile and as a procedural profile, then the fixed-point profile takes precedence and is used in constructing the flight path.

### 9.8.1 Track Distance

Track distance is the horizontal distance value from a reference point.

- Track distance is a value on an arbitrary axis, and the reference point is at track distance = 0.
- Track distance can be positive or negative.
- Track distance increases as the airplane flies the profile.

The coordinate reference point depends on the type of operation:

- APP Track distance = 0 at the touchdown point. Before touchdown, track distance is negative. At touchdown it is zero. After touchdown, track distance is positive.
- DEP Track distance = 0 at the start-roll point. Distance values start at zero and become more positive.
- TGO Track distance = 0 at the touchdown point. As with APP, the profile starts with negative track distance. At touchdown it is zero. After touchdown, track distance is positive.
- CIR Track distance = 0 at the start-roll point. Distance values start at zero and become more positive.
- OVF Track distance = 0 at the starting point. Distance values start at zero and become more positive.

### **9.8.2 Altitude**

Altitude is altitude above field elevation (AFE), not altitude above sea level, and not altitude above ground level. The altitude value should be operationally realistic for the airplane weight and airport temperature being modeled.

Changes in altitude depend on type of operation:

- APP Altitude starts positive, then decreases to zero at the touchdown point, and remains zero thereafter.
- DEP Altitude starts at zero, remains zero until takeoff, and increases thereafter.
- TGO Altitude starts at the pattern altitude, decreases to zero at touchdown, remains zero until takeoff, and increases to the original pattern altitude.
- CIR Altitude starts at zero, increases to pattern altitude, remains at pattern altitude, decreases to zero at the touchdown point, and remains zero thereafter.
- OVF Altitude usually remains constant for the entire profile, although it is not required.

### **9.8.3 Speed**

Speed is true airspeed (TAS), not calibrated or indicated airspeed. The speed values must be operationally realistic so that sound exposures are properly modeled.

### **9.8.4 Thrust Setting**

Thrust-setting value is used to compute noise from NPD curves. For civil airplanes, this parameter usually is corrected net thrust per engine in pounds, but some civil airplanes use percent of static thrust. Military airplanes use a wide variety of thrust setting types that are described in Appendix M.

Thrust-setting values must be operationally realistic for the airplane weight, altitude, temperature, and pressure being modeled. Make sure that the input value and the thrust-setting parameters on the airplane NPD curves are compatible. For example, a thrust-setting value of 3.5 is compatible if the NPD curves range from 1 to 4.

When the operational mode is set to Afterburner, select the afterburner curve from the drop-down list box, rather than typing in the thrust-setting value.

### **9.8.5 Operational Mode**

Noise operational modes are Approach, Depart, and Afterburner.

- If you select Approach or Depart, enter a thrust-setting value.
- If you select Afterburner, choose an afterburner thrust-setting value from a drop-down list of available afterburner values per NPD data for the airplane.

Thrust setting versus distance is calculated differently for the two cases:

- Approach or Depart – INM draws straight lines from point to point. Thrust setting is linearly interpolated between points.
- Afterburner – INM inserts profile points to make thrust-setting values remain constant while the afterburner is on. For example, if you define a Depart–Afterburner–Depart sequence of points, INM inserts two points:
  - A Depart point just before the Afterburner point
  - An Afterburner point just before the second Depart point.

The thrust setting versus distance graph shows a sudden increase due to the afterburner, and further on, a sudden decrease to the normal setting.

### **9.8.6 How to Build Touch-and-Go Profiles**

You build a complete touch-and-go flight operation by creating five objects:

- TGO track
- TGO profile
- CIR profile
- Flight operation using the TGO track and TGO profile
- Flight operation using the TGO track and the CIR profile.

If a fixed-point profile is created properly, INM can adjust the points to fit them onto an arbitrary TGO track. This means that TGO and CIR profiles can be

applied to different TGO tracks (just as an APP profile can be applied to different APP tracks).

The following list of profile points is an example of how to build a fixed-point TGO profile:

	DISTANCE	ALTITUDE	SPEED	THRUST	OP
1	-11287.0	<b>900.0</b>	<b>116.5</b>	<b>50.22</b>	<b>D</b>
2	-10287.0	900.0	110.4	23.43	D
3	-6858.0	600.0	99.9	27.20	A
4	0.0	0.0	99.0	26.61	A
5	377.6	0.0	85.5	122.85	A
6	678.7	0.0	95.0	122.85	D
7	2883.1	226.6	115.4	101.98	D
8	7355.6	900.0	116.5	103.48	D
9	7605.6	<b>900.0</b>	<b>116.5</b>	<b>50.22</b>	<b>D</b>

For a TGO profile, make the first and last points identical in altitude, speed, thrust, and operational mode (for example, points 1 and 9 above). INM can then insert extra distance between the last and first points to complete the TGO track.

The following list of profile points is an example of how to build a fixed-point CIR profile:

	DISTANCE	ALTITUDE	SPEED	THRUST	OP
1	0.0	0.0	16.0	122.85	D
2	1584.5	0.0	95.0	122.85	D
3	3788.9	226.6	115.4	101.98	D
4	8261.4	900.0	116.5	103.48	D
5	<b>8761.4</b>	<b>900.0</b>	<b>116.5</b>	<b>50.22</b>	<b>D</b>
6	<b>8761.4</b>	<b>900.0</b>	<b>116.5</b>	<b>50.22</b>	<b>D</b>
7	10261.4	900.0	110.4	23.43	D
8	13690.4	600.0	99.9	27.20	A
9	20548.5	0.0	99.0	26.61	A
10	20737.3	0.0	93.9	40.00	A
11	22436.5	0.0	30.0	10.00	A

For a CIR profile, make two identical points somewhere in the middle of the profile (for example, points 5 and 6, above). INM can then insert extra distance to complete the TGO track between these two points.

The distance around a TGO track must be larger than the flying distance implied by the fixed-point profile.

- In the TGO profile example above, the TGO track must be longer than  $11287.0 + 7605.6 = 18892.6$  feet.
- In the CIR profile example above, the TGO track must be longer than the distance from start roll to touchdown = 20548.5 feet.

### 9.8.7 How to Build a Taxi Profile

INM does not explicitly support taxi noise modeling for fixed-wing airplanes. However, a taxi path can be approximated by an overflight track and a fixed-point overflight profile.

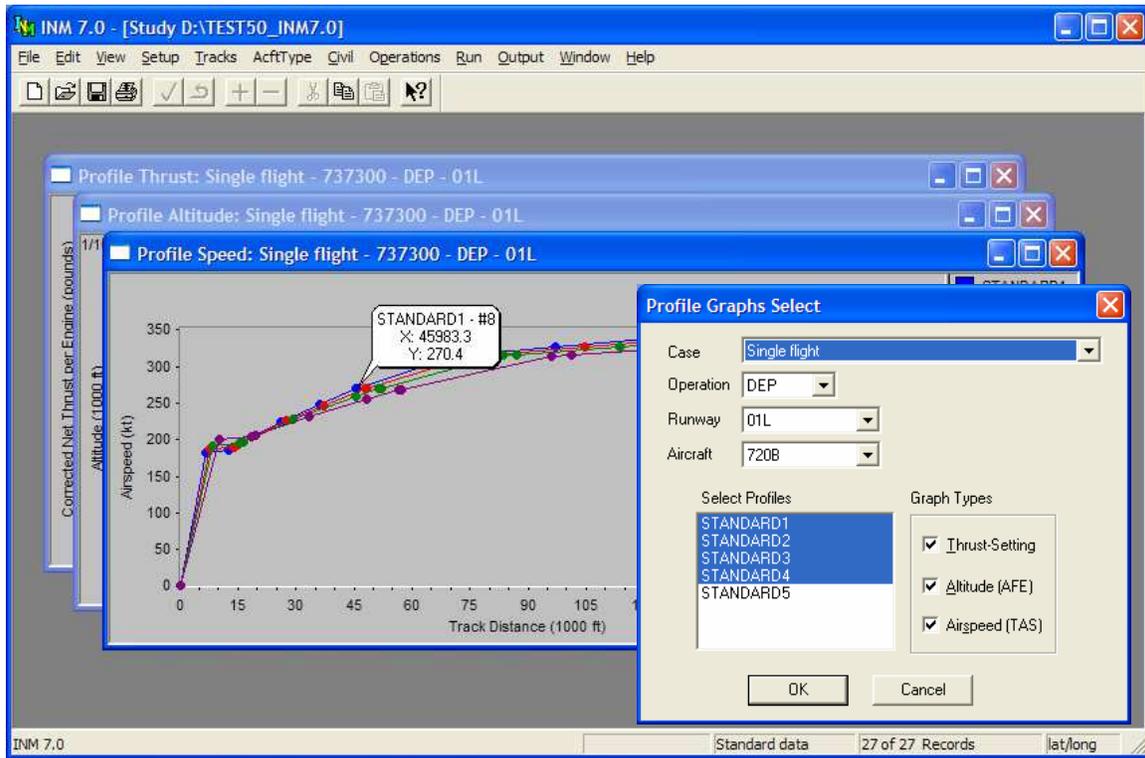
- Use *Tracks // Input Graphics* to create an OVF taxi track.
- Measure the length of the track.
- Use Fixed-Point Profiles to create a two-point OVF taxi profile. For example:

DISTANCE	ALTITUDE	SPEED	THRUST	OP
0.0	10.0	25.0	2000.0	A
4584.0	10.0	25.0	2000.0	A

- Profile distance is the measured taxi track length. Altitude is the average engine-installation height. Speed is the average taxi speed. Thrust setting is the average taxi thrust, such as 10% of static thrust. Use Approach mode NPD curves.
- Use *Operations // Flight Operations* to create a taxi operation that combines the OVF taxi track with the OVF taxi profile.

More complicated taxi models can be developed with additional profile points. Additional points represent runway intersections where airplanes slow or wait to cross the runway. Low average speed and high average thrust at these points represent acceleration across the runway.

Do not put zero speed in a fixed-point profile. If you want to model long duration at idle thrust setting, use the *Operations // Runup Operations* function to define a static noise source at the X,Y position of the queue.



## 9.9 Profile Graphs

Menu Item: *Civil // Profile Graphs* (also applies to *Military // Profile Graphs*)

Use this function to view three kinds of profile graphs:

- Altitude vs. distance
- Speed vs. distance
- Thrust setting vs. distance

Select an airplane, operation type, runway end, and case. INM pre-selects all the profile records for the given airplane and operation type. Press OK to see all three graphs.

- Runway end – procedural profiles are adjusted for runway gradient and runway headwind.
- Case – procedural profiles are adjusted for case-specific parameters such as airport temperature, pressure, and average headwind.
- Limit the number of curves on the graphs by de-selecting extra profiles before pressing OK
- Limit the number of graphs by un-checking extra graph types before pressing OK.

You may see an error message about “profile graph data could not be set up”. To fix the problem, change to a runway end that has a track defined for the given operation type. For example, if you created a TGO track on runway 17L, then to graph TGO or CIR profiles, you must select 17L, not some other runway.

Another potential error message reads “TGO track distance must be greater than TGO (or CIR) profile distance”. To fix the problem, make the TGO track larger, or change the profile so there is enough room for the airplane to fly at pattern altitude.

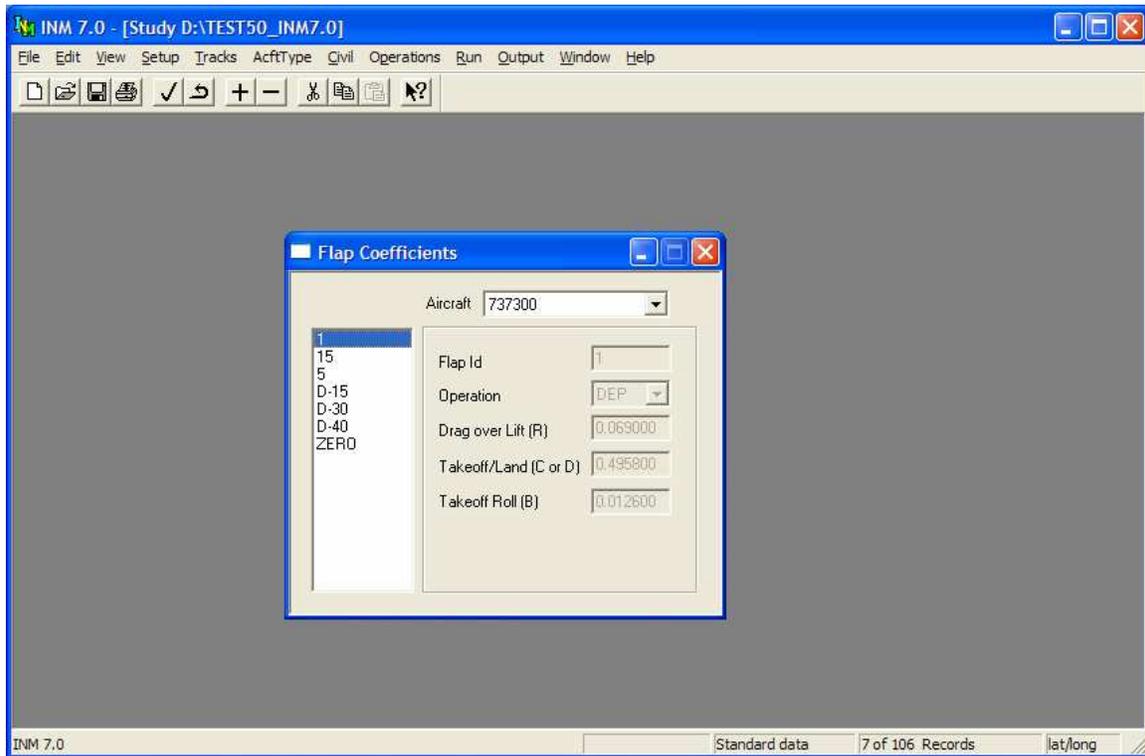
The “TGO track distance” error message may be triggered for a track/profile combination that you do not intend to use in flight operations. For example, you plan to put piston airplanes in a 900-ft pattern on a small TGO track, and jets in a 1500-ft pattern on a large TGO track, and both tracks are on the same runway end. The problem is that INM computes all profiles against all tracks for a given runway before displaying the graphs. So, a jet airplane fails to compute on the small TGO track, and you see the error message.

- To display the graphs, temporarily make the small TGO track bigger.
- When running a scenario of flight operations, this problem does not occur because flight operations determine track/profile combinations.

When you commit a record in the *Procedural Profiles* window or the *Fixed-Point Profiles* window, you can immediately see the effect on the profile in the *Profile Graphs* window. This feature is useful in debugging user-created profiles.

There are three ways to export *Profile Graphs* data:

- Use *File // Export As* to write profile-point data to a text file or *DBF* file.
- Or, use *File // Print* to send the graph to a printer.
- Or, use *Edit // Copy* to send a graphics metafile (*WMF* format) to the Windows Clipboard.



## 9.10 Flap Coefficients

Menu Item: *Civil // Flap Coefficients*

Do not change or add flap coefficient records. These coefficients are derived from measurements of actual airplane flight dynamics or from manuals and handbooks containing measured data, usually by the manufacturer. If you want to derive coefficients, you need to follow the procedure described in SAE-AIR-1845 (see Appendix A for how to obtain this document).

Many INM standard airplanes do not have flap coefficients. INM supplies standard fixed-point profiles for some of these airplanes.

Flap coefficients depend on the type of operation (approach or departure) and the flaps and gear configuration of the airplane.

- The number in the flaps identifier usually means the number of degrees that the flaps are extended.
- Some approach identifiers have the prefix U, meaning that the gear is up during descent. The prefix D means that the gear is down.
- The ZERO flaps identifier is often used in both departure and approach procedures, even though it is categorized as a departure identifier. ZERO means that the flaps are retracted.

The drag-over-lift R-coefficient is used in SAE-AIR-1845 equations involving departure climb and acceleration, and also descent thrust.

The takeoff-speed C-coefficient and the landing-speed D-coefficient are used to calculate speed as a function of the airplane weight:

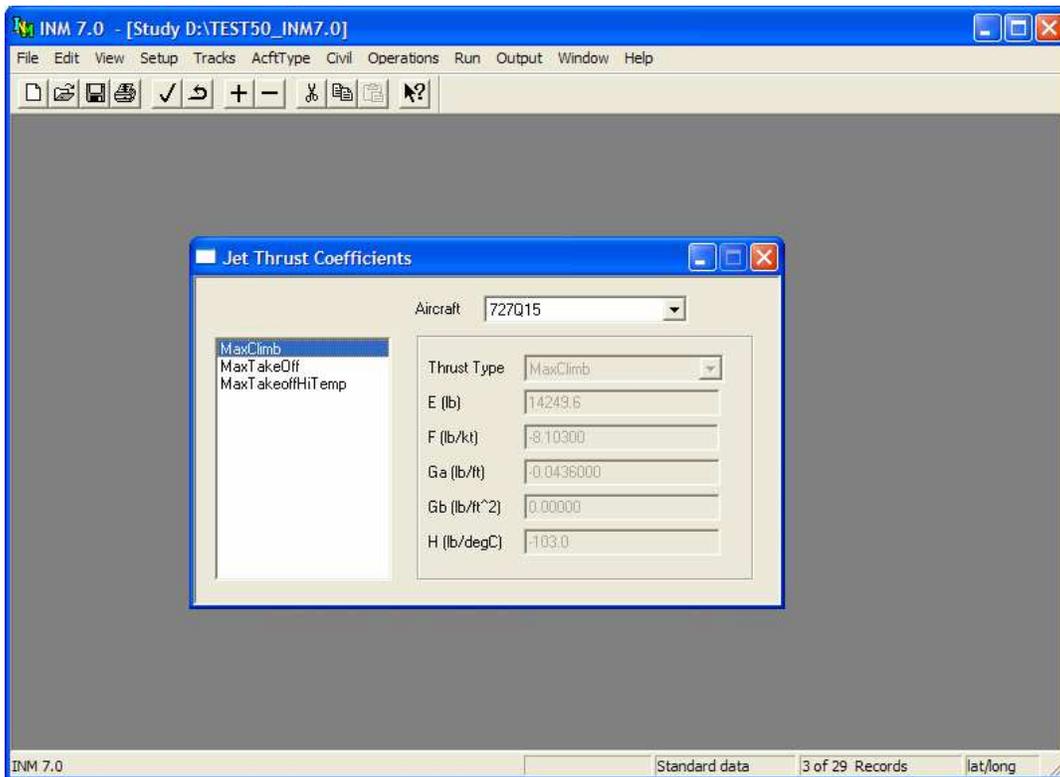
$$\text{Takeoff } V_c = C \sqrt{W}$$

$$\text{Landing } V_c = D \sqrt{W}$$

Where  $V_c$  is the calibrated airspeed in knots,  $\sqrt{x}$  is the square root function, and  $W$  is the airplane weight in pounds.

Flap records with operation type DEP contain C-coefficients, and records with operation type APP contain D-coefficients. Notice that some of the C/D coefficients are zero. This means the flaps identifier cannot be used for takeoff or landing procedure steps.

The takeoff-roll B-coefficient is used to calculate the takeoff distance using an SAE-AIR-1845 equation. The B-coefficient is in units of feet per pound. A variation of the SAE equation is used for touch-and-go takeoff distance.



## 9.11 Jet Thrust Coefficients

Menu Item: *Civil // Jet Coefficients*

Do not change or add jet thrust coefficient records. These coefficients are derived from measurements of actual airplane flight dynamics. If you want to derive coefficients, you need to follow the procedure described in SAE-AIR-1845.

Many INM standard airplanes do not have jet thrust coefficients. INM supplies standard fixed-point profiles for some of these airplanes.

There are usually two jet thrust coefficient records per airplane:

- MaxTakeoff – coefficients used to compute takeoff thrust
- MaxClimb – coefficients used to compute departure climb thrust.

Some airplanes have three jet coefficient records. For example, the 727QF has a third thrust type called MaxContinue for "maximum continuous" thrust and the GII and GIIB have a third thrust type called ReduceTakeoff for "reduced takeoff" thrust.

A few INM standard airplanes have high-temperature jet thrust coefficient records indicated by:

S	HighTempTakeoff
B	HighTempClimb
M	HighTempContinuous.

If the temperature at the airplane is higher than the engine breakpoint temperature, INM uses the high-temperature coefficients to compute thrust. If the high-temperature coefficients do not exist, INM uses a default procedure that sets the sea-level breakpoint temperature to 86°F and calculates the high-temperature H coefficient.

Appendix K lists the defined thrust types for each aircraft in the INM standard database

Jet thrust coefficients (E, F, G<sub>a</sub>, G<sub>b</sub>, H) are used to calculate corrected net thrust per engine by using the equation:

$$F_n/\delta = E + F V_c + G_a A + G_b A^2 + H T$$

Where  $F_n$  is net thrust per engine in pounds,  $\delta$  is the ratio of the atmospheric pressure at the airplane to the sea-level standard value,  $V_c$  is calibrated airspeed in knots,  $A$  is pressure altitude in feet MSL, and  $T$  is temperature in degrees Celsius.

The  $G_b A^2$  term is not specified in SAE-AIR-1845. This quadratic term was added to the INM equation to better approximate corrected net thrust as a function of altitude from 0 to 10,000 feet MSL, which was the original range of values for INM. When airplane altitude is higher than 10,000 feet MSL, a negative quadratic term may cause thrust to be under predicted.

### 9.11.1 Prop Thrust Coefficients

Menu Item: Civil // Prop Coefficients

Prop thrust coefficients are used to calculate corrected net thrust per engine by using the SAE-AIR-1845 equation:

$$F_n/\delta = ( 325.87 E P / V_T ) / \delta$$

Where  $F_n$  is net thrust per engine in pounds,  $\delta$  is the ratio of the atmospheric pressure to the sea-level standard value,  $E$  is propeller efficiency,  $P$  is net propulsive (shaft) power per engine at sea level in horsepower, and  $V_T$  is true airspeed in knots.

### 9.11.2 General Thrust Coefficients

Menu Item: Civil // General Coefficients

General coefficients are used to compute corrected net thrust per engine for civil jets as a function of power-setting parameters EPR or N1.

- Not all INM standard civil jet airplanes have general thrust coefficient data, even though they have thrust coefficient data for two or more power states (MaxTakeoff, MaxClimb, etc.).
- Procedural profiles cannot use EPR or N1 as input parameters.
- General coefficients are used only in the *View // Thrust Calculator*.
- There are no high-temperature general thrust coefficients available, and INM does not contain default values, so thrust computed from general coefficients cannot account for high temperature conditions.

General thrust coefficients are used to calculate corrected net thrust per engine for EPR power-setting:

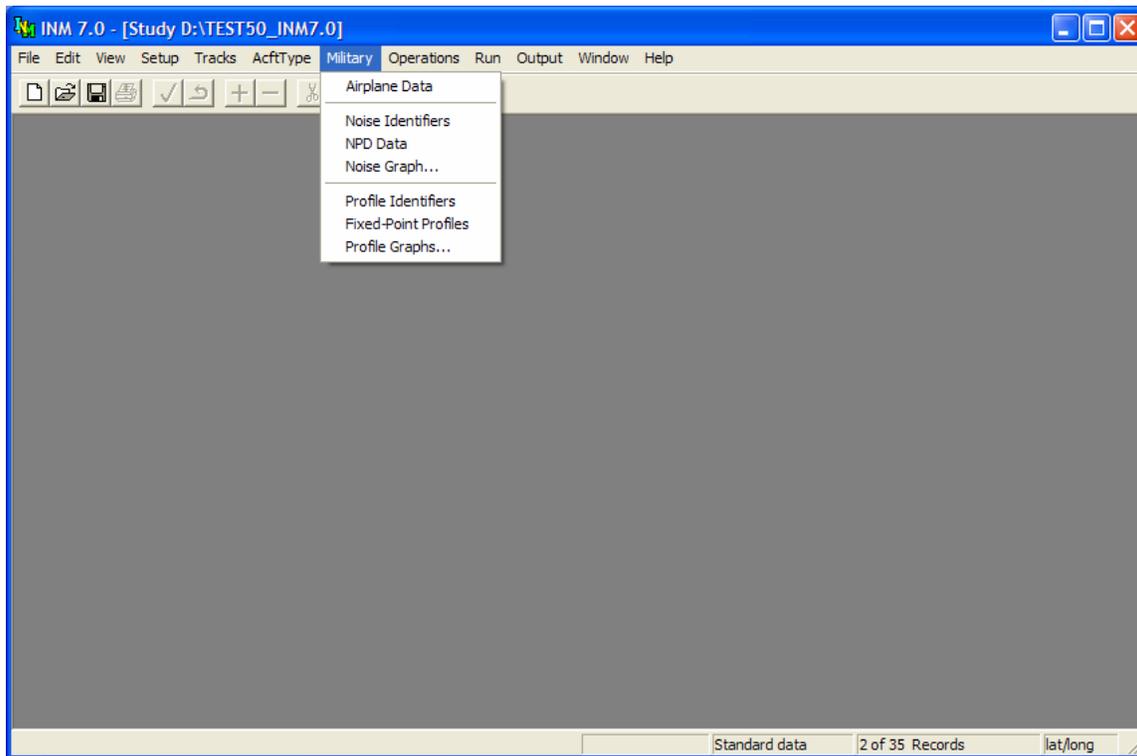
$$F_n/\delta = E + F V_c + G_a A + G_b A^2 + H T + K_{1a} \text{EPR} + K_{1b} \text{EPR}^2$$

Where  $F_n$  is net thrust per engine in pounds,  $\delta$  is the ratio of the atmospheric pressure at the airplane to the sea-level standard value,  $V_c$  is calibrated airspeed in knots,  $A$  is pressure altitude in feet MSL,  $T$  is temperature in degrees Celsius, and EPR is engine pressure ratio.

For N1 power-setting:

$$F_n/\delta = E + F V_c + G_a A + G_b A^2 + H T + K_2 \text{N1}_c + K_3 \text{N1}_c^2$$
$$\text{N1}_c = \text{N1}/\text{sqrt}(\theta)$$

Where N1 is the percent low pressure rotor speed, and  $\theta$  is the ratio of the temperature at the airplane to the sea-level standard value.

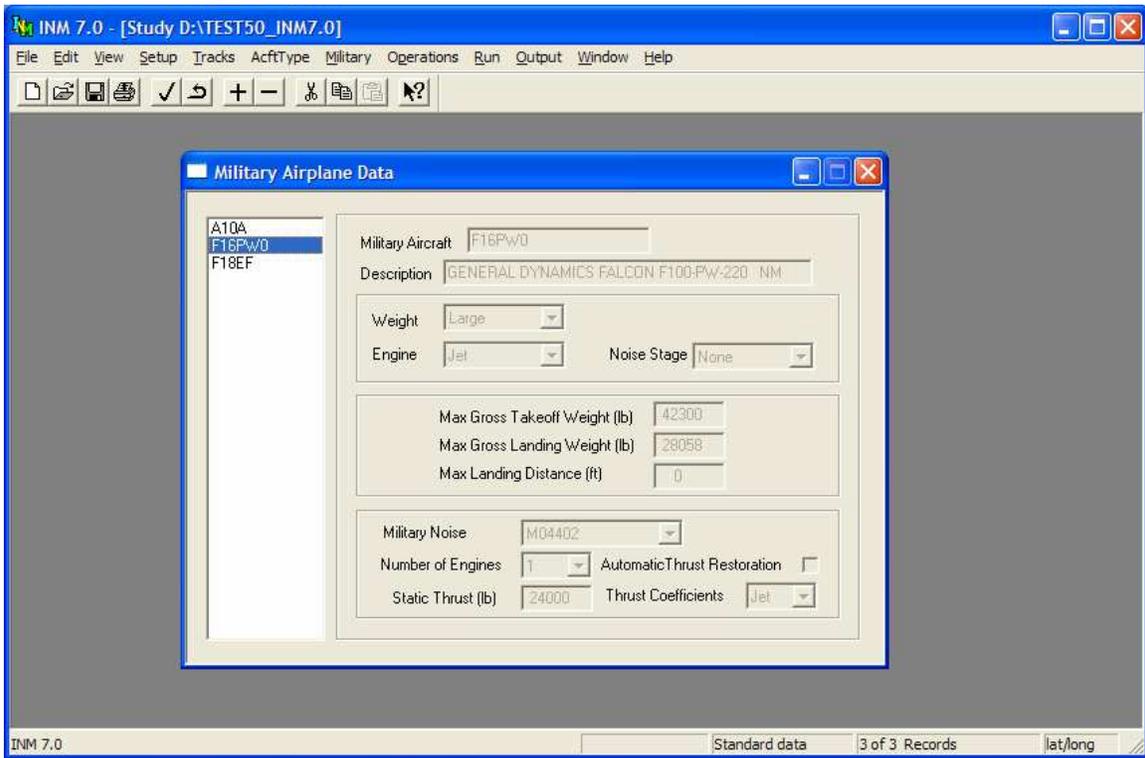


## 10 MILITARY MENU

Use this menu to input airplane data such as

- Military Airplane definition data
- Noise-power-distance noise levels
- Flight profiles

Military Airplanes are defined at the study level and are selectively used in cases according to how you specify flight operations.

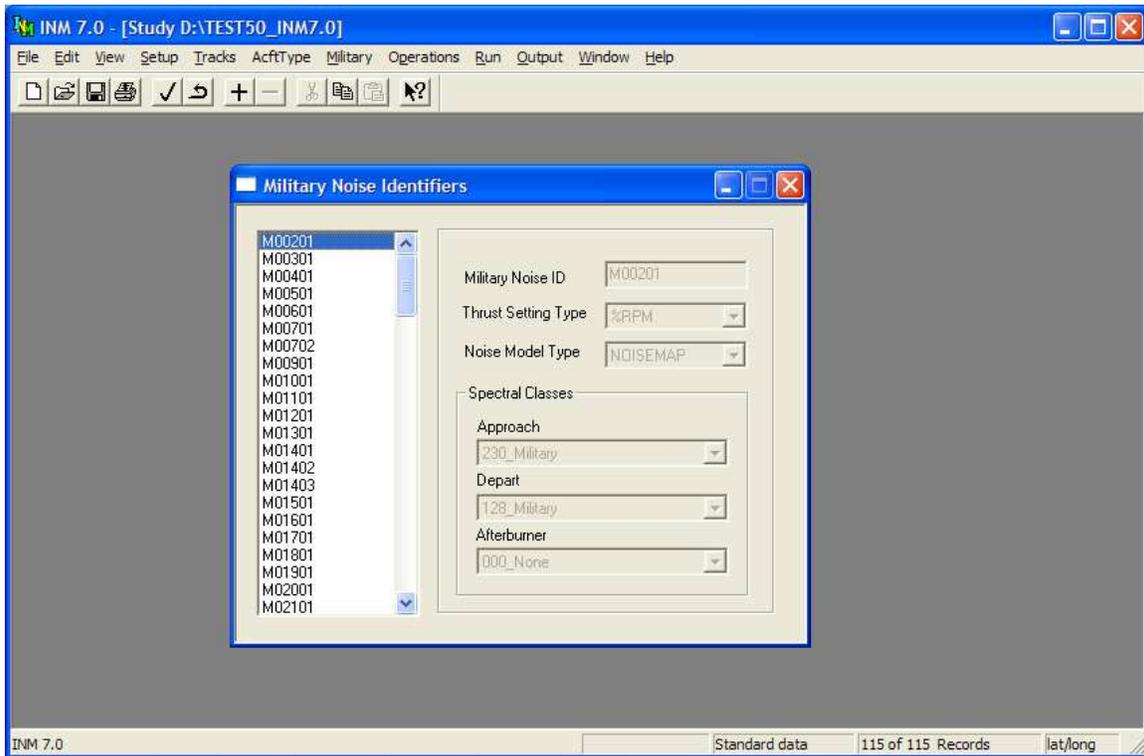


## 10.1 Military Airplane Data

Menu Item: *Military // Airplane Data*

Use this function to view and create military airplane records. The list on the left-hand side of the Military Airplane window displays military airplanes that are used in the study.

This window is essentially the same as the *Civil // Airplane Data* window. Therefore it can be used in the same manner as is described in Section 9.1.

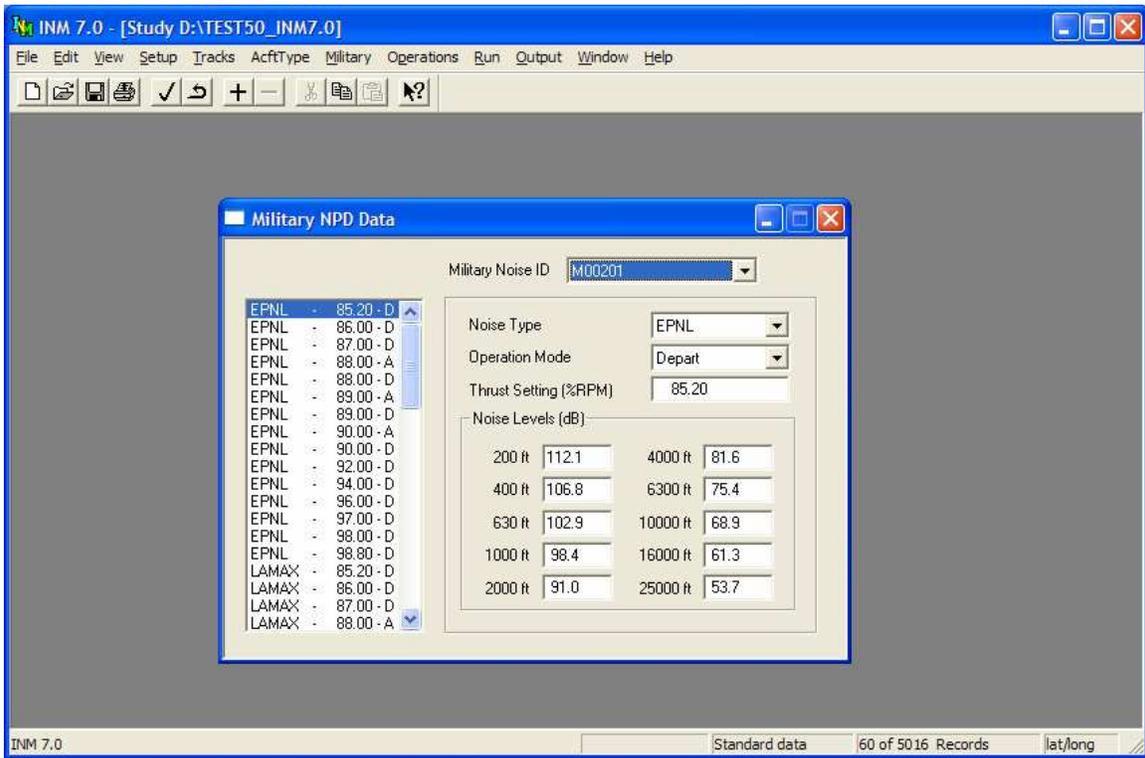


## 10.2 Military Noise Identifiers

Menu Item: *Military // Noise Identifiers*

Use this function to view and create noise identifiers for military airplanes. A noise identifier is the name of a set of noise-power-distance (NPD) curves.

This window is essentially the same as the *Civil // Noise Identifiers* window. Therefore it can be used in the same manner as is described in Section 9.3.



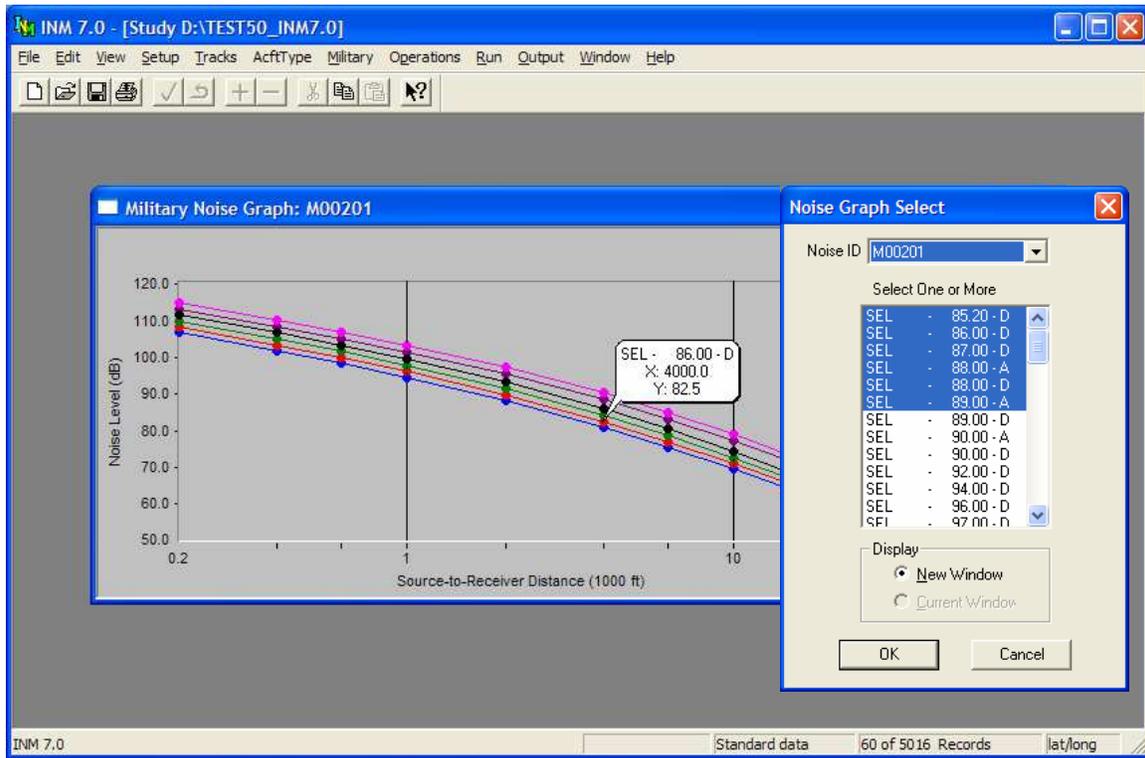
## 10.3 Military NPD Data

Menu Item: *Military // NPD Data*

Use this function to view and create noise-power-distance (NPD) curves for military airplanes.

Appendix J cross references noise identifiers to the airplanes that use them. Note that more than one airplane can use a given set of NPD curves.

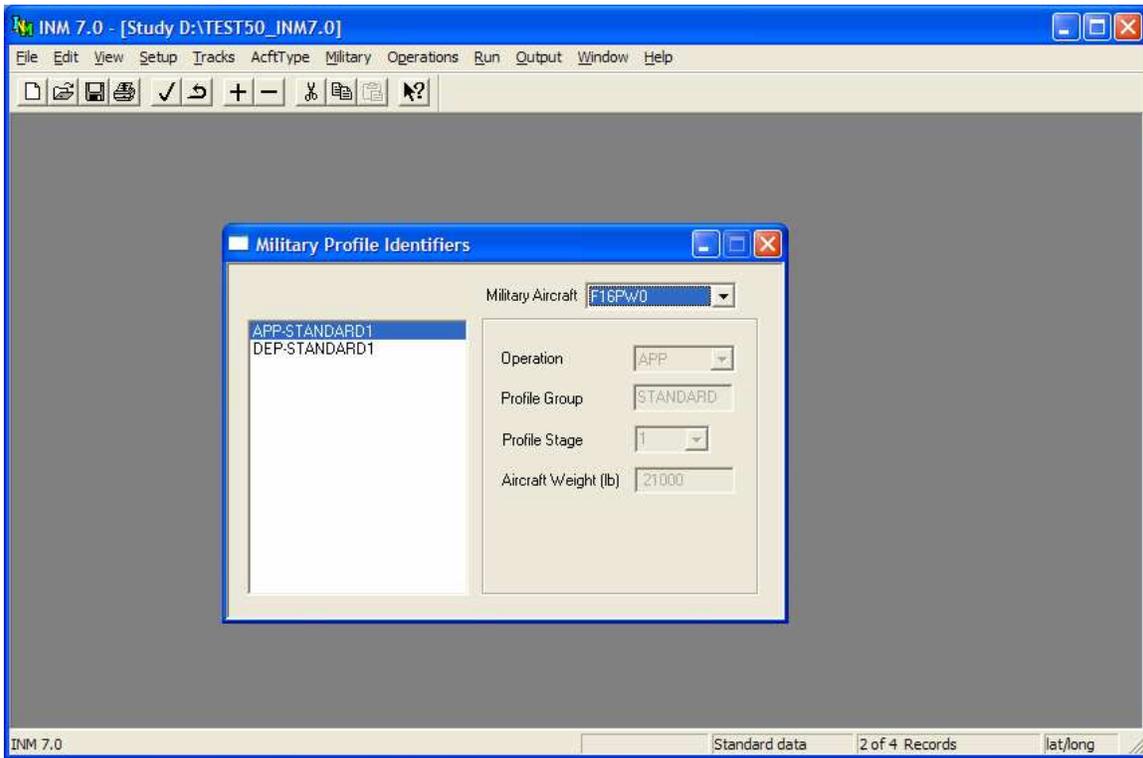
This window is essentially the same as the *Civil // NPD Data* window. Therefore it can be used in the same manner as is described in Section 9.4.



## 10.4 Noise Graph

Menu Item: *Military // Noise Graph*

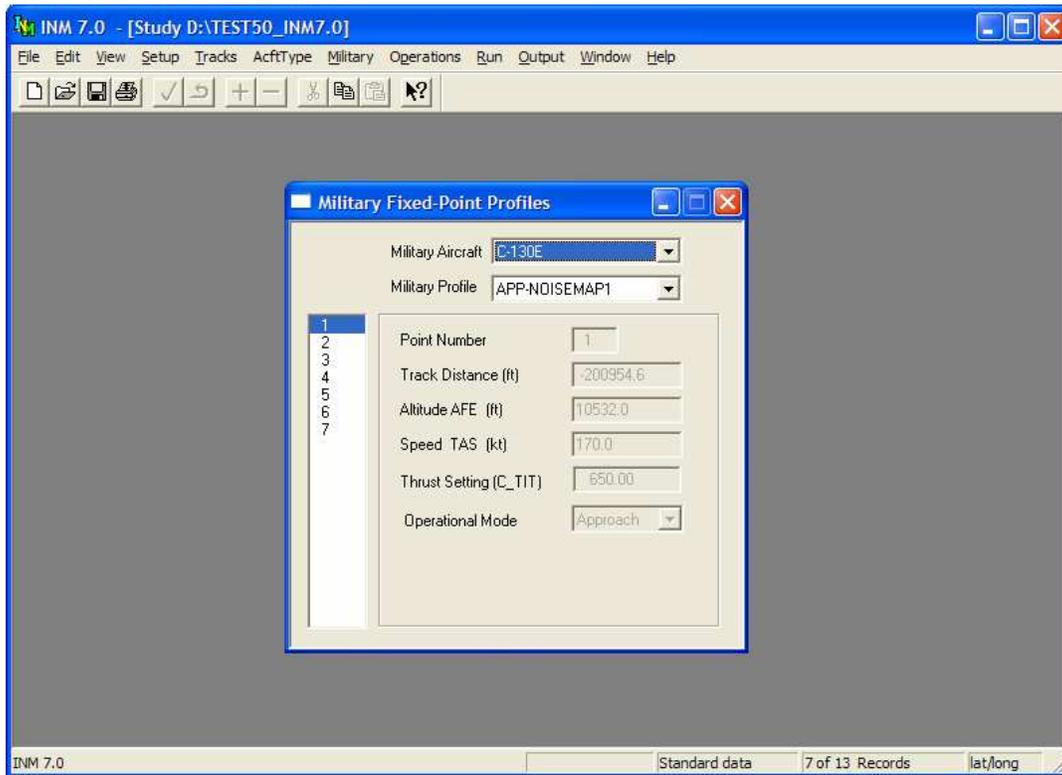
Use this function to view a graph of noise levels versus distance. This function is essentially the same as the *Civil // Noise Graph* window. Therefore it can be used in the same manner as is described in Section 9.5.



## 10.5 Profile Identifiers

Menu Item: *Military // Profile Identifiers*

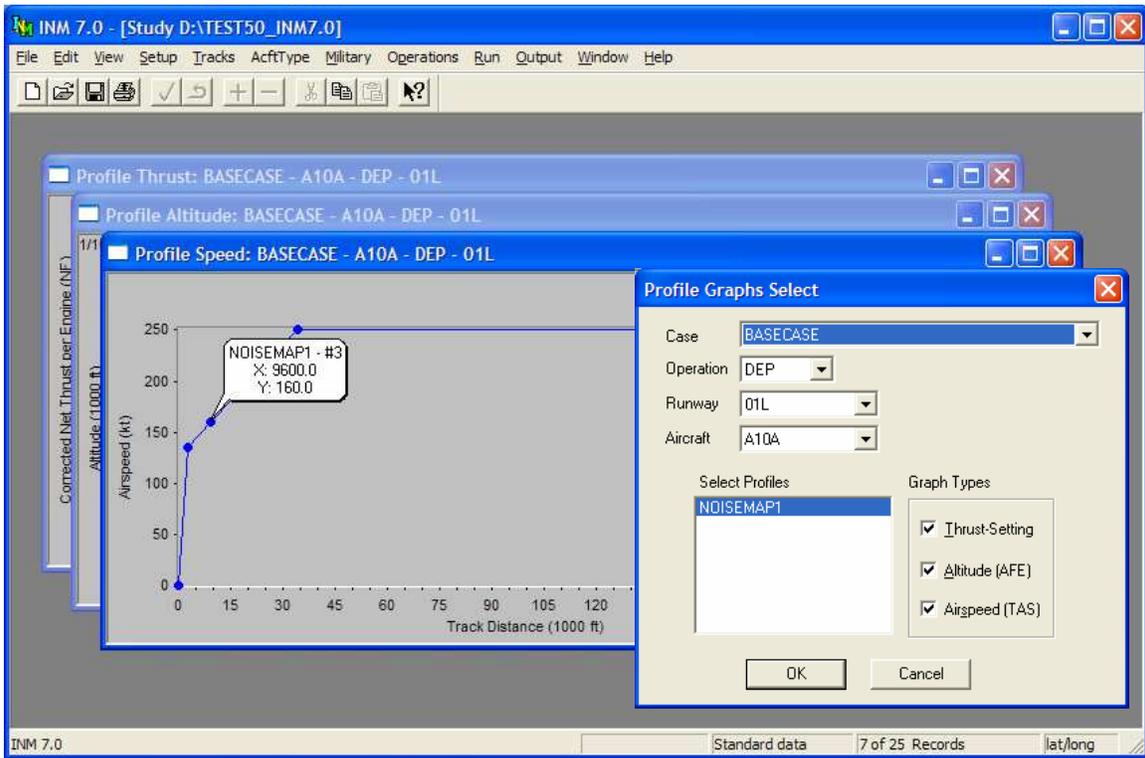
Use this function to view existing profile identifiers or to create a profile identifier before adding procedure steps or profile points. This window is essentially the same as the *Civil // Profile Identifiers* window. Therefore it can be used in the same manner as is described in Section 9.6.



## 10.6 Fixed-Point Profiles

Menu Item: *Military // Fixed-Point Profiles*

Use this function to create a fixed-point profile in terms of distance, altitude, speed, and thrust-setting values at multiple points. This window is essentially the same as the *Civil // Fixed-Point Profiles* window. Therefore it can be used in the same manner as is described in Section 9.8.



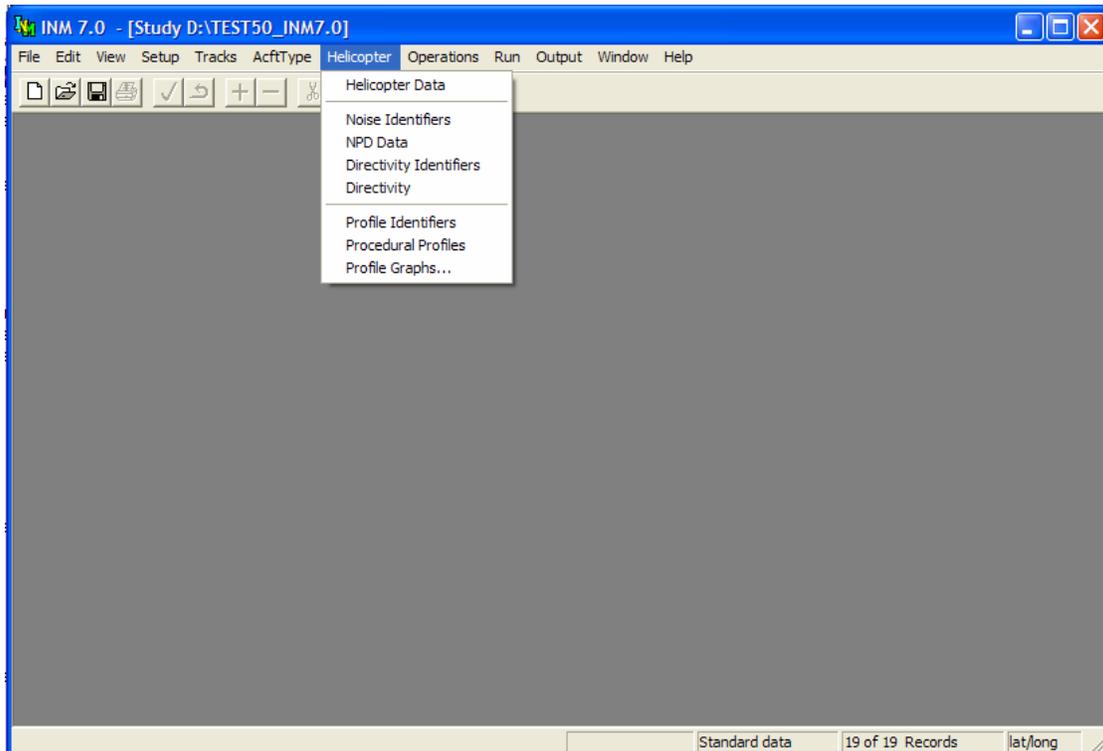
## 10.7 Profile Graphs

Menu Item: *Military // Profile Graphs*

Use this function to view three kinds of profile graphs:

- Altitude vs. distance
- Speed vs. distance
- Thrust setting vs. distance.

This function is essentially the same as the *Civil // Profile Graphs* function. Therefore it can be used in the same manner as is described in Section 9.9.

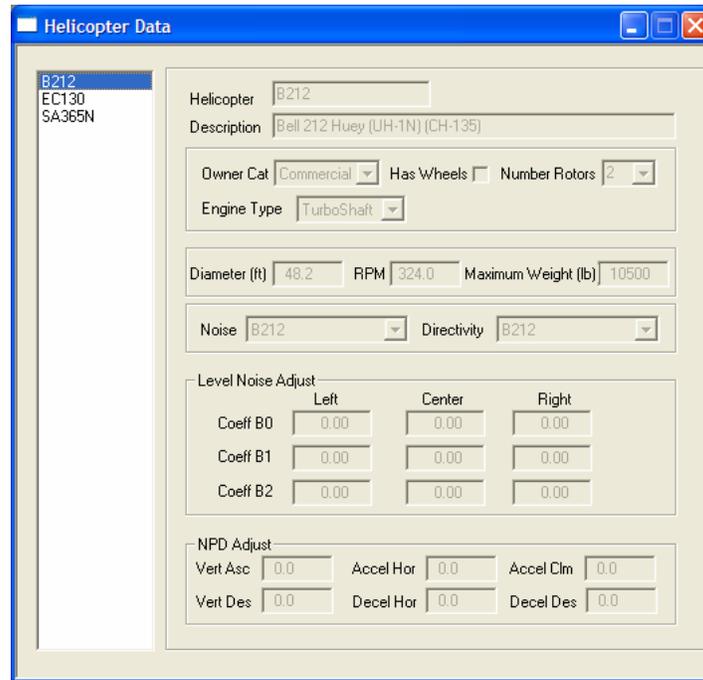


## 11 HELICOPTER MENU

Use this menu to input helicopter data such as

- Helicopter definition data
- Noise-power-distance noise levels
- Noise directivity data
- Flight profiles

Helicopters are defined at the study level and are selectively used in cases according to how you specify helicopter flight operations.



## 11.1 Helicopter Data

Menu Item: *Helicopter // Helicopter Data*

Use this function to view and create helicopter records. The list on the left-hand side of the Helicopter Data window displays helicopters that are used in the study.

Three methods may be used to add a helicopter to your study:

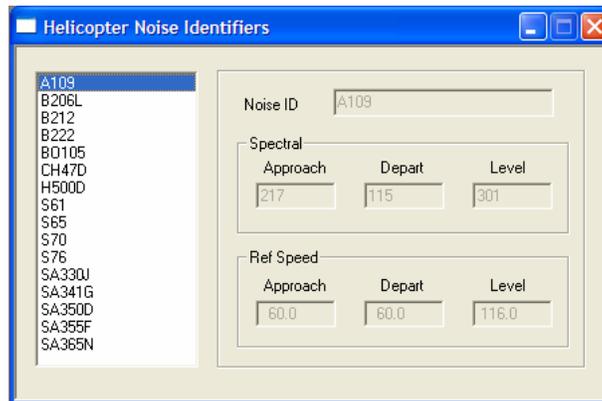
- Use the *Setup // Helicopters* function to bring an INM standard helicopter into the study. This is the easiest method.
- Or, select an existing helicopter to copy. Use *Edit // Copy Records* then *Paste Records*. INM displays a pop-up dialog box. Type a new helicopter identifier and press OK to create a copy of the helicopter record and all its related records. Then, you can modify the new helicopter record and related records.
- Or, use *Edit // Add Record* to create a new helicopter record, fill out the data, and then use *Commit Record*. Then go to *Helicopter // Profile Identifiers* and *Helicopter // Procedural Profiles* windows and create new records there too.

Some helicopter parameters are essential for computing noise contours and others are not. In the following list of 13 parameters (as displayed in the *Helicopter Data* window), essential parameters are underlined>.

1. Helicopter identifier is used to associate a helicopter with its profile identifiers, procedural profiles, and flight operations.
2. A forty-character description of the helicopter and its engines is used to provide additional information.
3. Owner category is Commercial, General Aviation, or Military.
4. Has Wheels – Checked if the helicopter has wheels, otherwise unchecked. It is used to determine the appropriate taxi NPD mode.
5. Number Rotors – Number of rotors for this helicopter, including the tail rotor if applicable. It is used to provide additional information about the helicopter.
6. Engine type is
  - Turboshaft – turboshaft-driven helicopter
  - Piston – piston-engine-driven helicopter.
7. Diameter – main rotor diameter in feet, used to determine the ground effect altitude.
8. RPM – Rotor speed (revolutions per minute).
9. Maximum weight is used to provide additional information about the helicopter.
10. Noise identifier associates a helicopter with its noise data. One or more helicopters can be associated with one set of noise data, however each standard INM helicopter has its own set of noise data.
11. Directivity identifier associates a helicopter with its directivity data. One or more helicopters can be associated with one set of directivity data, however each standard INM helicopter has its own set of directivity data.
12. Level Flight Noise Adjustment Coefficients are used to adjust level-flyover noise as a function of helicopter forward speed, which causes a difference in rotor tip mach number for the advancing vs. receding blades.

13. NPD Adjust values are decibel offsets that get added to NPD data during noise calculations. A given helicopter's noise data may not include NPD curves for every flight operating mode. In this situation the INM automatically substitutes NPD data from similar flight operating modes, this substitution process is described in Section 11.3.2. The NPD Adjust parameters provide the capability to adjust the NPD curves for 6 types of flight operating modes from the substitution mode values if these modes do not have their own NPD curves. The offsets are applied to A-weighted, C-weighted and P-weighted noise at all distances:
- Vert Asc: dB addition to “vertical ascent” mode NPD data.
  - Vert Dec: dB addition to “vertical descent” mode NPD data.
  - Accel Hor: dB addition to “depart with horizontal acceleration” mode NPD data.
  - Decel Hor: dB addition to “approach with horizontal deceleration” mode NPD data.
  - Accel Clm: dB addition to “depart with climbing acceleration” mode NPD data.
  - Decel Dsc: dB addition to “approach with descending deceleration” mode NPD data.

All standard INM helicopters have these six parameters set to zero.



## 11.2 Helicopter Noise Identifiers

Menu Item: *Helicopter // Noise Identifiers*

Use this function to view and create helicopter noise identifiers. A noise identifier is the name of a set of noise-power-distance (NPD) curves.

A noise identifier record contains:

- Twelve-character noise identifier
- Spectral classes for approach, depart, and level operational modes.
- Reference speeds for approach, depart and level operational modes.

### 11.2.1 Spectral Classes

INM has a database of 34 approach noise spectra, 34 departure noise spectra, and 7 level flyover noise spectra (the latter associated only with helicopters), which are listed in Appendix H and contained in the `SPECTRA.BIN` file in the `SYS_DATA` subdirectory.

These noise spectra are called "spectral classes", because they are average noise spectra from helicopters that have similar spectral shapes.

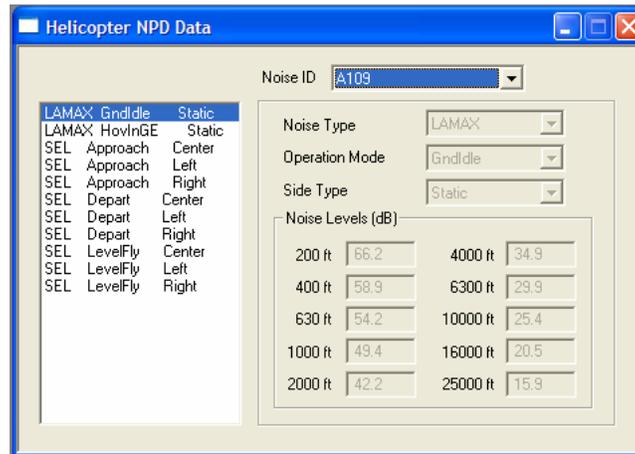
- An INM helicopter is assigned a noise identifier
- A noise identifier is assigned approach, departure and level spectral class identifiers.

Spectral classes are used to:

- Modify noise level curves for different atmospheric absorption models
- Modify A-weighted noise level curves to represent C-weighting
- Calculate the time audible (TAud) metric.

### 11.2.2 Reference Speeds

Each set of helicopter noise data has approach, departure and level reference speed values in knots. These reference speeds apply to sound exposure NPD data for each operating mode.



## 11.3 Helicopter NPD Data

Menu Item: *Helicopter // NPD Data*

Use this function to view and create helicopter noise-power-distance (NPD) curves.

Appendix J cross references noise identifiers to the helicopters that use them. Note that more than one helicopter can use a given set of NPD curves.

### 11.3.1 Noise Type

Noise types are:

- SEL – single-event Sound Exposure Level at a helicopter-specific reference speed. It belongs to the A-weighted noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2(1 \text{ s})$ .
- LAMAX – maximum sound level. It belongs to the A-weighted noise family. It is measured in decibels relative to  $(20 \mu\text{Pa})^2$ .
- EPNM – single-event Effective Perceived Noise Level at a helicopter-specific reference speed. It belongs to the perceived, tone-corrected noise family. It is measured in decibels relative to  $(20\mu\text{Pa})^2(10 \text{ s})$ .
- PNLTM – maximum perceived noise level. It belongs to the perceived, tone-corrected noise family. It is measured in decibels relative to  $(20\mu\text{Pa})^2$ .

"A-weighting" and "perceived tone-corrected weighting" are two common methods of adjusting (weighting) a measured noise spectrum so that it better represents human perception of noise.

SEL and EPNL exposure levels are for helicopter flying at a reference speed defined in the *Helicopter // Noise Identifiers* window at a fixed thrust setting, along a straight and level overhead flight path. INM adjusts the exposure levels for the actual speed flown.

You do not have to create both SEL/LAMAX and EPNL/PNLTM sets. For example, if all you are interested in is A-weighted noise metrics, you can just create the SEL/LAMAX set of NPD curves. However, if you do this, only A-weighted noise metrics are valid, even though perceived-noise metrics may be computed. The reason is that helicopters that are associated with a SEL-only noise identifier are missing EPNL-related data. Therefore, the perceived-noise metrics will not have noise contributions from those helicopters.

### 11.3.2 Operational Mode

Helicopters use a different set of NPD data for each flight operational mode. The helicopter flight operational modes are:

- Approach – Approach at constant speed.
- Depart – Depart at constant speed
- LevelFly – Level flyover at constant speed
- GndIdle – Ground Idle
- FltIdle – Flight Idle
- HovInGE – Hover in ground effect
- HovOutGE – Hover out of ground effect
- DepVertInGE – Vertical ascent in ground effect
- DepVertOutGE – Vertical ascent out of ground effect
- AppVertInGE – Vertical descent in ground effect
- AppVertOutGE – Vertical descent out of ground effect
- AppHorDec – Approach with horizontal deceleration
- AppDesDec – Approach with descending deceleration
- DepHorAcc – Depart with horizontal acceleration
- DepClmAcc – Depart with climbing acceleration
- Taxi – Taxi at constant speed

Operational mode is also used by INM to select which of three spectral classes (approach, depart, level) to employ with the NPD curve.

The INM can perform noise calculations if noise data is not available for every flight operational mode. In fact, most of the standard INM helicopters do not have noise data for every mode. When a flight profile uses a particular operating mode for which noise data are not available, the INM substitutes noise data from a similar operating mode. It also adds any dB offsets specified in the *Helicopter // Helicopter Data* window to the substituted NPD values. The INM makes substitutions for missing NPD data sets as follows:

Missing Flight Operational Mode	Use Available Operational Mode
GndIdle	FltIdle
FltIdle	GndIdle
HovInGE	HovOutGE
HovOutGE	HovInGE
DepVertInGE	HovInGE + Vert Asc Adjustment
DepVertOutGE	HovOutGE + Vert Asc Adjustment
AppVertInGE	HovInGE + Vert Des Adjustment
AppVertOutGE	HovOutGE + Vert Des Adjustment
AppHorDec	Approach + Decel Hor Adjustment
AppDesDec	Approach + Decel Des Adjustment
DepHorAcc	Depart + Accel Hor Adjustment
DepCImAcc	Depart + Accel Clm Adjustment
Taxi	FltIdle (has wheels) HovInGE (no wheels)

### 11.3.3 Side Type

Helicopter flight operational modes are classified as either static or moving. Side type applies to NPD data for moving flight operational modes. All three types (Left, Center, and Right) must be defined for NPD data that applies to moving flight operational modes. Helicopter flight operational modes are classified as follows:

<u>Moving:</u>	<u>Static:</u>
Approach	GndIdle
Depart	FltIdle
LevelFly	HovInGE
AppHorDec	HovOutGE
AppDesDec	DepVertInGE
DepHorAcc	DepVert.OutGE
DepCImAcc	AppVertInGE
Taxi	AppVert.OutGE

### 11.3.4 Noise Levels

The NPD curves are defined by 10 noise levels at 10 fixed distances.

- Exposure level distance – the distance from an observer to the closest point of approach along a straight flight path.
- Maximum level distance – the distance at which the maximum noise level is generated.

The 10 fixed distances are chosen so that they are approximately evenly spaced on a logarithmic scale:

200 ft	=	61.0 m
400 ft	=	121.9 m
630 ft	=	192.0 m
1000 ft	=	304.8 m
2000 ft	=	609.6 m
4000 ft	=	1219.2 m
6300 ft	=	1920.2 m
10000 ft	=	3048.0 m
16000 ft	=	4876.8 m
25000 ft	=	7620.0 m

Noise level must decrease as distance increases. If not, you will see an error message about “monotonic decreasing” levels when you try to commit the record.

Noise levels for NPD curves are based on SAE-AIR-1845 atmospheric absorption coefficients. If you check the *Setup // Cases // Modify NPD Curves* box, INM adjusts the NPD noise levels:

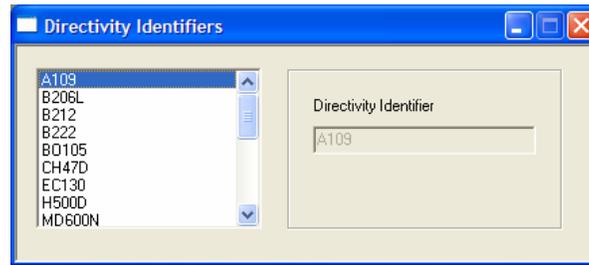
- The spectral class associated with the noise identifier and operational mode is used in the adjustment process.
- SAE-AIR-1845 atmospheric absorption losses are removed from the curves.
- SAE-ARP-866A atmospheric absorption losses are employed in the curves. Absorption is a function of temperature and relative humidity.
- INM cannot display SAE-ARP-866A NPD curves.

If you select C-weighted noise metrics in the *Run // Run Options* window, INM changes SEL curves to CEXP and LAMAX curves to LCMAX:

- The spectral class associated with the noise identifier and operational mode is used in the adjustment process.
- A-weighting losses are removed from the curves.
- C-weighting losses are employed in the curves. The C-weighted curves are generally higher than the A-weighted curves.
- INM cannot display C-weighted NPD curves.

### 11.3.5 Interpolation and Extrapolation

Helicopter noise calculations are modal. They are based exclusively on helicopter flight operational modes, with one set of NPD curves per mode. Unlike fixed-wing airplane noise calculations, the INM does not perform any interpolation or extrapolation between helicopter NPD curves.



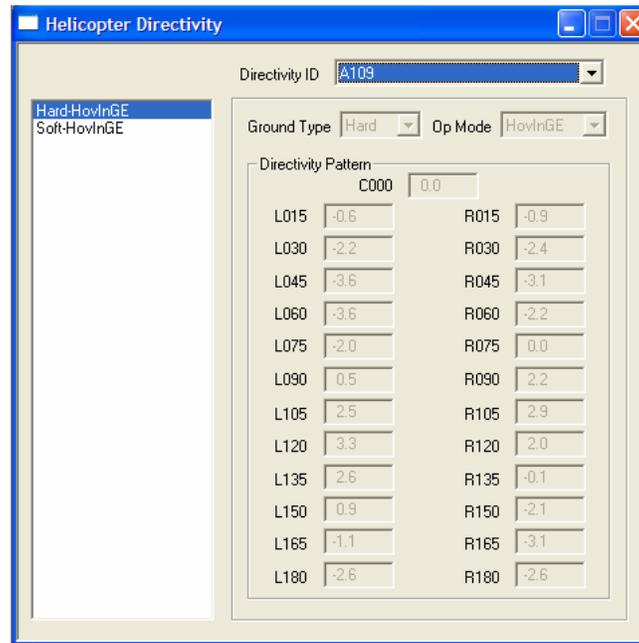
## 11.4 Directivity Identifiers

Menu Item: *Helicopter // Directivity Identifiers*

Use this function to view and create helicopter directivity identifiers. A directivity identifier is the name of a set of helicopter directivity data.

Two methods may be used to create a helicopter directivity identifier:

- Use *Edit // Add Record* to create a new directivity record, input the new identifier, and then use *Commit Record*.
- Or, select an existing directivity record to copy. Use *Edit // Copy Records* then *Paste Records*. INM displays a pop-up dialog box. Type a new directivity identifier and press OK to create a copy of the directivity record.



## 11.5 Helicopter Directivity

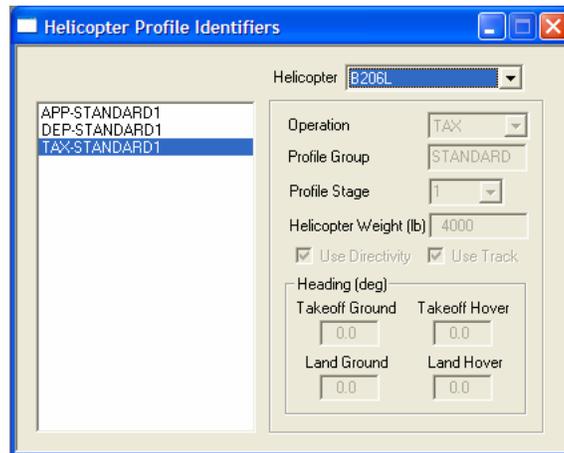
Menu Item: *Helicopter // Directivity*

Use this function to view, edit, or input the directivity data associated with a particular directivity identifier. Directivity patterns are only used during noise calculations for a given flight profile if directivity is selected for the profile using the *Helicopter // Profile Identifiers* menu item. Directivity data only apply to a subset of the available static helicopter flight operational modes.

Directivity parameters are as follows:

- Directivity Id – Unique directivity identifier.
- Ground Type –Indicates the type of ground that the directivity data is appropriate for. The two options are Hard or Soft ground. Hard ground refers to surfaces such as water or rock, while soft ground applies to surfaces such a ground covered with vegetation.
- Op Mode – The static helicopter flight operational mode that the directivity data applies to. The modes that can have unique directivity data associated with them are Ground Idle, Flight Idle, Hover-In-Ground-Effect, and Hover-Out-Of-Ground-Effect.
- Directivity Pattern - A set of dB adjustment values specified in 15-degree increments around the helicopter. Degree values are relative to the nose of the helicopter:
  - C000 – dB adjustment at 0 degrees (on the nose)
  - L015 – dB adjustment at 15 degrees left of nose

L030 – dB adjustment at 30 degrees left of nose  
L045 – dB adjustment at 45 degrees left of nose  
L060 – dB adjustment at 60 degrees left of nose  
L075 – dB adjustment at 75 degrees left of nose  
L090 – dB adjustment at 90 degrees left of nose  
L105 – dB adjustment at 105 degrees left of nose  
L120 – dB adjustment at 120 degrees left of nose  
L135 – dB adjustment at 135 degrees left of nose  
L150 – dB adjustment at 150 degrees left of nose  
L165 – dB adjustment at 165 degrees left of nose  
L180 – dB adjustment at 180 degrees (L180 = R180)  
R015 – dB adjustment at 15 degrees right of nose  
R030 – dB adjustment at 30 degrees right of nose  
R045 – dB adjustment at 45 degrees right of nose  
R060 – dB adjustment at 60 degrees right of nose  
R075 – dB adjustment at 75 degrees right of nose  
R090 – dB adjustment at 90 degrees right of nose  
R105 – dB adjustment at 105 degrees right of nose  
R120 – dB adjustment at 120 degrees right of nose  
R135 – dB adjustment at 135 degrees right of nose  
R150 – dB adjustment at 150 degrees right of nose  
R165 – dB adjustment at 165 degrees right of nose  
R180 – dB adjustment at 180 degrees (L180 = R180)



## 11.6 Helicopter Profile Identifiers

Menu Item: *Helicopter // Profile Identifiers*

Use this function to view existing helicopter profile identifiers or to create a new profile identifier before adding procedure steps.

To create a profile identifier:

1. Select a helicopter.
2. Use *Edit // Add Record* to create a new record.
3. Select a type of operation for the profile.
4. Input an eight-character profile group name.
5. Select a single-digit profile stage number.
6. Input the weight of the helicopter during the operation.
7. If desired, select Use Directivity.
8. If desired, select Use Track.
9. Enter heading values to define the orientation of the helicopter while on the ground and during hover.

You can use the profile stage numbers that are already defined by selecting them from the drop-down list, or you can create your own by typing a single digit (0 to 9) in the box.

### 11.6.1 Profile Operation Type

There are four types of helicopter flight profile operations:

APP	A	approach
DEP	D	departure
TAX	X	taxi
OVF	V	overflight

### **11.6.2 Profile Group**

The profile group name identifies profiles that belong to a group of similar procedures but of different weights or some other profile parameter. For example:

- DISTANT group may have four departure profiles of varying helicopter weights.
- LEVELAPP group may have two approach profiles using different level segments.

All INM standard profiles are identified by the name STANDARD. INM will not allow you to use this word to name your profiles. INM will also not allow the modification of any parameters associated with STANDARD profiles. Consequently, all parameters for STANDARD profiles are grayed-out in all INM windows.

### **11.6.3 Profile Stage Number**

Helicopter stage numbers are not related to trip distance the way that fixed-wing airplane departure stage numbers are. Similar to fixed-wing airplane approach stage numbers, helicopter stage numbers are just a way of distinguishing members in a group. For example, helicopter stage can mean different kinds of profiles. There is only one standard departure, approach, and taxi profile for most standard INM helicopters, and their stage numbers are set to 1.

### **11.6.4 Profile Weight**

Profile weight is the weight of the helicopter during the operation. Just like helicopter stage numbers, helicopter profile weights are just a way of distinguishing members in a group. Helicopter flight profiles are modal, and helicopter flight operational modes are not dependent upon weight. Therefore profile weight does not affect the INM's flight path or noise calculations.

### **11.6.5 Use Directivity**

If use Directivity is selected, any available directivity patterns for the Ground Idle, Flight Idle, Hover-In-Ground-Effect, and Hover-Out-Of-Ground-Effect flight operational modes will be used during noise calculations for this profile. Of course the directivity patterns will only be used if those operational modes are included in the profile.

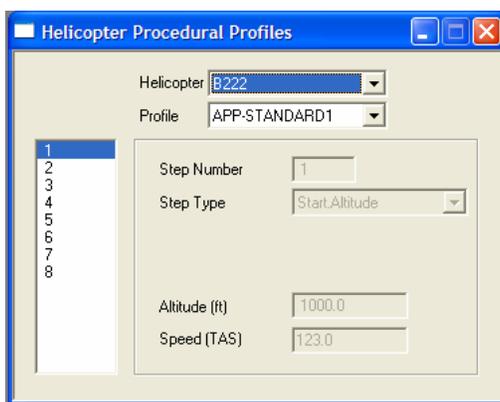
### **11.6.6 Use Track**

Use Track defines the reference direction from which the input headings for the helicopter while on the ground or in hover are measured. If the Use Track box is checked, the headings are calculated relative to the direction of the ground track as it approaches or departs the helipad. If the box is not checked, the headings are calculated relative to the direction of true north.

### **11.6.7 Headings**

The type of heading data required depends on the operation type defined for the profile, Approach, Departure, Taxi, or Overflight. The four possible headings define the different orientations of the helicopter while on the ground and during hover.

- Takeoff Ground – Takeoff ground heading in degrees relative to the ground track or true north.
- Takeoff Hover – Takeoff hover heading in degrees relative to the ground track or true north.
- Land Ground – Land ground heading in degrees relative to the ground track or true north.
- Land Hover – Land hover heading in degrees relative to the ground track or true north.



## 11.7 Helicopter Procedural Profiles

Menu Item: *Helicopter // Procedural Profiles*

Use this function to build helicopter procedural profiles by defining the procedure steps used for various phases of the flight.

Helicopter procedural profiles are modal; they are defined as a set of procedure steps that each represents a helicopter flight operational mode. Similar to fixed-wing airplane fixed-point profiles, helicopter procedural profiles can be controlled in detail. Also similar to fixed-point profiles, helicopter procedural profiles remain static and do not adapt to changes in study and case setup data (airport elevation, temperature, pressure, and headwind).

A review of user-created helicopter procedural profiles is recommended for Federally funded INM noise analyses, as described in Appendix B "FAA Profile Review Checklist".

The best way to learn how to create your own helicopter procedural profiles is to view and study the standard INM helicopter profiles.

To build a helicopter procedural profile, you need to create a profile identifier in the *Helicopter // Profile Identifiers* window. Then, in the *Helicopter Procedural Profiles* window, select the helicopter and profile that you plan to use.

General rules for the *Helicopter Procedural Profiles* window:

- Altitude is in feet (or meters) above field elevation (AFE).
- Distance is in feet (or meters) measured on the horizontal plane.
- Speed is in knots (or km/h) and is true airspeed (TAS). Speed is used in calculating sound exposure. You must input realistic speed values, based on the operational situation being modeled.
- Duration is in seconds.

Always check a newly created profile by using the *Helicopter // Profile Graphs* function. If there is a problem with the profile, you can usually see it on the

chart much more easily than by examining the numerical data in the *Helicopter Procedural Profiles* window. You can change procedure steps data and see the profile change in the chart window.

You can export a text file or DBF file of computed procedural profiles data by first using the *Helicopter // Profile Graphs* function to display the profile. Then, use the *File // Export As* function to create a file of profile point data.

### 11.7.1 Procedure Step Types

The four types of helicopter flight operations (APP, DEP, TAX, OVF) are created by using 14 types of procedure steps:

- Start Altitude – This step is used to start a profile at a given altitude and speed. Input the starting altitude and speed.
- Level Fly – This step is used to maintain altitude and speed for a given distance. Input the track distance covered by the step. Altitude and speed are defined by the previous step.
- App Const Speed – This step is used to descend at constant speed to a given altitude over a given distance. Input the track distance covered by the step and the final altitude. The initial altitude and speed are defined by the previous step.
- App Desc Decel – This step is used to descend and decelerate to a final altitude and speed over a given distance. Input the track distance covered by the step, the final altitude, and the final speed. The initial altitude and speed are defined by the previous step.
- App Horiz Decel – This step is used to decelerate to a final speed at constant altitude over a given distance. Input the track distance covered by the step and the final speed. The altitude and initial speed are defined by the previous step.
- App Vertical – This step is used to maintain horizontal position while descending to a final altitude over a given duration. Input the duration of the step and the final altitude. The horizontal position of the step is calculated from the previous step and the horizontal speed is zero.
- Hover – This step is used to maintain altitude and horizontal position for a given duration. Input the duration of the step. The altitude is defined by the previous step, the horizontal position of the step is calculated from the previous step, and the horizontal speed is zero.
- Ground Idle – This step is used to maintain ground idle for a given duration. Input the duration of the step. The altitude is zero, the horizontal position of the step is calculated from the previous step, and the horizontal speed is zero.
- Flight Idle – This step is used to maintain flight idle for a given duration. Input the duration of the step. The altitude is zero, the horizontal position of the step is calculated from the previous step, and the horizontal speed is zero.
- Dep Vertical – This step is used to maintain horizontal position while ascending to a final altitude over a given duration. Input the duration of

the step and the final altitude. The horizontal position of the step is calculated from the previous step and the horizontal speed is zero.

- Dep Horiz Accel – This step is used to accelerate to a final speed over a given distance. Input the track distance covered by the step and the final speed. The altitude and initial speed are defined by the previous step.
- Dep Climb Accel – This step is used to climb and accelerate to a final altitude and speed over a given distance. Input the track distance covered by the step, the final altitude, and the final speed. The initial altitude and speed are defined by the previous step.
- Dep Const Speed – This step is used to climb at constant speed to a given altitude over a given distance. Input the track distance covered by the step and the final altitude. The initial altitude and speed are defined by the previous step.
- Taxi – This step is used to taxi at a given speed. Input the speed. The track distance is calculated based on the assigned taxi ground track, and the altitude is defined by the previous step. INM allows helicopters defined as having wheels via the *Has Wheels* check box in the *Helicopter // Helicopter Data* window to taxi at zero altitude. Helicopters defined as not having wheels must taxi at an altitude greater than zero.

Helicopter procedure steps explicitly define a helicopter's flight path. There are no thrust calculations for helicopter flight paths as there are for fixed-wing aircraft. Rather, each procedure step correlates with a helicopter flight operational mode and each mode has its own set of NPD data.

Some helicopter procedure steps correlate with different helicopter flight operational modes (and therefore different NPD and directivity data) depending on their altitude. When constructing flight paths with the Hover, DepVertical, and App Vertical procedure steps, the INM calculates a ground effect altitude as follows:

$$\text{Ground Effect Altitude} = 1.5 \times \text{Main Rotor Diameter}$$

If the procedure step stays below the ground effect altitude, the procedure step correlates with the corresponding In Ground Effect flight operational mode. If the step stays at or above the ground effect altitude the procedure correlates with the corresponding Out of Ground Effect flight operational mode. If a given Dep Vertical or App Vertical procedure step crosses the ground effect altitude, the INM automatically divides the step into two at the ground effect altitude and assigns flight operational modes to the two steps as appropriate.

Appendix J shows the allowed transitions from one type of procedure step to the next, for each of the four types of flight profiles.

### **11.7.2 How to Build a Helicopter Approach Profile**

Helicopter approach profiles can be much more dynamic than fixed-wing airplane approach profiles. There are many more ways to operate a helicopter than there are to operate an airplane. The INM provides a standard approach

profile for each helicopter in the INM database, however these standard profiles may not be appropriate for the helicopter operations you are interested in modeling. Additionally, general guidelines are not as appropriate for helicopter approach operations as they are for fixed-wing airplanes. It is strongly recommended that you evaluate the helicopter flight operations being modeled to determine if using the standard INM helicopter procedures is appropriate. In most cases you will need to consult with helicopter operators to design helicopter profiles that are appropriate for your study.

All helicopter approach profiles must start with a Start.Altitude step.

For reference, INM standard helicopter approach procedures consist of the following procedure steps:

1. Start Altitude, with altitude set to 1000 feet AFE and speed set equal to the helicopter's Level Reference Speed from the *Helicopter // Helicopter Noise Identifiers* window.
2. Level Fly, with distance set to 87250.0 ft (approximately 14 nautical miles).
3. App Horiz Decel, maintaining an altitude of 1000 ft while decelerating to the helicopter's Approach Reference Speed from the *Helicopter // Helicopter Noise Identifiers* window over a distance of 5000 ft.
4. App Const Speed, maintaining the helicopter's Approach Reference Speed while descending to an altitude of 500 feet AFE over a track distance of 4800 feet.
5. App Desc Decel, descending to an altitude of 15 feet AFE while decelerating to a speed of 0 knots over a distance of 2850 feet.
6. App Vertical, maintaining horizontal position while descending to 0 feet AFE over a duration of 3 seconds.
7. Flight Idle for a duration of 30 seconds.
8. Ground Idle for a duration of 30 seconds.

### **11.7.3 How to Build a Helicopter Departure Profile**

Helicopter departure profiles can be much more dynamic than fixed-wing airplane approach profiles. There are many more ways to operate a helicopter than there are to operate an airplane. The INM provides a standard departure profile for each helicopter in the INM database, however these standard profiles may not be appropriate for the helicopter operations you are interested in modeling. Additionally, general guidelines are not as appropriate for helicopter departure operations as they are for fixed-wing airplanes. It is strongly recommended that you evaluate the helicopter flight operations being modeled to determine if using the standard INM helicopter procedures is appropriate. In most cases you will need to consult with helicopter operators to design helicopter profiles that are appropriate for your study.

All helicopter departure profiles must end with a Level.Fly step.

For reference, INM standard helicopter departure procedures consist of the following procedure steps:

1. Ground Idle for a duration of 30 seconds.
2. Flight Idle for a duration of 30 seconds.
3. Dep Vertical, maintaining horizontal position while ascending to an altitude of 15 ft AFE over a duration of 3 seconds.
4. Dep Horiz Accel, maintaining altitude while accelerating to a speed of 30 knots over a distance of 100 feet.
5. Dep Climb Accel, climbing to an altitude of 30 feet AFE while accelerating to the helicopter's Depart Reference Speed from the *Helicopter // Helicopter Noise Identifiers* window over a distance of 500 feet.
6. Dep Const Speed, maintaining speed while climbing to an altitude of 1000 feet AFE over a track distance of 3500 feet.
7. Dep Horizontal Accel, maintaining altitude while accelerating to the helicopter's Level Reference Speed from the *Helicopter // Helicopter Noise Identifiers* window over a track distance of 2800 feet.
8. Level Fly, with distance set to 93100 feet (approximately 15 nautical miles).

#### **11.7.4 How to Build a Helicopter Taxi Profile**

An INM helicopter taxi profile begins on a helipad, is stretched to fit the size of the assigned Taxi ground track, and ends on the same or another helipad. The INM provides a standard Taxi profile for each helicopter in the INM standard database, however it is strongly recommended that you evaluate the helicopter taxi operations being modeled to determine if using the standard INM helicopter Taxi procedures is appropriate. In most cases you will need to consult with helicopter operators to design helicopter taxi profiles that are appropriate for your study.

For reference, INM standard helicopter taxi procedures for helicopters without wheels consist of the following procedure steps:

1. Ground Idle for a duration of 30 seconds.
2. Flight Idle for a duration of 30 seconds.
3. Dep Vertical, maintaining horizontal position while ascending to an altitude of 3 feet AFE over a duration of 10 seconds.
4. Taxi, maintaining altitude over the length of the assigned Taxi ground track at a constant speed of 10 knots.
5. App Vertical, maintaining horizontal position while descending to 0 feet AFE over a duration of 10 seconds.
6. Flight Idle for a duration of 30 seconds.
7. Ground Idle for a duration of 30 seconds.

INM standard helicopter taxi procedures for helicopters with wheels consist of the following procedure steps:

1. Ground Idle for a duration of 30 seconds.
2. Flight Idle for a duration of 30 seconds.
3. Taxi, at zero altitude over the length of the assigned Taxi ground track at a constant speed of 10 knots.
4. Flight Idle for a duration of 30 seconds.
5. Ground Idle for a duration of 30 seconds.

### **11.7.5 How to Build a Helicopter Overflight Profile**

A typical helicopter overflight profile begins in the air at the start of an overflight track, follows the track, and ends in the air. Overflight profiles may include any of the steps defined in section 11.7.1 except for the Taxi step, but must start with a Start Altitude step.

Make sure that a helicopter overflight profile is long enough to extend across the noise calculation area because INM does not extend profiles (INM does extend ground tracks). A helicopter flight path starts at the beginning of an overflight track and continues until the profile ends. Noise is not produced before the start of the track or after the end of the profile, even though the ground track may continue on.

### **11.7.6 Helicopter Flight Path Construction**

INM calculates helicopter profile points using only procedure step data. After profile points are calculated, a three-dimensional flight path is constructed.

INM constructs a three-dimensional flight path by merging a two-dimensional profile (a set of distance vs. altitude points) with a two-dimensional ground track (a set of X,Y points) using the following method:

- Wherever there is a track point, a Z-value is computed by interpolating between two points on the profile.
- Wherever there is a profile point, X,Y values are computed on the ground-track segment under the profile point.

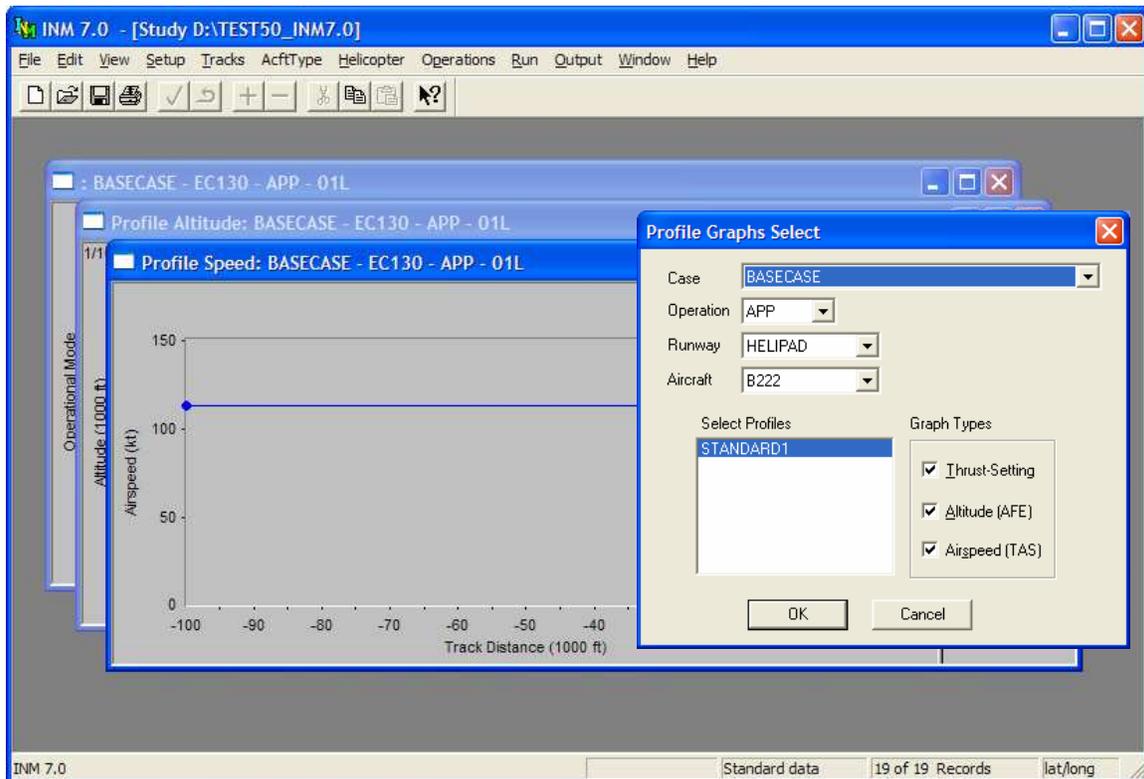
The result of this construction is an ordered set of X,Y,Z points and associated data describing the flight path. Thus, a flight path is a set of flight path segments, and each segment contains the following data:

- Segment starting point (X,Y,Z)
- Unit vector pointing along the segment in the direction of flight
- Segment length
- Segment starting speed, and change in speed
- Segment starting thrust setting, and change in thrust setting.

During flight path construction, INM automatically extends ground tracks so that a profile has a track under it. However, INM does not extend profiles, so the helicopter “disappears” after the last profile segment, and does not contribute to the noise calculation after that.

The last flight path segment is constructed by using the last profile point and the second-to-last segment. The last segment length is set to one foot.

The *Output // Flight Path Report* function writes a text file of flight path data to each case subdirectory within a scenario.



## 11.8 Helicopter Profile Graphs

Menu Item: *Helicopter // Profile Graphs*

Use this function to view three kinds of helicopter profile graphs:

- Altitude vs. distance
- Speed vs. distance
- Operational Mode vs. distance.

Select a helicopter, operation type, runway end, and case. INM pre-selects all the profile records for the given helicopter and operation type. Press *OK* to see all three graphs.

- Limit the number of curves on the graphs by de-selecting extra profiles before pressing *OK*.
- Limit the number of graphs by un-checking extra graph types before pressing *OK*.

When you commit a record in the *Helicopter Procedural Profiles* window, you can immediately see the effect on the profile in the *Helicopter Profile Graphs* window. This feature is useful in debugging user-created profiles.

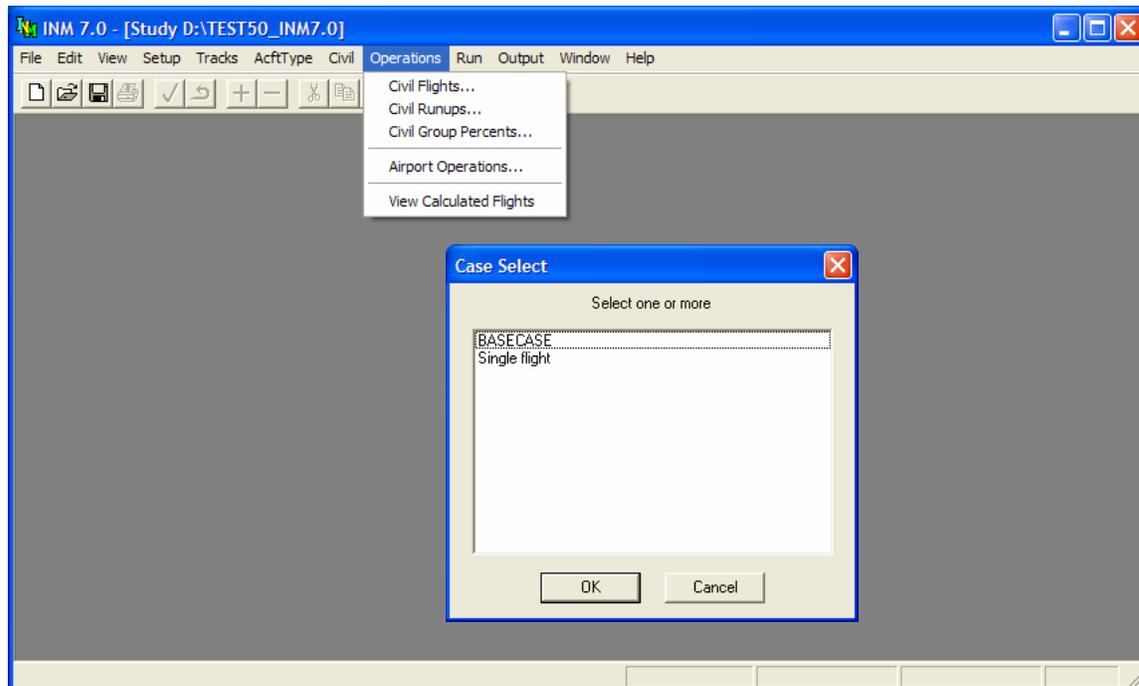
The operational mode vs. distance graph indicates the helicopter flight operational mode used for each flight path segment. The modes are represented

in this graph by integers between 0 and 15. The integer values map to operational modes as follows:

<u>INDEX</u>	<u>OPERATIONAL MODE</u>
0	Approach
1	Depart
2	LevelFly
3	GndIdle
4	FltIdle
5	HovInGE
6	HovOutGE
7	DepVertInGE
8	DepVertOutGE
9	AppVertInGE
10	AppVertOutGE
11	AppHorDec
12	AppDesDec
13	DepHorAcc
14	DepClmAcc
15	Taxi

There are three ways to export Profile Graphs data:

- Use *File // Export As* to write profile-point data to a text file or *DBF* file.
- Or, use *File // Print* to send the graph to a printer.
- Or, use *Edit // Copy* to send a graphics metafile (*WMF* format) to the Windows Clipboard.

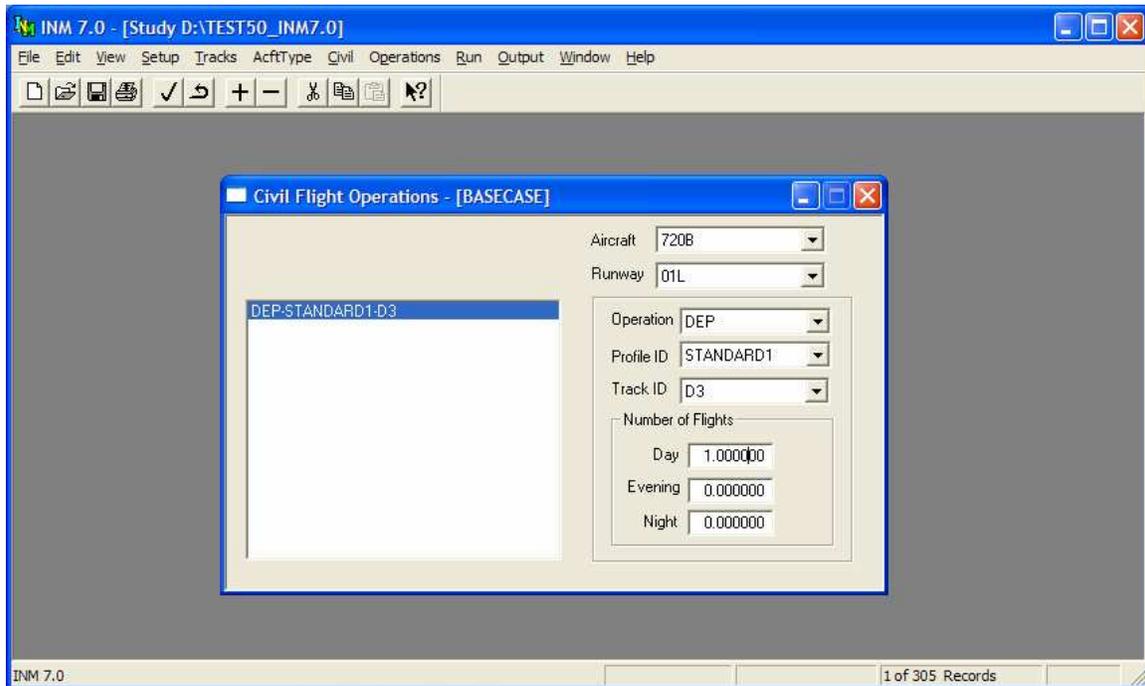


## 12 OPERATIONS MENU

Use this menu to:

- Input flight operations for specific runways/helipads and tracks.
- Input runup operations.
- Distribute airport operations over tracks and runways/helipads.
- Input airport flight operations.
- Calculate flight operations using distributed airport operations, aircraft substitution operations, and sub-track operations.
- View filtered and summary flight operations.

Operations can only be entered for one aircraft type (civil, military, or helicopter) at a time. The available aircraft type can be specified via the *AcftType* menu described in Section 8. Operations are associated with a specific case, so the Case Select menu will prompt you automatically when one of the menu options is selected.



## 12.1 Flight Operations

Menu Item: *Operations // Civil Flights*, *Operations // Military Flights*, or *Operations // Helicopter Flights*

Use this function to assign numbers of aircraft to individual runways/helipads and tracks. Flight operation data are at a detailed level, rather than for the airport as a whole.

To create a flight operation record:

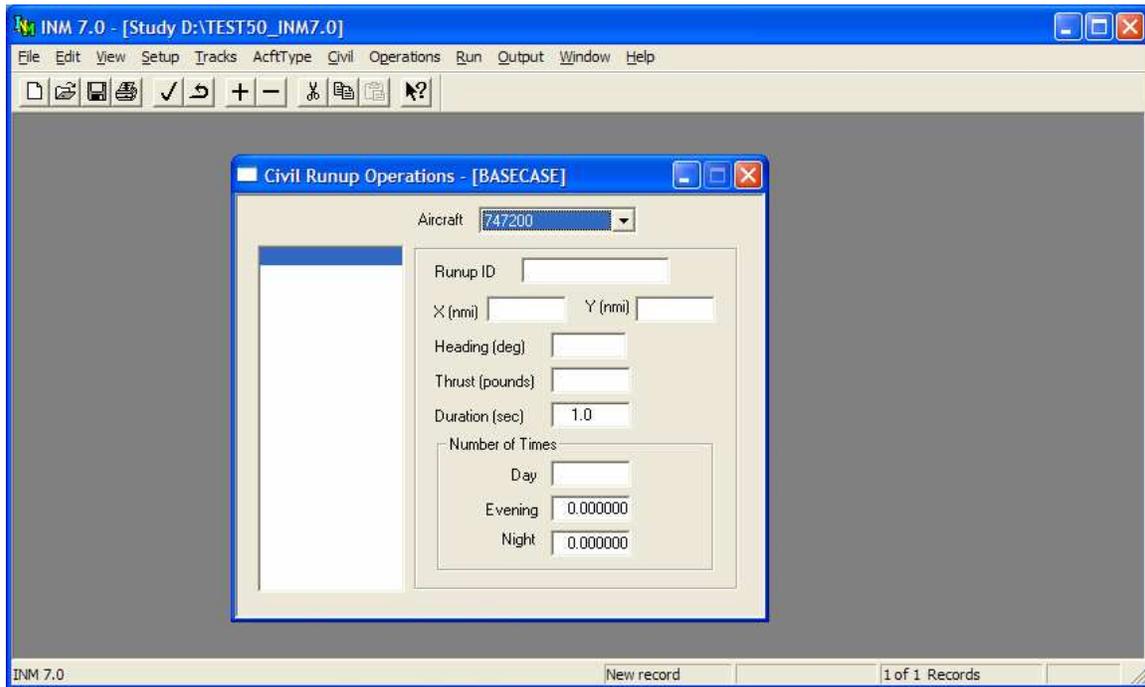
1. Select an aircraft.
2. Select a runway end or helipad.
3. Use *Edit // Add Record*.
4. Select a type of flight operation. You must have profiles and tracks already defined for the selected operation.
5. Select a profile group and stage identifier. For departures, the stage number defines takeoff weight.
6. Select a track identifier.
7. Input the number day, evening, and nighttime flight operations for this aircraft, operation, profile, and track.

You can create both airport operation records and flight operation records for the same type of operation. Usually, you would use this feature to distribute one group of aircraft by group percentages, while detailing another group. For example, you could create general aviation departures using *Airport Operations* and create commercial departures using *Civil Flight Operations*. In this case, you are not specifying the same aircraft-runway-profile-track

combination by two different methods because different aircraft groups contain different aircraft.

Do not define the same aircraft-runway-profile-track combination by both *Airport Operations* and *Flight Operations* functions because you will have too many flights.

If you use both *Airport Operations* and *Flight Operations*, check the final count in the *Operations // View Calculated Flights View Summary* window to make sure that the total numbers of operations are correct.



## 12.2 Runup Operations

Menu Item: Operations // Civil Runup Operations or Operations // Military Runup Operations

Use this function to input run-up operations for a specific Case.

1. Select an aircraft identifier.
2. Use *Edit // Add Record* to create a blank record.
3. Input an 8-character runup pad identifier.
4. Input the X,Y position of the pad. If you do not know the coordinates:
  - Use *Tracks // Input Graphics // View // Geo Units* to change to nautical miles (or kilometers)
  - Position the mouse pointer on the runup pad, and read the X,Y values on the status bar in the lower-right part of the main window.
5. Input the heading of the airplane on the runup pad. Heading is measured in degrees clockwise from the Y-axis (true north).
6. Input the average thrust-setting.
  - For airplanes with NPD curves in Pounds, you can use static thrust, which is displayed on the airplane record in the *Civil // Airplane Data* or *Military // Airplane Data* window.

- For airplanes with NPD curves in Percent, you can use 100%.
7. To model runups that do not operate on all engines, calculate and use the thrust-setting that would diminish the noise level by  $10\log(N/N_T)$  dB, where N is the number of operative engines, and  $N_T$  is the total number of engines.
  8. Input the average duration of the runup event. Duration is the time that the average thrust setting is in effect, and it is measured in seconds. The maximum duration is 24 hours.
  9. Input the number of times the runup event occurs during the day, evening, and night time periods.

INM uses a single directivity pattern to calculate noise around an airplane on a runup pad. This is the same SAE-AIR-1845 directivity pattern function that is used to compute noise behind takeoff. The directivity pattern is symmetric around the longitudinal axis of the airplane.

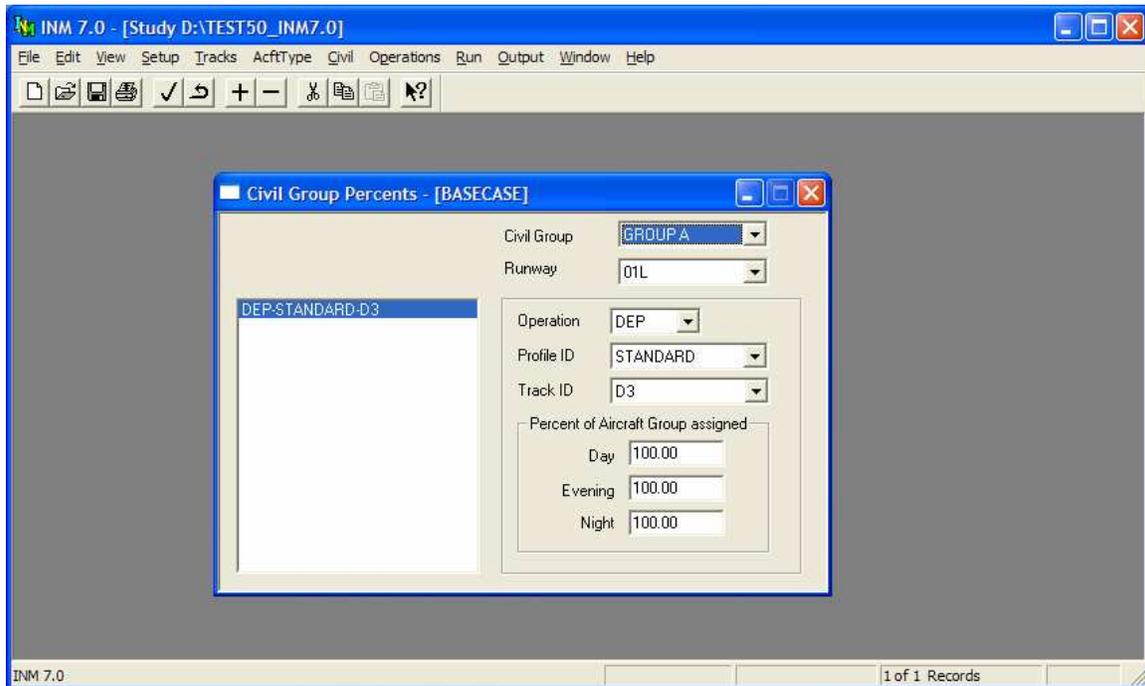
The INM directivity pattern function is given by:

$$\begin{aligned}
 P &= 0.0 && 0 \leq \theta \leq 90 \\
 P &= 51.44 - 1.553\theta + 0.015147\theta^2 - 0.000047173\theta^3 && 90 < \theta \leq 148.4 \\
 P &= 339.18 - 2.5802\theta - 0.0045545\theta^2 + 0.000044193\theta^3 && 148.4 < \theta \leq 180
 \end{aligned}$$

$$\begin{aligned}
 L &= P && 0 < D \leq 2500 \\
 L &= P \cdot 2500/D && D > 2500
 \end{aligned}$$

Where

- L is the number of decibels added to the maximum noise level.
- D is the distance from the airplane to the observer (feet).
- $\theta$  is the angle from the nose of the airplane to an observer behind the airplane (degrees).



## 12.3 Group Percents

Menu Item: *Operations // Civil Group Percents, Operations // Military Group Percents, or Operations // Helicopter Group Percents*

Use this function in conjunction with the *Operations // Airport Operations* function to create flight operations for a given case. Data for group percent records specify how operations for the airport as a whole are distributed across runways and tracks.

To create a group percent record:

1. Select an aircraft group identifier. These identifiers are under your control, but they cannot be changed in the Group Percents window. Instead, aircraft group identifiers are assigned to individual aircraft in the *Setup // Aircraft Group Assignment* window.
2. Select the runway end or helipad to work on. INM filters the group percent records and presents those records that are currently defined for the selected aircraft group and runway end. You can then edit current records or add new ones.
3. Use *Edit // Add Record* to create a blank record.
4. Select a flight operation.

5. Select a profile group identifier. The reason for defining a profile group is so that you have control over the kind of profile flown on a track. For example, you may want only distant NADPs on a particular track.
6. Select a track identifier.
7. Enter the percent of aircraft in the aircraft group that use this profile/track during the Day, Evening and Night time periods. Group percent records that have the same aircraft group identifier, time period and operation type should add up to 100%. INM normalizes the percentage values before computing, but you should also make sure that they add to 100% for your own information.

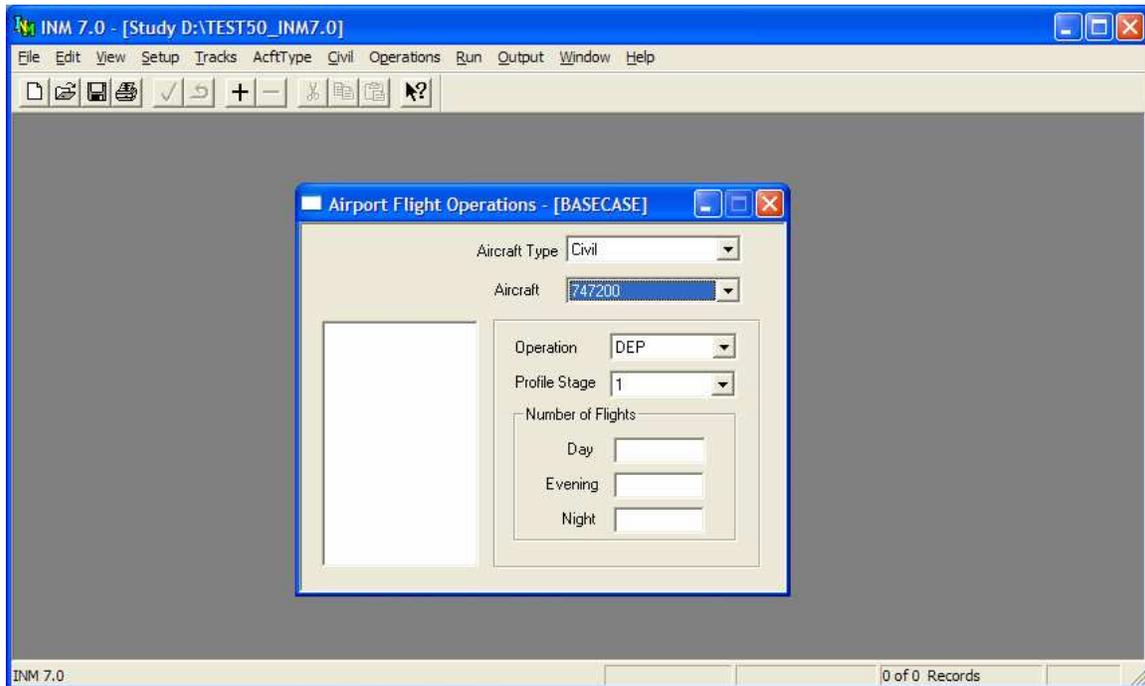
A potential problem with specifying the profile group on a track is that when INM calculates airport operations, some aircraft in the group may not have the required profiles.

For example, you put a 747200 into aircraft group HVY, and you assigned 30% of HVY to profile group DISTANT and track 33L-BEZEL. But what if the 747200 does not have DISTANT profiles defined? INM cannot detect this problem until it calculates flight operations. If you use only INM standard data, the above problem does not occur because there is only one kind of profile group – STANDARD.

When INM does detect the problem:

- No record is produced for the 747200-33L-DISTANT-BEZEL operation
- A message is written to the error file *OPS\_ERR.TXT* file in the case subdirectory.

The message in the error file alerts you to the problem. You need to take care of the problem by creating DISTANT profiles for 747200, or by defining aircraft group HVY such that it contains aircraft of like profiles. If you do not take care of the error, the number of flights that are computed is less than the number of flights defined in the *Airport Operations* window.



## 12.4 Airport Flight Operations

Menu Item: *Operations // Airport Operations*

Use this function in conjunction with the *Operations // Civil Group Percents*, *Operations // Military Group Percents*, and/or *Operations // Helicopter Group Percents* functions to create flight operations for a given case.

To create an airport operation record:

1. Select an Aircraft Type (Civil, Military or Helicopter)
2. Select an aircraft.
3. Use *Edit // Add Record* to create a blank record.
4. Select the type of flight operation.
5. Select a profile stage number. For departures, the stage number defines takeoff weight.
6. Input the number of day, evening, and night-time flight operations for this aircraft, operation, and profile stage. Flight operations are specified for the airport as a whole, meaning that they are not assigned to individual runways and tracks.

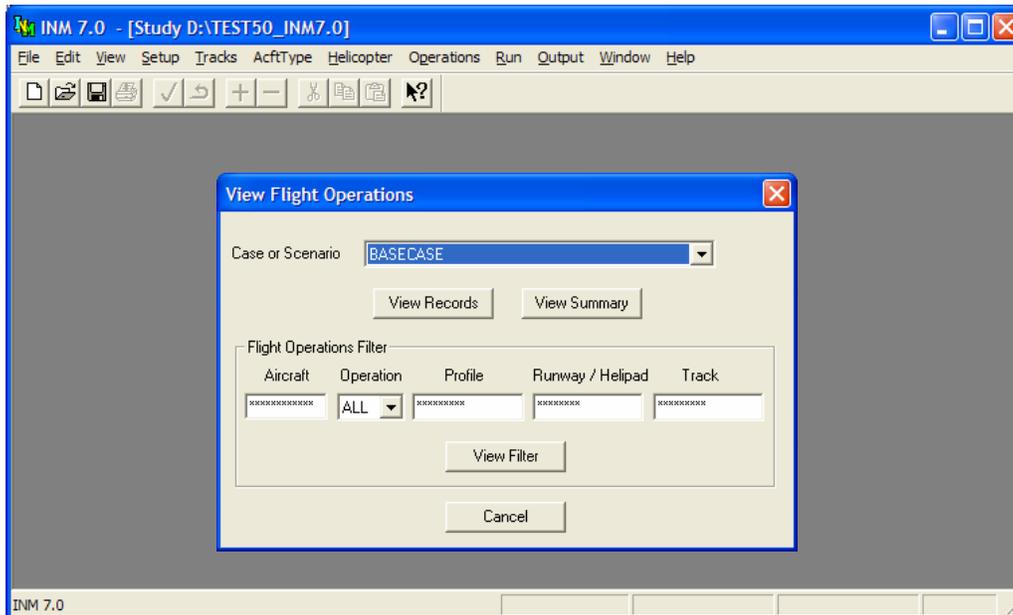
The standard noise metrics within INM, such as DNL, assume that flight operations are developed for a 24-hour day. Average daily flight operations are divided into three time periods: day, evening, and night. In the U.S., these time periods are defined relative to airport local time:

Day	0700 - 1900	(12 hours)
Evening	1900 - 2200	(3 hours)
Night	2200 - 0700	(9 hours)

INM standard and user-defined noise metrics are associated with three metric weights (day, evening, and night multipliers). The metric weights multiply the number of flight operations in the day, evening, and night fields on flight operation records (see section 6.4).

You are not constrained by the U.S. definition of hourly time periods. Day, evening, and night are simply the names of three time periods. The number of flights and the metric weight are what really gives a time period meaning. If you want the three time periods to represent different numbers of hours, you may have to create new noise metrics in *Setup // Metrics*. For example, you should create a new night equivalent noise level metric, LAEQN, if you have a 10-hour night instead of a 9-hour night.

When performing analysis containing both user-defined and standard metrics, keep a consistent definition between the time averaging time parameter of the metric and the time period implicitly assumed in the development of the flight operations.



## 12.5 View Calculated Flights

Menu Item: Operations // View Calculated Flights

Use this function to obtain summary information for all defined flight operations. Operations are calculated for a single case or scenario, and they may be summed by aircraft, operation type, profile definition, runway, or track. User input Annualization parameters are not applied here for multi-case scenarios, rather the default values are used (Scale Factor = 1.0 for all cases, the Annualization Percentage is equal for all cases). The data may be viewed within INM, saved to disk, or copied to another application. This function is most useful for verifying that INM input data match the user's intention.

INM calculates flight operations by:

- Distributing airport operations across tracks, as specified by group percent records.
- Distributing flight operations across INM aircraft, as specified by aircraft substitution records.
- Distributing flight operations across sub-tracks, as specified by track records.
- Adding flight operations records.

INM saves the calculated flight operations in the *OPS\_CALC.DBF* file in case directories and the *SCEN\_OPS\_CALC.DBF* file in scenario directories. If errors are generated during calculation, INM writes them to the *OPS\_ERR.TXT* file, which is also in the case subdirectory.

To use this function, select a case and then use one the three function buttons: View Records, View Filter, and View Summary.

Calculated Flight Operations - [BASECASE]

ACFT	OP	PROFILE	S	RWY	TRACK	S	GRP	DAY	EVENING	NIGHT
720B	D	STANDARD	1	01L	D3	0	—	1.000000	0.000000	0.000000
727Q15	A	STANDARD	1	01R	A4	0	—	0.050000	0.030000	0.010000
727Q15	A	STANDARD	1	10R	A3	0	—	0.160000	0.090000	0.030000
727Q15	A	STANDARD	1	19R	A2	0	—	2.160000	1.180000	0.430000
727Q15	A	STANDARD	1	28L	A1	0	—	23.680000	12.890000	4.690000
727Q15	D	STANDARD	1	01L	D3	0	—	0.260000	0.030000	0.020000
727Q15	D	STANDARD	1	01L	D5	0	—	0.660000	0.080000	0.040000
727Q15	D	STANDARD	2	01L	D3	0	—	1.300000	0.270000	0.060000
727Q15	D	STANDARD	2	01L	D5	0	—	3.230000	0.660000	0.140000
727Q15	D	STANDARD	2	01R	D2	0	—	8.580000	1.760000	0.380000
727Q15	D	STANDARD	2	01R	D4	0	—	2.800000	0.570000	0.120000
727Q15	D	STANDARD	2	01R	D4A	0	—	2.800000	0.570000	0.120000
727Q15	D	STANDARD	2	01R	D4B	0	—	2.800000	0.570000	0.120000
727Q15	D	STANDARD	2	10R	D1	0	—	2.360000	0.480000	0.100000
727Q15	D	STANDARD	2	19L	D8	0	—	0.210000	0.040000	0.010000

INM 7.0 record 14 305 records 1 selected

### 12.5.1 View Current Flight Operations

Menu Item: *Operations // View Calculated Flights // View Records*

Press the View Records button to view the current set of calculated flight operation records for a given case.

You can export calculated flight operations:

- Print the records, or a subset of the records, by using the *File // Print* function.
- Export the records, or a subset of the records, to a file by using the *File // Export As* function.
- Copy the records to the Windows Clipboard as text with the *Edit // Copy* function.

### 12.5.2 View Filtered Flight Operations

Menu Item: *Operations // View Calculated Flights // View Filter*

There may be a very large number of calculated flight operation records. You can view a subset of these records by first editing the filter input boxes, and then pressing the View Filter button.

The filter command has the following input boxes:

- Aircraft identifier (for example, DC930)
- Type of operation (APP, DEP, TGO, CIR, OVF)
- Profile identifier (group+stage identifiers; for example, STANDARD5)
- Runway end or helipad identifier (for example, 27R)



Flight operation summary data are useful for checking your input data. For example:

- Does the average number of approaches to a given runway match the real operational data?
- Does the average number of departures equal the average number of approaches?

Airport landing/takeoff operations are counted differently than shown in the flight operations summary table. You can calculate landing/takeoff operations by using the INM summary data:

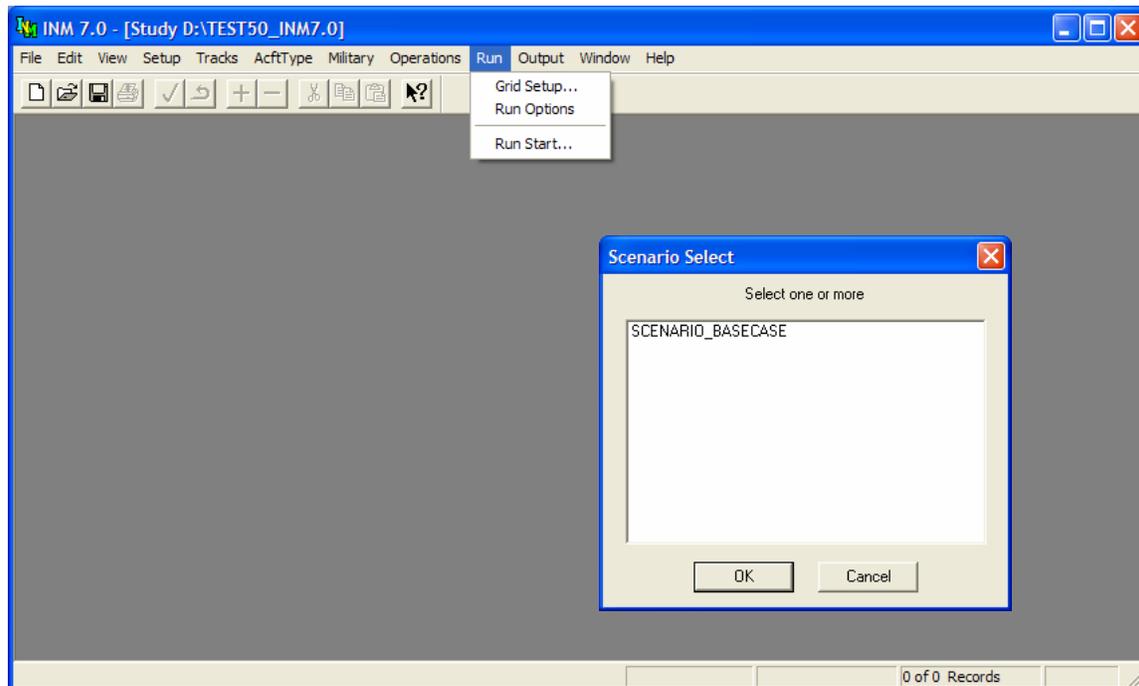
$$\begin{aligned}\text{Airport Landings} &= N_{\text{APP}} + N_{\text{TGO}} + N_{\text{CIR}} \\ \text{Airport Takeoffs} &= N_{\text{DEP}} + N_{\text{TGO}} + N_{\text{CIR}}\end{aligned}$$

Where,

- $N_{\text{APP}}$  = sum of all approaches (A)
- $N_{\text{DEP}}$  = sum of all departures (D)
- $N_{\text{TGO}}$  = sum of all touch-and-go operations (T)
- $N_{\text{CIR}}$  = sum of all circuit flights (F)

A TGO or CIR flight operation is counted twice because it has both a landing event and a takeoff event.

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## 13 RUN MENU

Use this menu to setup and run a scenario. INM calculates noise metrics at specific locations according to your definition of grid points and saves the results in the scenario subdirectory. Grid definition includes a special rectangular grid called a contour grid. There is only one contour grid per scenario.

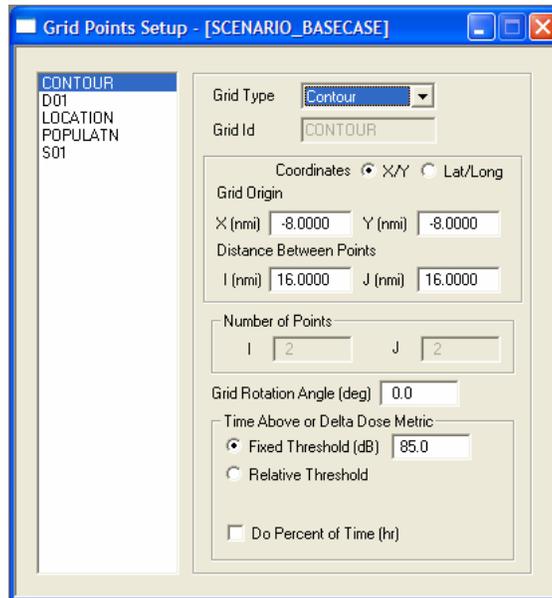
The setup functions include:

- Defining a contour grid or grids for specific points
- Specifying the metrics and other noise calculation options.

The execution functions include:

- Launching one or more scenarios.
- Managing runs in progress.

Options are associated with specific scenarios, so the Scenario Select menu will prompt you automatically when one of the menu options is selected.



## 13.1 Grid Setup

Menu Item: Run // Grid Setup

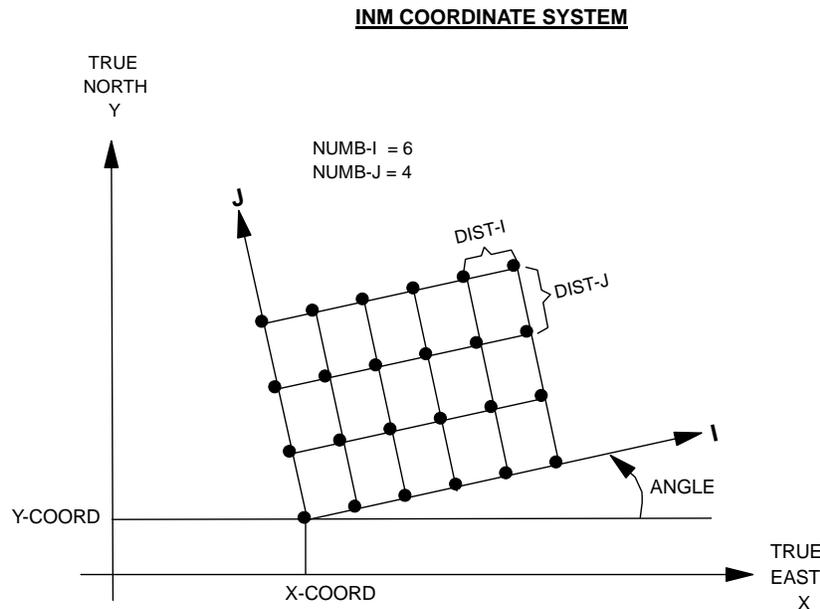
Use this function to define various kinds of grids.

- Grid points define locations where noise is calculated. The definition requires an origin, the number of points in the grid array, and the distance between the points.
- A single location is defined by a 1x1 grid array.
- The rectangle in which INM computes contours is defined by a 2x2 grid array.

Each scenario has its own set of grid records, which are contained in the *GRID.DBF* file. If you want to use the same grid records for several scenarios:

- Use the *Setup // Scenario Copy* function to copy the *GRID.DBF* file to a new scenario subdirectory when you create a new scenario.
- Use *Edit // Copy Records* and *Paste Records* functions to copy records in one scenario and paste them to another.
- Or, use a file manager to copy a *GRID.DBF* file from one scenario to another, external to INM. Close INM before using this method.

A grid is a rectangular array of points. A grid can be rotated relative to the X,Y coordinate system. Because it can be rotated, grid coordinates I,J are used instead of X,Y coordinates. When the rotation angle is zero, the I-axis is parallel to the X-axis, and the J-axis is parallel to the Y-axis.



To create a grid record:

1. Use *Edit // Add Record* to create a new record. INM creates a default, un-rotated, square contour grid, 16 nmi on a side, and centers it on the X,Y coordinate origin. You can change these default parameters.
2. Select the type of grid:
  - Contour – define four corners of a rectangle. INM produces noise contours inside this rectangle.
  - Standard – define observer locations. INM produces a concise noise analysis for these grid points.
  - Detailed – define observer locations. INM produces an extensive noise analysis at these grid points. INM computes and saves various geometric and acoustic measures for each flight operation.
  - Location – define the threshold noise level for computing time-above at location points. The number and locations of location points are defined in the *Setup // Location Points* window.
  - Population – define the threshold noise level for computing time-above at population points. The number and locations of population points are defined in the *Setup // Location Points* window.
3. Input a grid identifier (up to eight characters) for a standard or detailed grid. INM provides the grid identifier for contour, location, or population grids, and it cannot be changed.
4. Select the type of coordinates you would like to input. Choose either X,Y coordinates in nautical miles or Latitude/Longitude values in decimal degrees.

5. Input the X,Y or Latitude/Longitude values of the lower-left corner point for contour, standard, and detailed grids. Location and population points are defined in the *Setup // Location Points* and the *Setup // Population Points* windows.
6. Input the distances between neighboring grid points along the I and J axes.
7. Input the numbers of points along the I and J axes for standard and detailed grids. A contour grid rectangle has four points.
8. Input the rotation angle relative to the X-axis (maximum  $\pm 90$  degrees). Rotation is counter-clockwise around the lower-left corner.
9. For time-above or Delta Dose analyses, select the type of threshold to use and input a threshold parameter:
  - Fixed Threshold – INM uses a fixed time-above threshold that is the same for all points in the grid.
  - Relative Threshold – INM uses a relative time-above threshold that is determined by an ambient noise level at a grid point plus a delta level. Delta is the same for all points in the grid. Delta can be positive, zero, or negative.
    - Ambient noise levels are defined in a text or binary file, which are metric and scenario dependent (see Section 13.1.1 below). You create the text file and tell INM where to find it using the *Setup // File Locations* function. Binary ambient files must be obtained from the FAA and are only used in special circumstances. See Appendix N for more details.
10. Put a check mark in the Do Percent of Time box if you want INM to compute time-above as a percentage of a given time duration in hours.
  - For example, if you check this box and enter 8 hours, INM calculates percent time-above as  $TA\% = 100 TA / (8 \cdot 60)$ , where TA is time-above in minutes.
  - Without a check mark, INM computes time-above in minutes. In either case, the result is referred to as "time-above".

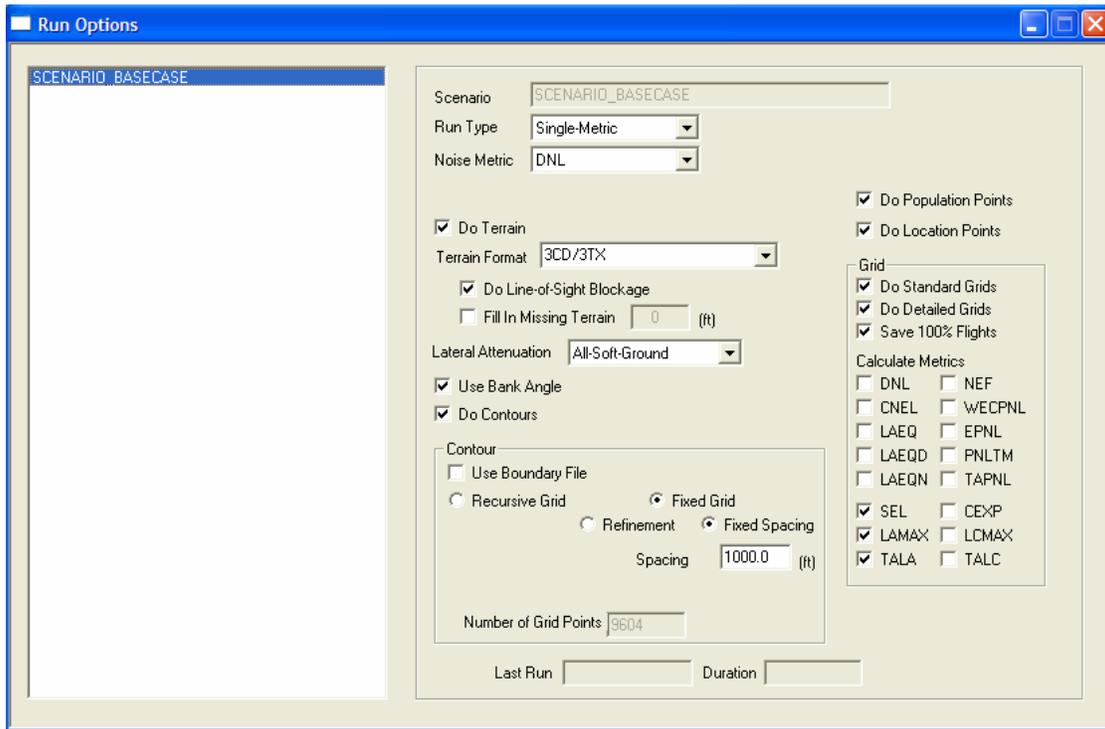
You can have only one contour grid record, one location grid record, and one population grid record.

You can have any number of standard and/or detailed grids per scenario. However, the output from a detailed grid analysis can be very large, and you should limit the number of detailed grids, the number of points in them, and the number of standard metrics calculated.

### **13.1.1 Ambient Text Files**

INM supports two text file formats for ambient data. The newer format supports ambient data to one decimal place (i.e., 3 total digits) whereas the original format specified only integer values (2 total digits). Files developed in the old format are still supported for backward compatibility for using the time above metrics. However, for time above metrics, INM automatically converts data files to the new 3-digit format. 2-digit data are archived in a file called *AMBIENT\_BACKUP.TXT* and the new 3-digit data are written to *AMBIENT.TXT*.

An example *AMBIENT.TXT* file is shown in Appendix N.4.



## 13.2 Scenario Run Options

Menu Item: *Run // Run Options*

Use this function to specify run options before running a scenario. Start by selecting a scenario from the list on the left. (You can add scenarios in the *Setup // Scenarios* window).

### 13.2.1 Run Type

Use this drop-down box to select a type of run. The selected run type affects what other options are available in the *Run Options* window.

- Single-Metric - one noise metric is computed. Using this metric, you can compute contours, standard grids, detailed grids, population points, and location points, all in one run. Select this run mode if you want to calculate grids or if you need only one kind of contour.
- Ambient Screening - used to assist in the determination of the need for ambient noise data collection. See Appendix N for more details on this run type.
- Audibility - this option is available only when the required ambient data file has been obtained from the FAA and its location has been specified in *Setup // File Locations // Ambient Noise File*. See Appendix N for more details on this run type.

### 13.2.2 Noise Metric

Use this drop-down box to select a noise metric for the run. This box is only available if the Single-Metric Run Type has been selected.

- The noise metric list contains 16 standard metrics and any other metrics that you may have created.

### 13.2.3 Do Terrain

Check this box if you want INM to utilize terrain data for noise calculations. Using terrain data is optional. When checked, INM computes the distance from a ground-based observer to an airplane using terrain elevation data from one or more terrain files. When unchecked, INM computes observer-to-airplane distance based on flat ground around the airport at the airport elevation. To utilize terrain data:

- Specify the terrain data format (*3CD/3TX*, GridFloat, or Digital Elevation Model) in the Terrain Format drop-down list.
- You must tell INM where to find terrain files of the proper format that are to be used during the run via the *Setup // File Locations* function.
- You can use the *File // Import Data into Study // Terrain Files* function to view terrain contours from your data within INM graphics windows, however this function is not required in order to utilize terrain data for noise calculations.

***Do Line-Of-Sight Blockage*** - When using terrain data, you also have the option of having the INM account for Line-Of-Sight-Blockage. When *Do Line-Of-Sight Blockage* is checked, INM computes the distance from a ground-based observer to an airplane while accounting for the added attenuation due to LOS blockage from terrain features. The computation time dramatically increases when using the *Do Line-Of-Sight Blockage* feature.

***Fill in Missing Terrain*** - When checked, the *Fill in Missing Terrain* check box has one of two functions:

- If *Do Line-of-Sight Blockage* is also checked, INM will create terrain files that cover any areas that are missing terrain data. The feature is may be necessary when calculating Line-of-Sight Blockage because the Line-Of-Sight calculations require more extensive terrain coverage. Typically this function will be used when terrain data is not available for download, for example, along coastlines or over water. You may input an elevation for the additional terrain files. Every elevation point in the file will be set to your input value. The elevation is measured from Mean Sea Level, the default value is zero. INM creates a cad file, *FILLED\_IN\_TERRAIN.CAD*, that can be viewed in the *Tracks // Input Graphics* or *Output // Output Graphics* windows. The file graphically displays the area covered by the selected terrain files and the area covered by the INM-generated filled-in-terrain files.
- If Line-of-Sight Blockage is unchecked, the *Fill in Missing Terrain* value is used to replace any *No Data* values in the selected terrain files with a user-input elevation value. Since *3CD* files are complete, this

feature is only available when Digital Elevation Model or GridFloat terrain files are being used. In this situation “Fill in Missing Terrain” can not be used as a substitute for entire terrain files, it can only be used to fill in data gaps within terrain files. Missing terrain data files will result in an error message and a halted run.

Typical errors that can occur when attempting to utilize terrain data for noise computations include:

- Terrain Span Check – INM stops with an error if the terrain data is missing or there are gaps in the data. When using Line-of-Sight Blockage, gaps can be filled in automatically by checking “Fill in Missing Terrain”. If terrain data files are missing then confirm that the Terrain Files Directory (see Section 6.13) contains all of the desired terrain files. Missing data will be highlighted in a CAD error file that can be displayed in the *Input Graphics* or *Output Graphics* windows; an INM dialog will provide the filename and location. Red areas displayed in this CAD file represent areas of missing terrain data.
- Contours – INM stops with an error message if a required terrain file is missing. Look in the *TERRAIN\_ERR.TXT* file in the terrain directory for information on which file is missing.
- Standard grid point, detailed grid point, population point, or location point – INM sets the metric at the point to -98.0 and continues running. Tables may contain both valid and invalid (-98.0) values.

#### **13.2.4 Lateral Attenuation**

INM makes adjustments to predicted noise levels based on lateral attenuation effects. You can change how lateral attenuation affects are applied by changing the selection in the Lateral Attenuation drop-down list:

- All-Soft-Ground – INM uses SAE-ARP-5662 lateral attenuation for all aircraft types
- No-Prop-Attenuation – INM turns off lateral attenuation only for flights from propeller-driven airplanes and helicopters. Jet aircraft still use SAE-ARP-5662 lateral attenuation.

#### **13.2.5 Use Bank Angle**

When checked, INM includes the affects of airplane bank angle when calculating flight performance and sound propagation. Airplanes tend to climb more slowly when banking then they do when flying in a straight line, and shielding effects from an airplane’s wings during banking tend to increase lateral attenuation (decreasing noise) on the inside of a turn and decrease it (increasing noise) on the outside of a turn. When this box is not checked the airplane bank angle is set to zero (no bank) for all calculated flight path segments. In either case, bank angle affects are not applied to helicopters or aircraft without thrust defined in pounds or percent maximum thrust.

Bank angle is calculated based on ground track curvature and an airplane’s speed. Due to the strong effects of ground track curvature, it is recommended

that the *Use Bank Angle* box only be checked when ground tracks are defined as vector-type tracks. If points-type ground tracks are to be used during a run that also includes bank angle calculations, extra care must be taken to ensure that the ground tracks define realistic turns and that supposedly straight ground track sections do not in fact oscillate back and forth even to a small degree. The INM imposes a maximum airplane bank angle limit of plus or minus 30 degrees. At run time, INM will write a warning message to the *ERROR&WARNING.TXT* File whenever these limits are exceeded along a flight path. A large number of these warnings for a given run indicates that the ground track definitions are not suitable for bank angle calculations, and the scenario should be re-run with the *Use Bank Angle* box unchecked.

### 13.2.6 Do Contours

Check the *Do Contours* box when you want INM to calculate contouring data. You must tell INM where to compute contours by creating a contour grid record in the *Run // Grid Setup* window.

INM allows the use of recursively subdivided irregular grids or fixed-resolution grids with constant grid spacing when calculating contour data. The allowable contour grid type is dependent upon the number of cases in the scenario to be run and also the desired run mode. Recursively subdivided irregular grids can only be used when running single-case scenarios, and only when running in the standalone run mode (see Section 13.3). This is because the process of annualizing multi-case scenarios (see Section 14.3) requires noise to be calculated at identical points across all cases, which will not occur when using recursive grids. Likewise, the process used to divide up contour grid points for parallel processing in the multi-threaded run mode requires fixed contour grid spacing. Multi-case scenarios or any scenario run using the multi-threaded or run mode (see Section 13.3) must use fixed-resolution contour grids.

Fixed contour grid runs may take significantly longer than recursive contour grid runs due to the much greater number of points being calculated. This run-time penalty may or may not be offset by the additional functionality available when using fixed contour grids, including the ability to organize input data within multiple cases instead of just one case, and also the ability to alter operations levels after a run using the Annualization function (see Section 14.3) and produce new noise results without having to re-run the scenario. In addition, some or the entire run-time penalty may be eliminated through the use of the multi-threaded run mode as described in Section 13.3. You will need to consider the available computer hardware, allowable run times, and needed input and output data flexibility when deciding between the use of recursive or fixed contour grids.

***Use Boundary File*** – Checking this box limits INM contour calculations to an area defined by a Boundary File. When checked, INM will only calculate contour data within the intersection of the contour grid rectangle and the area defined by the Boundary File. A Boundary File can define a single polygon of any shape and size. A Boundary File is a text file with the same format as an

INM Polyline *TXT* file, which is detailed in Section 3.5.2. INM will always use only the first layer defined in the Boundary File as the boundary polygon. You must define the location of the Boundary File using the *Setup // File Locations* menu item.

**Recursive Grid** – Select this option if you would like INM to use a recursively subdivided irregular grid method to calculate data for contours. This option is not available for scenarios that include more than one case. When this option is selected:

1. Input a refinement number:
  - Using the recursively subdivided-grid method, areas where the noise changes substantially are divided into small grids; areas where there is little change in noise are left undivided.
  - You control the size of the smallest contouring grid with the refinement number. The size *d* in nautical miles of the smallest grid is:

$$d = (1/2^{N-3})(D/2)/(1 + \text{int}(D/2))$$

where *N* is the refinement number, *D* is the distance between corner points in nautical miles, and *int*(*x*) is the integer part of *x*. The table below shows the largest value of *d* as a function of refinement (assuming *D*=999 nmi., the maximum allowed value).

N	d (feet)	N	d (feet)
4	3038	7	380
5	1519	8	190
6	760	9	95

2. Input a tolerance value:
  - You control the process of subdividing a contouring grid with the tolerance value. If the tolerance is small, INM is more sensitive to changes in the noise metric over an area, and is more likely to divide a grid.
  - The units for the tolerance value are decibels for noise level metrics, and minutes for time-above metrics.
  - The combination of a large refinement number and a small tolerance value causes INM to calculate more contouring grid points, resulting in a longer run time, but producing higher-fidelity contours.
3. Input low and high cutoff values:
  - Contouring grids that have noise values lower than the low cutoff level are not subdivided.
  - Contouring grids that have noise values higher than the high cutoff level are not subdivided.
  - Single-Metric or Audibility run – the valid noise area lies between the low-cutoff and high-cutoff contour levels. Noise levels outside the valid noise area are not accurately calculated.

**Fixed Grid** – Select this option if you would like INM to generate contours by calculating noise at a fixed-resolution set of grid points within the defined

contour grid rectangle. Contour calculations for multi-case scenarios must use a fixed contour grid.

- **Refinement** – Select this option if you would like the spacing between grid points to be determined by the refinement level. Select a refinement number from the drop down list. The grid point spacing is calculated similarly to the method defined above for recursive grids. Fixed grids use the same spacing in the I and J directions of the contour rectangle, while the spacing in the I and J directions for recursive grids can differ based on the contour rectangle's proportions. Therefore the same refinement level may not yield the exact same spacing values in both the I and J directions for both recursive and fixed grids.
- **Fixed Spacing** – Select this option if you would like to input the spacing between grid points. Enter a spacing value. The value applies in both the I and J directions of the contour rectangle.
- **Number of Grid Points** – Displays the total number of contour grid points that will be calculated during the run. This number is generated using the dimensions of the contour grid rectangle specified in the *Run // Grid Setup* window and the selected Refinement or Fixed Spacing value. This field can not be used to directly specify the number of grid points. INM will not allow the specification of more than 50 million contour grid points for a single scenario run.

### 13.2.7 Do Population Points

Check the *Do Population Points* box to compute noise at population points.

- Population points are located at the centers of census blocks, which for densely populated areas, correspond to city blocks.
- You need to have a *POP\_PTS.DBF* file in the study directory to run population points. Use the *File // Import Data into Study // Census PL94-171 DBF Files* function.
- You must have a population grid record defined in the *Run // Grid Setup* window, even when not computing a time-above metric.
- A *POP\_PTS.DBF* file can be very large, and it may take a long time to compute noise.

### 13.2.8 Do Location Points

Check the *Do Location Points* box to compute noise at location points.

- Location points are at nav aids, fixes, and special noise-sensitive locations around an airport, such as schools, hospitals, etc.
- You must have a *LOC\_PTS.DBF* file in the study directory to run location points.
- Create the file in *Setup // Study // View Airports*.
- Add location points in *Setup // Location Points* window.
- You must have a location grid record defined in the *Run // Grid Setup* window, even when not computing a time-above metric.

### **13.2.9 Do Standard Grids**

Check the *Do Standard Grids* box to compute noise at standard grid points.

- You must have one or more standard grid records defined in *Run // Grid Setup*.
- INM calculates up to 17 noise metrics at standard grid points:
  - INM calculates the metric selected from the Noise Metric drop-down list. It is called METRIC in the output table.
  - INM calculates all standard metrics that are checked under Calculate Metrics. You do not need to check the same metric that was selected from the Noise Metric drop-down list.
  - If one or more of your aircraft is missing a family of NPD curves (for example, EPNL/PNTLM curves are missing), then you should turn off all of the standard metrics in that noise family because they will not calculate correctly.

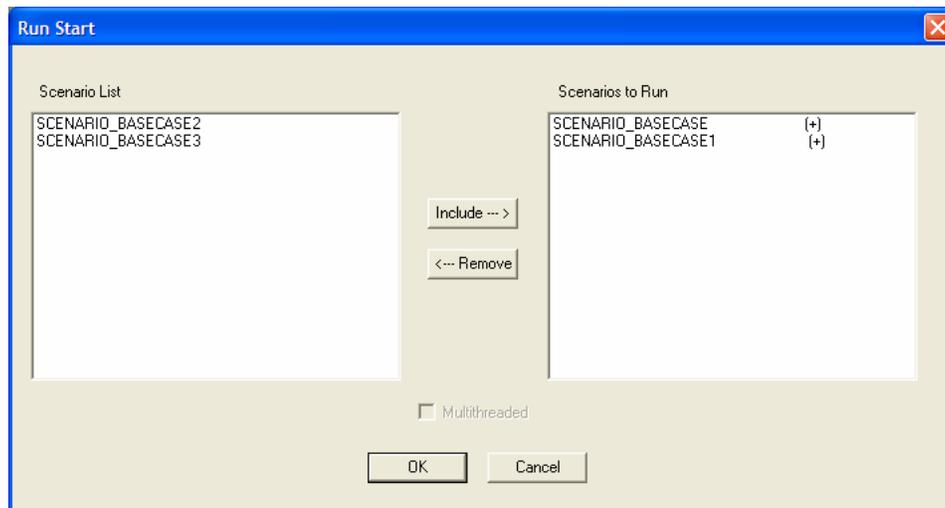
### **13.2.10 Do Detailed Grids**

Check the *Do Detailed Grids* box to compute noise at detailed grid points.

- You must have one or more detailed grid records defined in *Run // Grid Setup*.
- Save 100% Flights box – check this box if you want INM to save all flight operations in the *GRID\_DTL.DBF* file. Otherwise, INM saves only those flight operations that contribute 97% of the noise at the grid point. This is a way to reduce the amount of output data.
- INM always calculates the metric selected from the Noise Metric drop-down list. Uncheck most of the 16 standard metric boxes or you will get an extremely large amount of output data.
- If you select a standard metric from the Noise Metric drop-down list and also put a check mark in the box for that metric, the metric is written twice to the detailed grid file.
- INM creates a *GRID\_STD.DBF* file in addition to the *GRID\_DTL.DBF* file so that you can determine grid point X,Y,Z and lat/long from I,J values.

INM fills out the Last Run and Duration boxes after you run the scenario. The date and time of the run and the duration of the noise computation are displayed in these boxes.

- Once you edit and commit a record in the *Run Options* window, these two boxes are cleared in preparation for a new run.
- If you make a run, compute and view the contours, change the run options (the run time is cleared), and then you try to look at the output again, INM displays a warning message saying that that the scenario should be run again. The warning message is because you changed the run options and the changes may affect the output; however, INM will still display the *Output Graphics* window.



## 13.3 Batch Runs

Menu Item: Run // Run Start

Use this function to select scenarios to run:

1. Select the run mode. Only scenarios that are available to run in the selected mode will be visible on the scenario list. All run modes yield the same output.
2. Select one or more scenarios in the left-hand box.
3. Press the Include button.
4. INM moves the selected scenarios to the right-hand box.
5. Press *OK* to start the batch of runs.

For each scenario, INM:

- Reads study and standard data from disk, if the data are not already in memory.
- Calculates two-dimensional flight profiles and three-dimensional flight paths. When the flight path calculations are complete, INM will create two output files in the scenario directory. The *THRUSTLEVELINFORMATION.TXT* file indicates any calculated thrust values that are out of the range of thrust values provided in the available NPD data for the particular aircraft. The *ERROR&WARNING.TXT* file lists any errors or warnings encountered while generating the flight paths.
- Writes noise metric, flight path, and grid location data to the *FLIGHT.PTH* file for each case in the scenario.
- Displays the *Run Status* dialog box and starts noise computations.

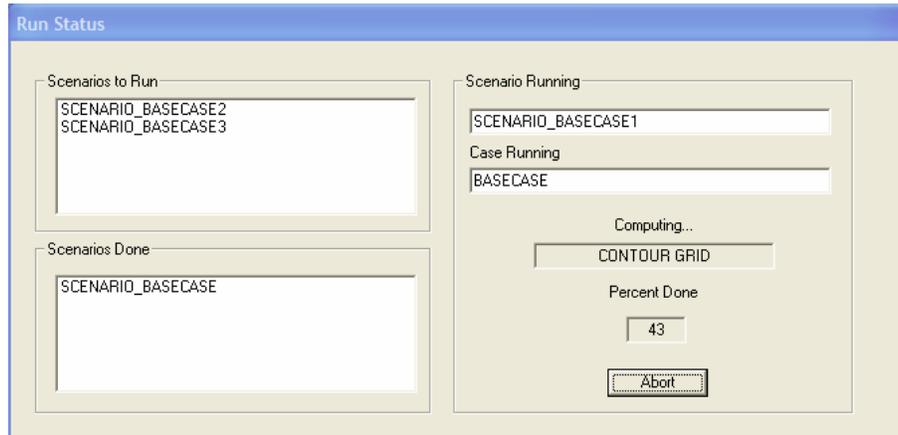
### 13.3.1 Standalone Mode

Use this mode to run INM on a single computer. This is the most flexible run mode as all scenarios are available to run, regardless of the number of cases in

each scenario or the type of contour grid that is selected in the *Run // Run Options* window.

**Multi-threaded** - Check this box to make INM utilize all available processors on a multi-core computer for noise computations. INM will automatically detect whether the computer it is running on has more than one processor available. This option is not available if your computer has only one processor. This option is also not available for any scenarios that have the Recursive Grid option selected in the *Run // Run Options* window. When this box is not checked, INM will only utilize one of the computer's available processors.

- Noise computation times are decreased based on the number of processors available. The grid points defined for a given run (contour, location, population, detailed and/or standard) are divided between the available processors and run in parallel.



### 13.3.2 Standalone Mode Run Status

During Standalone mode runs, the *Run Status* dialog box shows:

- *Scenarios to Run* – scenarios queued up to run in the future
- *Scenarios Done* – scenarios that have already finished
- *Scenario Running* – the scenario that is currently computing
- *Case Running* – the case that is currently computing
- *Computing* box – the type of grid currently computing
- *Percent Done* box – the progress of the run:
  - a. Standard, detailed, population, and location points – the value shown is the percent of total number of points that are finished, which is approximately the percent of total run time.
  - b. Contour grid points –
    - Fixed Grid runs: the value shown is the percent of the total number of points that are finished.
    - Recursive runs: the value shown is the percent of total number base grids that are finished. The number of base grids depends on the size of the contouring area. The

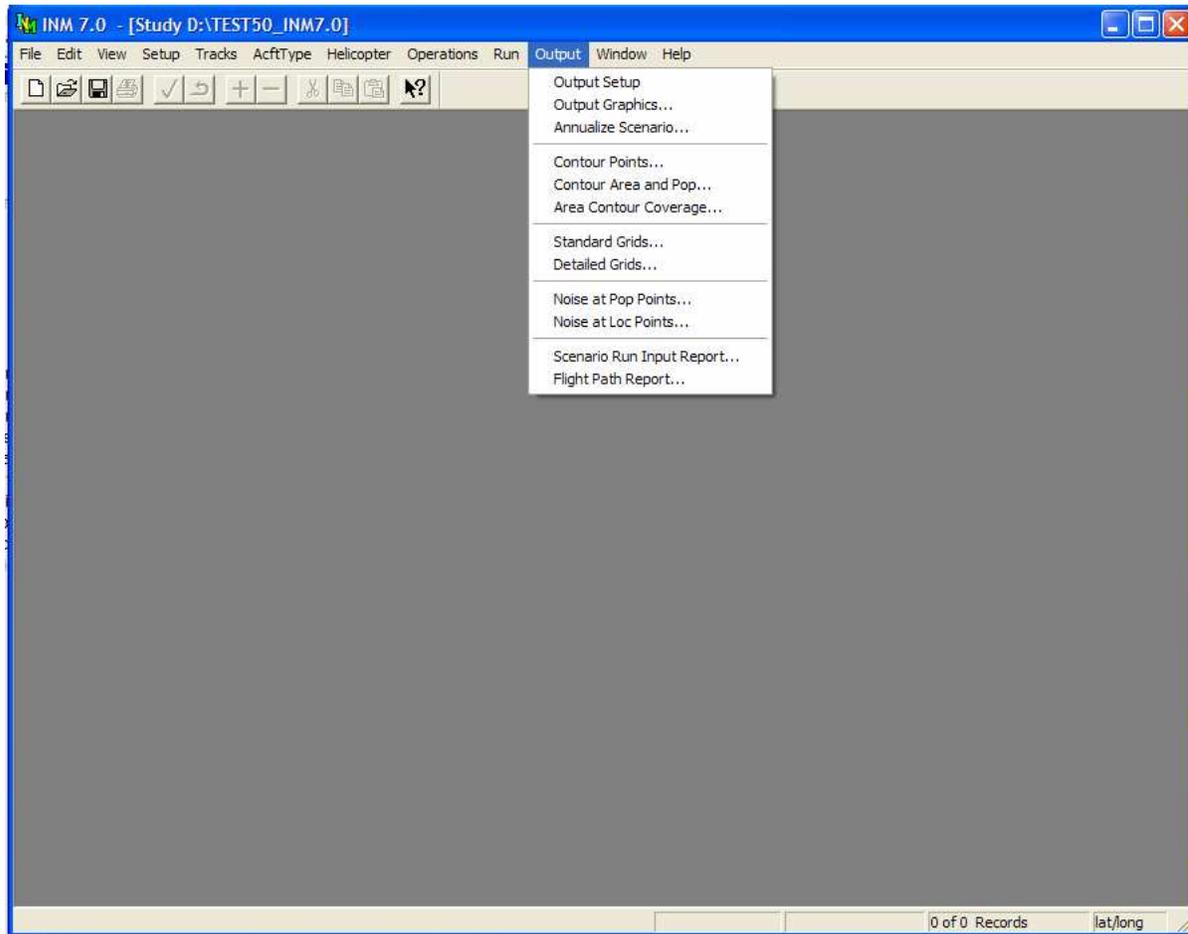
percent of total run time cannot be predicted because each base grid is subdivided to different levels, and the number of points computed varies from one base grid to another.

- *Abort* button – use this to stop the currently running scenario.

After a batch of runs is finished, INM removes the Run Status dialog box and unlocks the INM user interface. Go to the Output menu to view the results.

- Standard, detailed, population, and location point results are stored in the scenario subdirectory.
- Output data for multi-case scenarios are automatically scaled using default annualization parameters (Scale factor = 1.0 for all cases, Annualization Percentage for each case =  $100 / \text{Number of Cases}$ ). To reset the default annualization parameters, go to the *Output // Annualize Scenario* menu item.
- Contours require more processing. Contour post-processing occurs when you access the *Output // Output Graphics* function.

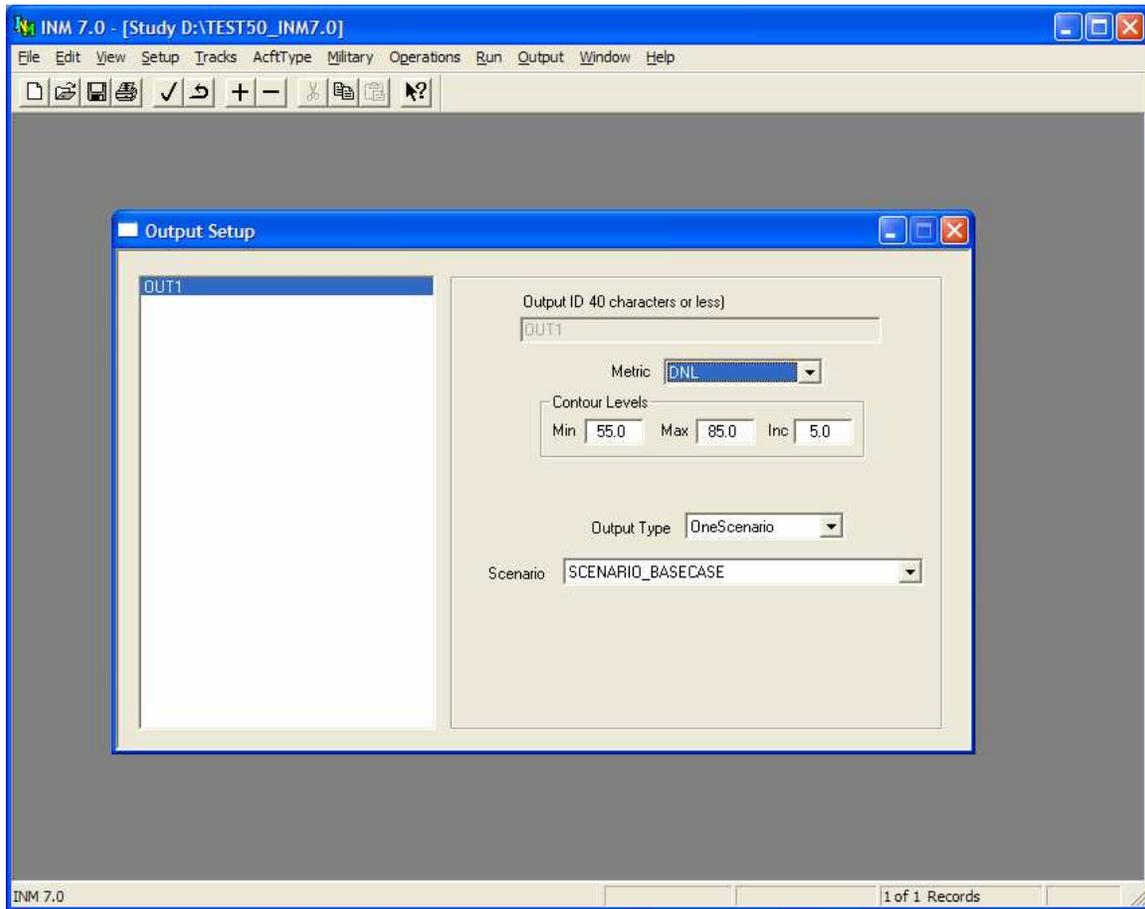
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## 14 OUTPUT MENU

Use the *Output* menu to:

- Setup output subdirectories for graphics post-processing
- Display output graphics showing noise contours
- Set scenario annualization parameters
- Display a table of contour points
- Display a table of areas and people inside contour levels
- Display a table of the percentage of an area covered by different contour levels
- Display a table of standard grid point data
- Display a table of detailed grid point data
- Display a table of noise levels at populations points
- Display a table of noise levels at location points
- Display a summary report of scenario input parameters
- Write a text file of flight path data for each case in a scenario.



## 14.1 Output Setup

Menu Item: *Output // Output Setup*

Use this function to create an output record before opening an *Output Graphics* window. An output record associates contour calculation parameters with one or more scenarios. An output record must be added and committed before you can calculate and view noise contours.

To create an output record:

1. Use *Edit // Add Record* to display a blank record.
2. Type an output identifier, which is the name of the output subdirectory where noise-contour data are stored.
3. Select the noise metric that you want to display. There is a special “SCREEN” metric defined for scenarios that were run using the Ambient Screening run type. See Appendix N for more details about Ambient Screening.

4. Input the minimum, maximum, and incremental contour level (dB or minutes) for display.
  - The maximum number of contours is 50.
  - The maximum less the minimum should be a positive integer number of increments.
  - For scenarios that were run using the recursive grid option, make sure that the minimum contour level is equal to or greater than the low cutoff level, and the maximum contour level is equal to or less than the high cutoff level, as specified in the *Run // Run Options* window. This is not a requirement for scenarios that were run using the fixed grid option.
  - When calculating difference contours, be sure to reset the desired contour levels and intervals to be appropriate for difference values rather than the absolute values for the contours involved. Example of levels for difference contours: (-3.0, 3.0, 1.5) specifies 5 difference contours from -3 dB to 3 dB in increments of 1.5 dB.
  
5. Select the type of output processing. Available options are dictated by the type of contour grid used when running a scenario due to limitations in the contouring software used by INM. For Recursive contour grids, INM utilizes an older built-in version of the NMPlot contouring software to create contours, which allows for several types of output processing. When dealing with scenarios run with Recursive contour grids you may select:
  - OneScenario – standard output processing.
  - Difference – one scenario is subtracted from another (noise level or time-above)
  - LogAdd – power-sum dB level of two or more scenarios (noise level only, does not apply to time-above metrics)
  - Merge – combine two or more scenarios to cover a larger area (noise level or time-above)
  - Do one-scenario processing on individual scenarios (see Section 14.1.1) before using the difference, log-add, or merge functions.

The built-in version of NMPlot is not capable of handling the large number of contour grid points generated when running Fixed contour grids, therefore INM utilizes the latest stand-alone version of NMPlot to create contours from Fixed grids. The interface to this version does not allow INM to provide anything other than standard output processing.

For scenarios run with Fixed contour grids:

- OneScenario – scenario processing of multiple case output noise levels scaled to the parameters provided in *Output // Annualize Scenario*.
- When Difference, LogAdd, or Merge output processing is selected, INM will not allow the selection of any scenarios run with fixed contour grids, therefore these options are unusable for these scenarios.

If you would like to do difference, log-add or merge processing for scenarios that were run using fixed grids, you can do this outside of INM

using the stand-alone version of NMPlot that is distributed with INM (NMPlot.exe located in the INM system directory).

6. Select the scenario to be processed. The scenarios that are available for selection in the list boxes depend on the noise metric, the type of output processing, and the type of contour grid (Recursive or Fixed) used for each scenario.
7. Use *Edit // Commit Record* to save the output record.

### **14.1.1 One-Scenario Output Processing**

One-scenario processing merges the noise output from the cases that were included in the scenario by scaling the noise values (decibels or minutes) according to the parameters defined in the *Output // Annualize Scenario* window.

Contours are created for the selected noise metric. The selected metric determines the scenarios that are available in the Scenario1 list box. For example, if you select DNL, then all single-metric DNL scenarios are displayed in the list box.

When you open an *Output Graphics* window for one-scenario output:

- INM reads noise data files in the selected scenario, scales the data based on the defined annualization parameters (for multi-case scenarios) and writes the *NMPlot.GRD* file.
- For scenarios that were run using the recursive grid option, INM calls the built-in NMPlot module to calculate contours and write the *CONTOURS.DAT* file.
- For scenarios that were run using the fixed grid option, INM calls the external NMPlot executable to calculate contours. The executable generates a set of ESRI shapefiles that are used to create the *\_INM.BIN* file.
- INM computes the area inside contours and writes the *POP\_CONR.DBF* file. If both population points *POP\_PTS.DBF* and noise at population points *POP\_NOIS.DBF* exist, INM also computes the numbers of people inside contours.

You must display one-scenario output in Output Graphics windows before trying to display multi-scenario output. This is because the NMPlot contouring module uses the one-scenario *NMPlot.GRD* files for multi-scenario output processing.

### **14.1.2 Difference Output Processing**

Difference processing creates contours that represent the difference between two noise surfaces (decibels or minutes).

Scenario 2 is subtracted from Scenario 1 (for example, SCENARIO01 – SCENARIO02 ).

- If a grid point in Scenario 1 is 62 dB and the same point in Scenario 2 is 60 dB, the difference is +2 dB.
- Negative values mean that the area in Scenario 2 is louder than in Scenario 1.

Ordinarily, an alternative scenario is compared to a base scenario using a convention where delta noise is positive when the alternative is louder. For this convention, set Scenario 1 to the alternative and set Scenario 2 to the base scenario.

If you use single-metric runs to build difference contours, do not use contours that are outside of either valid noise area.

- The valid noise area for a single-metric run is the area that lies between the low-cutoff and high-cutoff contour levels.
- When two single-metric runs are used, the valid noise area for difference contours is the union of the two valid-noise areas.

### **14.1.3 Log-Add Output Processing**

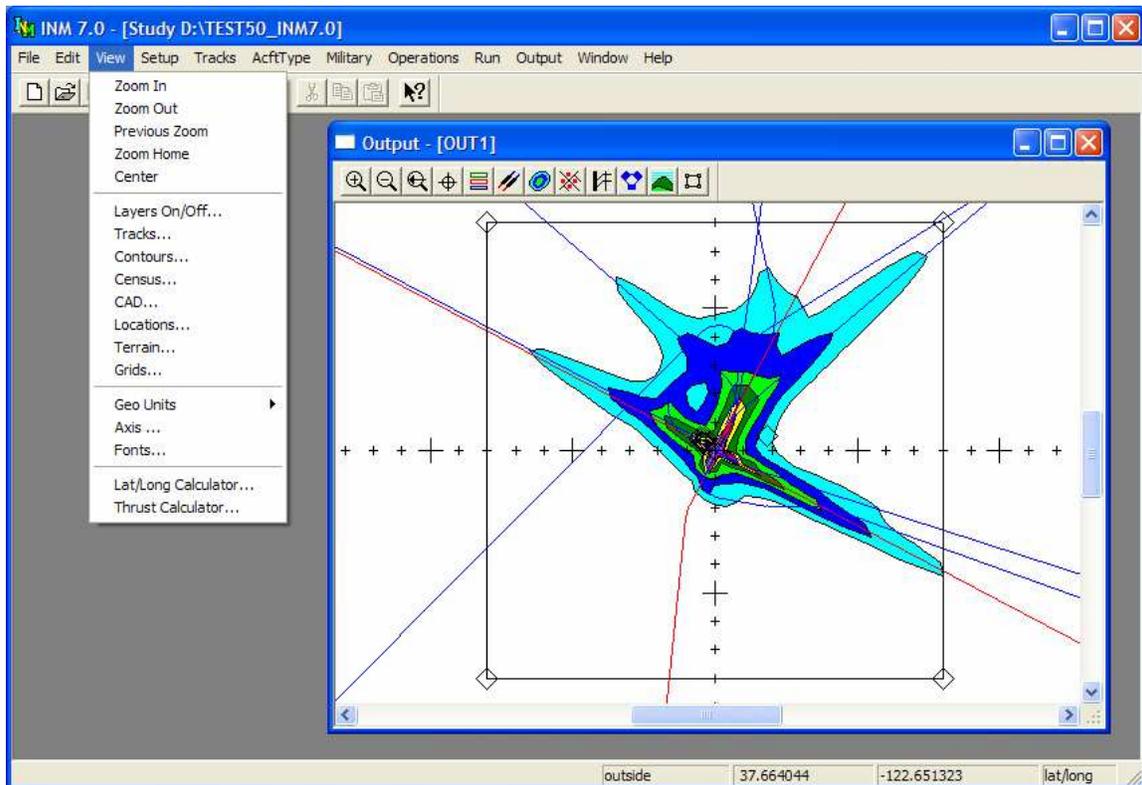
Log-add processing creates contours that represent the sum of noise from two or more scenarios. Decibels are converted to their power (or energy) representations before adding, and then they are converted back to decibels. For example,  $60 \text{ dB} + 60 \text{ dB} = 63 \text{ dB}$ .

- Only areas that are common to all scenarios are summed, so make sure that your scenarios use the same contouring grid definition.
- You cannot use the log-add function for time-above metrics because their values should be added without logarithmic conversion.

### **14.1.4 Merge Output Processing**

Merge processing creates contours that extend across two or more contouring rectangles.

- Scenarios can have different contouring rectangles.
- Only one scenario metric value is used at a grid point.
- When contouring rectangles overlap, the scenario with the higher resolution (smaller subdivided grid) determines the metric value.



## 14.2 Output Graphics

Menu Item: *Output // Output Graphics*

Use the *Output Graphics* function to view:

- Noise contours
- Flight tracks
- Radar tracks
- Runways
- Street maps
- Population points
- Location points
- Airport drawings
- Terrain contours.

To display graphical output from one or more scenarios, you must first define what you want in the *Output // Output Setup* window. Then, open an *Output Graphics* window by selecting output identifiers in the Output Select dialog box. An *Output Graphics* window is associated with an output subdirectory.

### 14.2.1 Output Processing

Before displaying one-scenario output contours, INM checks files and dates in the scenario and output subdirectories and also checks to see if any of the Output

Setup parameters have changed since the last time the Output Graphics window was opened for the selected output record. If any changes are detected or if the output record is new, INM computes contours points, contour areas, and population inside contours (if both population points and noise at population points exist).

Before displaying multi-case contours, INM checks for current *NMPLLOT.GRD* files in output subdirectories.

- One-scenario *GRD* files must be up-to-date and accessible before INM can compute difference contours, etc.
- INM may display a message asking you to run NMPlot again to update one-scenario contour data. If this happens, close the multi-scenario window, open the requested *Output Graphics* windows (thereby re-computing contours), and then open the multi-scenario window again.

### **14.2.2 View Functions in Common**

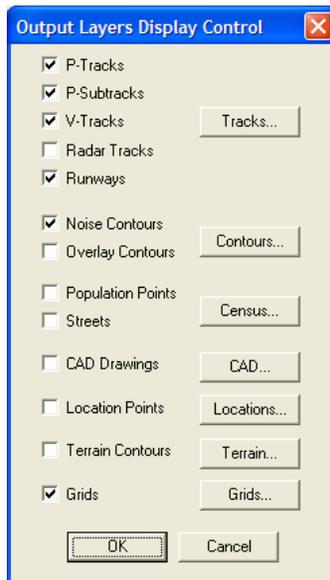
When an *Output Graphics* window is active, the *View* menu on the main menu bar changes to provide various functions that allow you to manage the appearance of graphics layers. These functions are discussed below in separate sections.

Many of the layer control functions have a Color button, which activates the Color and Pattern Selector dialog box. Please refer to *Input Graphics - View // Tracks - Color* for information about operating the color dialog box.

Many of the layer control functions have a pair of unlabeled circular buttons. When you click in the left circle, INM selects (highlights) all items in the associated list box, which is usually directly above the pair of buttons. When you click in the right circle, INM deselects all items.

The *Output Graphics* functions listed below operate in the same manner as they do for *Input Graphics*:

<i>View // Zoom In</i>	<i>View // Tracks</i>	<i>View // Geo Units</i>
<i>View // Zoom Out</i>	<i>View // CAD</i>	<i>View // Axis</i>
<i>View // Zoom Home</i>	<i>View // Locations</i>	<i>View // Fonts</i>
<i>View // Center</i>		
<i>View // Previous Zoom</i>		

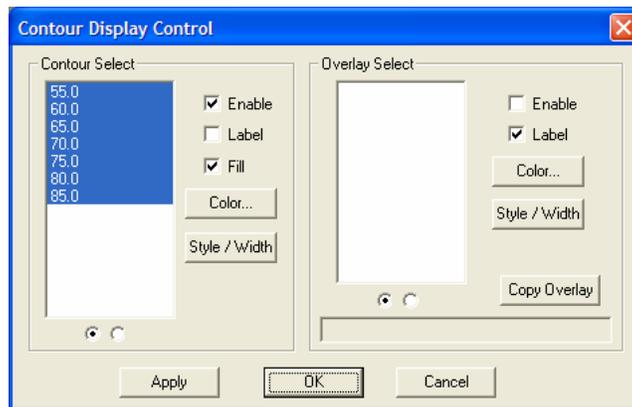


### **14.2.3 View // Layers On/Off**

Use this function to turn on and off various output graphics layers. You can enable or disable a layer by clicking in the box next to a layer name. A check mark in the box means that the layer is on.

In addition to enabling layers, you can go directly to a *Display Control* dialog box by selecting the button associated with a layer.

- For example, selecting the *Tracks* button puts you in the same dialog box as selecting *Tracks* from the *View* menu.



#### 14.2.4 View // Contours

Use this function to select and manage noise contours for display.

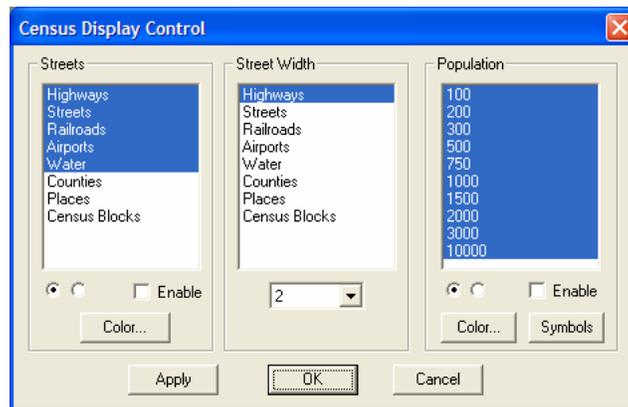
- Select individual contours with the mouse, or select or deselect all contours with the pair of small round buttons.
- Check the *Enable* box to turn on the noise contour layer.
- Check the *Label* box to display the numeric values of selected contours.
- Check the *Fill* box to color the area between contours. For example, the color of the 65-contour fills the area to the 70-contour.
- Press the *Color* button to display a dialog box that allows you to change the color of the contours.
- Press the *Style/Width* button to display a dialog box that allows you to change the style and width of the contour lines.

Also, use this function to overlay contours from another output subdirectory for direct comparison with this output.

- Press the *Copy Overlay* button to select an `_INM.BIN` contour file. It is copied into this output subdirectory and renamed `_OVERLAY.BIN`.
- Select which overlay contours to display.
- Enable, label, and color selected contours.

The following Dialog buttons are available:

- *Apply* – display changes without committing to them
- *OK* – apply and save changes and exit the dialog box
- *Cancel* – discard changes and exit the dialog box.



### 14.2.5 View // Census

Use this function to display street maps and population points. You must obtain and process U.S. Census data before this function will work. Use the two *File // Import Data into Study* functions:

- *TIGER 2000 Line Files*
- *Census 2000 PL94-171 Files.*

Make selections in the Streets menu to display roads, boundaries, and other features.

- Check the Enable box to turn on the map layer.
- Click items from the menu to select them one-by-one, or select all of them by clicking the radio button at the bottom of the menu.
- Press the street Color button to change their color.

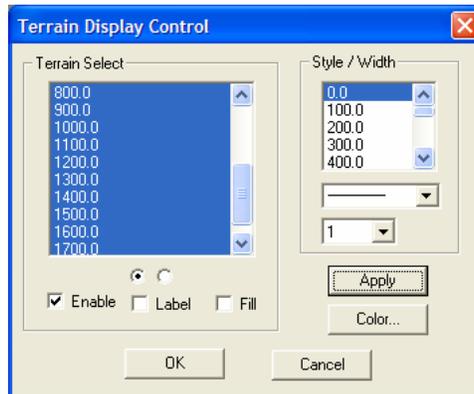
The Streets Width menu controls the width of items on the map. Select an item, then set its width using the drop-down list at the bottom of the menu.

Use the Population menu to select population levels and enable the population layer.

- Population points are color coded to represent the number of people living in a census block, which is usually a city block in densely populated areas.
- For example, population level 200 means that 100 to 200 people live in census block.
- Press the population color button to change population point color.
- Press the population symbols button to change the population point symbols.

The following Dialog buttons are available:

- *Apply* – display changes without committing to them
- *OK* – apply and save changes and exit the dialog box
- *Cancel* – discard changes and exit the dialog box.



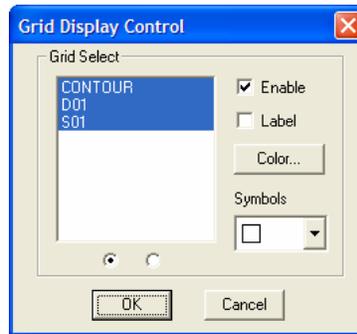
### 14.2.6 View // Terrain

Use this function to display terrain contours.

- You must obtain and process terrain source data before this function will work. Use the *File // Import Data into Study // Terrain Files* function.
- Select terrain contours for display.
- Check the *Enable* box to turn on the terrain layer.
- Check the *Label* box to display terrain contour values.
- Check the *Fill* box to fill the terrain contours with color.
- Use the Style/Width menu to change the style and width of the terrain contour lines.
- Press the Color button to change the terrain contour colors.

The following Dialog buttons are available:

- *Apply* – display changes without committing to them
- *OK* – apply and save changes and exit the dialog box
- *Cancel* – discard changes and exit the dialog box.



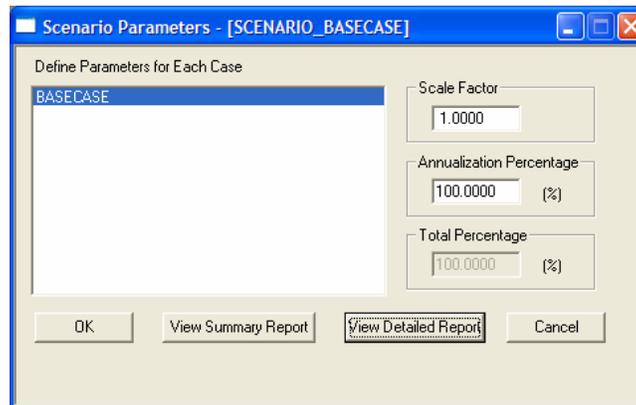
### 14.2.7 View // Grids

Use this function to display grids of points:

- INM copies a scenario *GRID.DBF* file to the output subdirectory. Data in this file is available for display.
  - The file comes from the scenario subdirectory that is shown in the *Output Setup Scenario-1* box.
  - You can put a different file in the output subdirectory using a file manager program, external to INM. Close the Output Graphics window before doing this.
- Select grids for display. Three kinds of grids can be displayed (contour, standard, and detailed). The grid points are shown with connecting lines.
- Check the *Enable* box to turn on the grid layer.
- Check the *Label* box to display the names of the grids.
- Select a symbol for the grid points using the Symbols drop down menu.

The following Dialog buttons are available:

- *OK* – apply and save changes and exit the dialog box
- *Cancel* – discard changes and exit the dialog box.



### 14.3 Annualize Scenario

Menu Item: *Output // Annualize Scenario*

Use this function to set the annualization parameters for a multi-case scenario. This function is not available or applicable for single-case scenarios, and is not available for scenarios run using the Ambient Screening or Audibility run types.

Annualization allows you to scale operations in a given case and combine multiple cases in different proportions to represent different sets of operations for the overall scenario. INM automatically and instantly calculates new noise values based on any operations levels adjusted using the annualization parameters without actually re-running the entire scenario. This allows you to make adjustments to operations levels for a scenario that has already been run without having to wait for the completion of another run.

Annualization parameters are defined as follow:

- Scale Factor - the factor by which each operation in a given case is multiplied. For example, a Scale Factor of 2.0 will double the Day, Evening, and Night values for each flight operation in a case.
- Annualization Percentage - the percent of the selected case operations that will be assigned to the scenario. The sum of the annualization percentages across all cases in a scenario must equal 100%.
- Total Percentage - the current sum of the Annualization Percentages for all cases in the scenario. This box is designed to help when defining percentages for each case to ensure the values for all cases in a scenario add up to 100%.

The detail to which you can manipulate a scenario's operations using the annualization parameters is dependent upon the way in which operations are divided up between each case in your scenario. For example, if each case in a scenario is defined to represent a different airport operating configuration, you can adjust the use of each operating configuration within the scenario by adjusting the Annualization Percentage for each case. You can also scale the total number of operations in each case of a scenario to represent different operations levels for different years.

There are no constraints on how a scenario's operations can be divided between cases or on the use of the annualization parameters, so INM provides a great deal of freedom in the way flight operations can be grouped within a scenario and the detail to which a scenario can be modified after it has been run.

The following Dialog buttons are available:

- *OK* – apply and save changes and exit the dialog box
- *View Summary Report* – produces a summary of the annualized scenario operations over all cases. This is the same type of report produced using the *Operations // View Calculated Flights // View Summary* function, however this report accounts for the user-input annualization parameters. See section 12.5.3 for more details on this report.
- *View Detailed Report* - a detailed operations report for the annualized scenario. This is the same type of report produced using the *Operations // View Calculated Flights // View Records* function, however this report accounts for the user-input annualization parameters. See section 12.5.1 for more details on this report.
- *Cancel* – discard changes and exit the dialog box.

LEVEL	IS	PN	X-COORD	Y-COORD	OK	LATITUDE	LONGITUDE
55.0	1	P	8.0000	-4.3851	N	37.545712	-122.207187
55.0	1	P	8.0000	-4.0172	N	37.551850	-122.207174
55.0	1	P	8.0000	-4.0172	Y	37.551850	-122.207174
55.0	1	P	7.9810	-4.0000	Y	37.552138	-122.207571
55.0	1	P	7.9593	-3.9834	Y	37.552415	-122.208025
55.0	1	P	7.9375	-3.9670	Y	37.552689	-122.208482
55.0	1	P	7.9028	-3.9375	Y	37.553183	-122.209208
55.0	1	P	7.8750	-3.9165	Y	37.553535	-122.209790
55.0	1	P	7.8235	-3.8750	Y	37.554228	-122.210868
55.0	1	P	7.8125	-3.8670	Y	37.554363	-122.211098
55.0	1	P	7.7500	-3.8194	Y	37.555158	-122.212406
55.0	1	P	7.7413	-3.8125	Y	37.555274	-122.212587
55.0	1	P	7.6875	-3.7732	Y	37.555931	-122.213714
55.0	1	P	7.6572	-3.7500	Y	37.556319	-122.214350
55.0	1	P	7.6250	-3.7286	Y	37.556677	-122.215023
55.0	1	P	7.6053	-3.7161	Y	37.556886	-122.215436
55.0	1	P	7.5859	-3.7032	Y	37.557102	-122.215841
55.0	1	P	7.5629	-3.6856	Y	37.557396	-122.216323
55.0	1	P	7.5404	-3.6673	Y	37.557702	-122.216794
55.0	1	P	7.5000	-3.6356	Y	37.558233	-122.217639
55.0	1	P	7.4853	-3.6250	Y	37.558410	-122.217948

## 14.4 Contour Points

Menu Item: *Output // Contour Points*

Use this function to view the contour points table. You have to open an *Output Graphics* window first to calculate the contour points before you can view them.

A contour points table (*CONR\_PTS.DBF*) has the following fields:

- LEVEL – contour level (dB or minutes).
- IS – island number (an island is a single closed curve).
- PN – indicator whether the island is positive (P), meaning that noise inside the curve is louder than on the curve, or negative (N).
- X-COORD, Y-COORD – coordinates of the contour point (nmi or km).
- OK – indicator whether the point is inside the contouring grid border (Y = yes) or on the border (N = no).
- LATITUDE, LONGITUDE – latitude and longitude of the contour point (decimal degrees).

The screenshot shows the INM 7.0 software interface. A window titled "Contour Area and Population - [OUT1]" is open, displaying a table with the following data:

LEVEL	OK	POPULATION	SQ.KM	SQ.MI	M.SQ.FT	ACRES
55.0	N	138908	179.331	69.240	1930.31	44313.7
60.0	Y	24556	79.214	30.585	852.66	19574.3
65.0	Y	5109	31.946	12.334	343.86	7894.0
70.0	Y	1362	15.710	6.066	169.10	3882.1
75.0	Y	0	7.050	2.722	75.88	1742.0
80.0	Y	0	3.202	1.236	34.47	791.2
85.0	Y	0	1.340	0.517	14.42	331.1

## 14.5 Contour Area and Population

Menu Item: *Output // Contour Area and Pop*

Use this function to view areas and numbers of people inside contour levels. Contour areas are calculated when the *Output Graphics* window is first opened.

Population is also calculated when the *Output Graphics* window is first opened, providing that:

- There is a *POP\_PTS.DBF* file in the study directory (use the *Files // Import Data into Study // Census 2000 PL94-171 Files* function)
- There is a *POP\_NOIS.DBF* file in the scenario subdirectory associated with the output (use the *Run // Run Options - Do Population* function)
- Both files have the same number of records and both files are in the same order. Do not edit in the *Setup // Population Points* window after making a population run because the *POP\_PTS.DBF* records will be alphabetized and saved in a different order.

A contour area/population table (*POP\_CONR.DBF*) has the following fields:

- LEVEL – contour level (dB or minutes).
- OK – indicator for whether all islands are inside the contouring rectangle (Y = yes), or if one or more islands are cut by the border (N = no). If OK = N, area and population data are not accurately represented.
- POPULATION – sum of the numbers of people inside all islands of the contour level.
- SQ.KM – area inside all islands of the contour level (square kilometers).

- SQ.MI – area inside all islands of the contour level (square statute miles).
- M.SQ.FT – area inside all islands of the contour level (millions of square feet).
- ACRES – area inside all islands of the contour level (acres).

Contour area includes the area inside the airport boundary.

LEVEL	CONTOUR OK	BOUNDARY OK	% OF AREA
55.0	Y	Y	96.46
60.0	Y	Y	90.68
65.0	Y	Y	72.63
70.0	Y	Y	48.89
75.0	Y	Y	17.11
80.0	Y	Y	3.94
85.0	Y	Y	0.39

## 14.6 Area Contour Coverage

Menu Item: *Output // Area Contour Coverage*

Use this function to view the percentage of an area that is covered by individual contour levels. The area used for these calculations must be defined using a Boundary File. A Boundary File can define a single polygon of any shape and size. A Boundary File is a text file with the same format as an INM Polyline TXT file, which is detailed in Section 3.5.2. INM will always use only the first layer defined in the Boundary File as the boundary polygon. You must define the location of the Boundary File using the *Setup // File Locations* menu item. You do not need to check the *Run // Run Options Use Boundary File* check box to use this function.

A contour area coverage table (*PCT\_AREA.DBF*) has the following fields:

- LEVEL – contour level (dB or minutes).
- CONTOUR\_OK – indicator for whether all islands are inside the contouring rectangle (Y = yes), or if one or more islands are cut by the border (N = no). If CONTOUR\_OK = N, area data are not accurately represented.
- BOUNDARY\_OK – indicator for whether the entire boundary is inside the contouring rectangle. (Y = yes, N = no)
- % OF AREA – the percentage of the area defined by the boundary that is covered by the given contour level.

The screenshot shows the INM 7.0 software window with a menu bar (File, Edit, View, Setup, Tracks, AcftType, Helicopter, Operations, Run, Output, Window, Help) and a toolbar. The main window displays a table titled 'Standard Grids - [SCENARIO\_BASECASE]'. The table has 13 columns: GRID, I, J, X-COORD, Y-COORD, ELEV, LATITUDE, LONGITUDE, METRIC, DNL, CNEL, LAEQ, and LAEQD. The data is as follows:

GRID	I	J	X-COORD	Y-COORD	ELEV	LATITUDE	LONGITUDE	METRIC	DNL	CNEL	LAEQ	LAEQD
S01	1	1	-0.4937	0.2469	11.0	37.623121	-122.385200	89.2	0.0	0.0	0.0	0.0
S01	1	2	-0.4937	0.3621	11.0	37.625044	-122.385200	80.5	0.0	0.0	0.0	0.0
S01	1	3	-0.4937	0.4773	11.0	37.626966	-122.385201	75.6	0.0	0.0	0.0	0.0
S01	2	1	-0.3291	0.2469	11.0	37.623122	-122.381747	80.2	0.0	0.0	0.0	0.0
S01	2	2	-0.3291	0.3621	11.0	37.625044	-122.381747	77.1	0.0	0.0	0.0	0.0
S01	2	3	-0.3291	0.4773	11.0	37.626966	-122.381747	72.3	0.0	0.0	0.0	0.0

The status bar at the bottom indicates 'INM 7.0', 'record 1', '6 records', and '1 selected'.

## 14.7 Standard Grid Analysis

Menu Item: *Output // Standard Grids*

Use this function to view standard grid results for a scenario, providing that:

- The scenario was run in the single-metric or audibility mode
- You specified either a standard or a detailed grid analysis in the *Run // Run Options* window before running the scenario.

A standard-grid table (*GRID\_STD.DBF*) has the following fields:

- GRID – grid identifier.
- I, J – grid numbers which serve to name the point.
- X-COORD, Y-COORD – coordinates of the grid point (nmi or km).
- ELEV – elevation of the grid point (feet or meters MSL).
- LATITUDE, LONGITUDE – latitude and longitude of the grid point (decimal degrees).
- USER – computed value of the noise metric that you selected for the case (dB or minutes). This can be either a user-defined metric or a standard metric, depending on how you setup the case.
- DNL, CNEL, LAEQ, etc. – computed values for 16 standard noise metrics (dB or minutes).

If you created noise curves using *Civil/Military/Helicopter // Noise Identifiers* and *Civil/Military/Helicopter // NPD Data*, but did not define both kinds of noise families (SEL/LAMAX and EPNL/PNLTM), then the results shown for those metrics belonging to the missing noise family are not valid.

METRIC	GRID	I	J	ACFT	OP	PROFILE	S	RWY	TRACK	S	DISTANCE	ALT	ANG
DNL	D01	1	1	727Q15	D	STANDARD	2	01R	D2	0	7738.7	1064	7.9
DNL	D01	1	1	737QN	D	STANDARD	2	01R	D2	0	7829.0	1588	11.7
DNL	D01	1	1	727Q15	D	STANDARD	2	10R	D1	0	7728.5	1166	8.7
DNL	D01	1	1	727Q15	D	STANDARD	3	01R	D2	0	7716.0	880	6.5
DNL	D01	1	1	737QN	D	STANDARD	2	01L	D5	0	8631.3	1413	9.4
DNL	D01	1	1	737QN	D	STANDARD	2	01R	D4A	0	7946.5	1475	10.7
DNL	D01	1	1	727Q15	D	STANDARD	2	01R	D4A	0	7863.1	925	6.8
DNL	D01	1	1	737QN	D	STANDARD	2	01R	D4B	0	7948.5	1458	10.6
DNL	D01	1	1	737QN	D	STANDARD	2	01R	D4	0	7948.5	1458	10.6
DNL	D01	1	1	737QN	D	STANDARD	2	10R	D1	0	7824.7	1690	12.5
DNL	D01	1	1	727Q15	D	STANDARD	2	01L	D5	0	8554.3	820	5.5
DNL	D01	1	1	727Q15	D	STANDARD	2	01R	D4B	0	7864.9	898	6.6
DNL	D01	1	1	727Q15	D	STANDARD	2	01R	D4	0	7864.9	898	6.6
DNL	D01	1	1	A300B4-203	R	R1	-	-	-	-	7069.7	0	0.0
DNL	D01	1	1	747200	D	STANDARD	5	01R	D2	0	7690.1	621	4.6
DNL	D01	1	1	MD81	D	STANDARD	3	01R	D2	0	7750.1	1145	8.5
DNL	D01	1	1	737300	D	STANDARD	2	01R	D2	0	7764.1	1235	9.2
DNL	D01	1	1	737QN	D	STANDARD	2	01L	D3	0	8718.6	1353	8.9
DNL	D01	1	1	727Q15	D	STANDARD	2	28R	D7	0	7783.5	0	0.0
DNL	D01	1	1	727Q15	D	STANDARD	3	10R	D1	0	7711.3	1047	7.8
DNL	D01	1	1	727Q15	D	STANDARD	2	01L	D3	0	8642.8	720	4.8
DNL	D01	1	1	727Q15	D	STANDARD	1	01L	D5	0	8572.7	988	6.6

## 14.8 Detailed Grid Analysis

Menu Item: *Output // Detailed Grids*

Use this function to view detailed grid results for a scenario, providing that:

- The scenario was run in the single-metric or audibility mode
- You specified a detailed grid analysis in the *Run // Run Options* window before you ran the scenario.

INM computes a detailed grid record for:

- Each grid point of every detailed grid defined in the *Run // Grid Setup* window
- The selected metric and all metrics checked in the *Run // Run Options* window
- Every combination of aircraft, profile, and track. If you checked the Save 100% Flights box in *Run // Run Options*, all flights are saved. If the box is unchecked, only those flights that contribute 97% of the noise are saved.

Because of all the possible combinations, a detailed grid file can become very large. You should limit the number of detailed grids, number of points per grid, and number of metrics when you setup a detailed grid run.

Unwanted double records are generated if you check the standard metric that is also your selected metric. For example, you run a grid analysis on DNL and you

put a check mark in the DNL box. Then, you will get a set of DNL records for the user metric and an identical set of DNL records for the checked standard metric. To avoid this problem, do not put a check mark in the standard DNL box.

A detailed grid table (*GRID\_DTL.DBF*) has the following fields:

1. METRIC – noise metric identifier.
2. GRID – grid identifier.
3. I, J – grid numbers that name the point. You can obtain X,Y coordinates for detailed grid points from the standard grid file.
4. ACFT – aircraft identifier.
5. OP – type of flight operation (A = approach, D = departure, T = touch-and-go, F = circuit flight, V = overflight, R = runup).
6. PROFILE – profile group identifier.
7. S – profile stage number.
8. RWY – runway end or helipad identifier.
9. TRACK – track identifier.
10. S – sub-track number.
11. DISTANCE – distance (feet or meters) from the grid point on the ground to the aircraft at closest-point-of-approach.
12. ALT – altitude above airport elevation (feet or meters) of the aircraft at closest-point-of-approach.
13. ANG – elevation angle (degrees) from the horizontal ground plane to the aircraft at closest-point-of-approach.
14. SPEED – true airspeed (knots or m/s) of the aircraft at closest-point-of-approach.
15. THRUST – thrust-setting (pounds, percent, or other) of the aircraft at closest-point-of-approach. This is corrected net thrust per engine, not total net thrust.
16. EQUIV – equivalent number of operations (weighted day, evening, and night operations) for the given flight operation.
17. ONE – metric value (dB or minutes) for a single operation of the given flight.
18. ALL – metric value (dB or minutes) for all weighted operations of the given flight.
19. PERCENT – percent of the total metric value that is caused by the flight operation. For noise levels, percent is based on energy or power ratios, not decibels.

The methods used to compute the equivalent number of operations, the metric for all operations, and the percentage value are detailed below:

For exposure-related metrics:

$$\begin{aligned} \text{OPS\_EQUIV} &= \text{WGT\_DAY} * \text{OPS\_DAY} + \text{WGT\_EVE} * \text{OPS\_EVE} + \\ &\quad \text{WGT\_NIGHT} * \text{OPS\_NIGHT} \\ \text{METRIC\_ALL} &= \text{METRIC\_ONE} + 10 \log( \text{OPS\_EQUIV} ) \\ \text{PERCENT} &= 100 * 10^{\text{METRIC\_ALL}/10} / \text{SUM}( 10^{\text{METRIC\_ALL}/10} ) \end{aligned}$$

For maximum-level metrics:

$$\begin{aligned} \text{OPS\_EQUIV} &= 1.0 \\ \text{METRIC\_ALL} &= \text{METRIC\_ONE} \\ \text{PERCENT} &= 100.0 \end{aligned}$$

- Only one flight operation is saved, the one that is the loudest at the grid point.

For time-above metrics:

$$\begin{aligned} \text{OPS\_EQUIV} &= \text{OPS\_DAY} + \text{OPS\_EVE} + \text{OPS\_NIGHT} \\ \text{METRIC\_ALL} &= \text{METRIC\_ONE} * \text{OPS\_EQUIV} \\ \text{PERCENT} &= 100 * \text{METRIC\_ALL} / \text{SUM}( \text{METRIC\_ALL} ) \end{aligned}$$

POPULATN-POINT	METRIC
CA0014282001012	49.9
CA0014282001022	50.3
CA0014282001023	50.1
CA0014282001024	50.2
CA0014282002000	50.8
CA0014282002001	50.3
CA0014282002002	50.5
CA0014282002003	49.7
CA0014282002012	49.7
CA0014283011000	54.7
CA0014283011001	54.6
CA0014283011002	54.2
CA0014283011003	54.1
CA0014283011004	54.1
CA0014283011005	53.8
CA0014283011006	53.7
CA0014283011007	53.8
CA0014283011008	53.7
CA0014283011009	54.1
CA0014283011010	54.2
CA0014283011011	53.9
CA0014283011012	53.8

## 14.9 Noise at Population Points

Menu Item: Output // Noise at Pop Points

Use this function to view the results of a population points run, providing that:

- There is a *POP\_PTS.DBF* file in the study directory (use the *Files // Import Data into Study // Census 2000 PL94-171 Files* function)
- You checked the Do Population Points box in the *Run // Run Options* window.

A population noise table (*POP\_NOIS.DBF*) has the following fields:

- POPULATION-POINT – population point identifier, a concatenation of:
  - State code (2 digits)
  - County code (3 digits)
  - Tract/BNA code (6 characters)
  - Block code (4 characters).
- METRIC – noise metric value at the point (dB or minutes).

POINT	METRIC
BARTN	44.4
BERKS	35.7
BOLDR	1.5
BRINY	6.3
CCR	6.9
COLLI	34.2
COMMO	26.9
CROIT	8.8
DECOT	26.8
DOKKS	34.0
DUXBY	47.9
GOBBS	39.7
HADLY	14.4
LIZRD	10.0
LOZIT	32.6
LUVVE	29.7
MENLO	27.7
MICRA	17.2
NORMM	49.3
NUQ	27.2
OAK	55.1
OSI	14.5

## 14.10 Noise at Location Points

Menu Item: *Output // Noise at Loc Points*

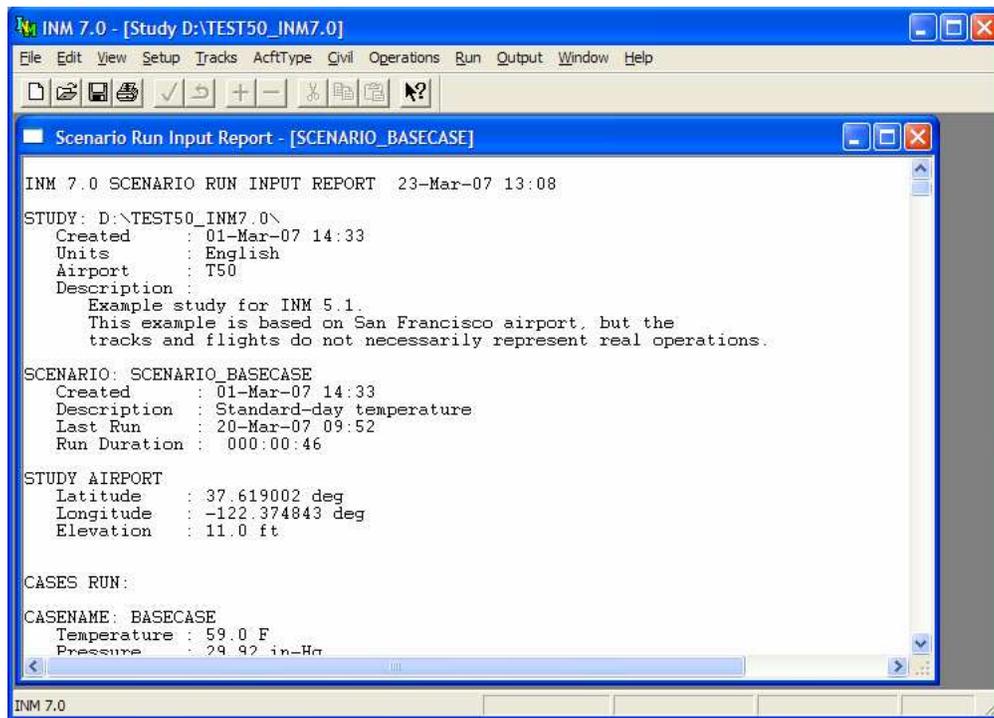
Use this function to view the results of a location points run, providing that:

- There is a *LOC\_PTS.DBF* file in the study directory (use the *Setup // Location Points* function)
- You checked the Do Location Points box in the *Run // Run Options* window.

A location noise table (*LOC\_NOIS.DBF*) has the following fields:

- POINT – location point identifier.
- METRIC – noise Metric value at the point (dB or minutes).

Rather than repeating latitude, longitude, and height data for every scenario, INM lists only the location point identifier and the computed metric. The location point identifier in the *LOC\_PTS.DBF* file in the study directory gives you access to these other location-point data.

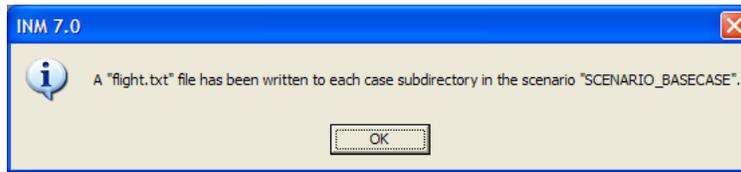


## 14.11 Scenario Run Input Report

Menu Item: *Output // Scenario Run Input Report*

Use this function to view the scenario run input report. The scenario run input report documents user-created study and scenario data.

- The data shown in the run input report window are also written to the *REPORT.TXT* file in the scenario subdirectory.
- The run input report contains units specified for the study (English or metric).



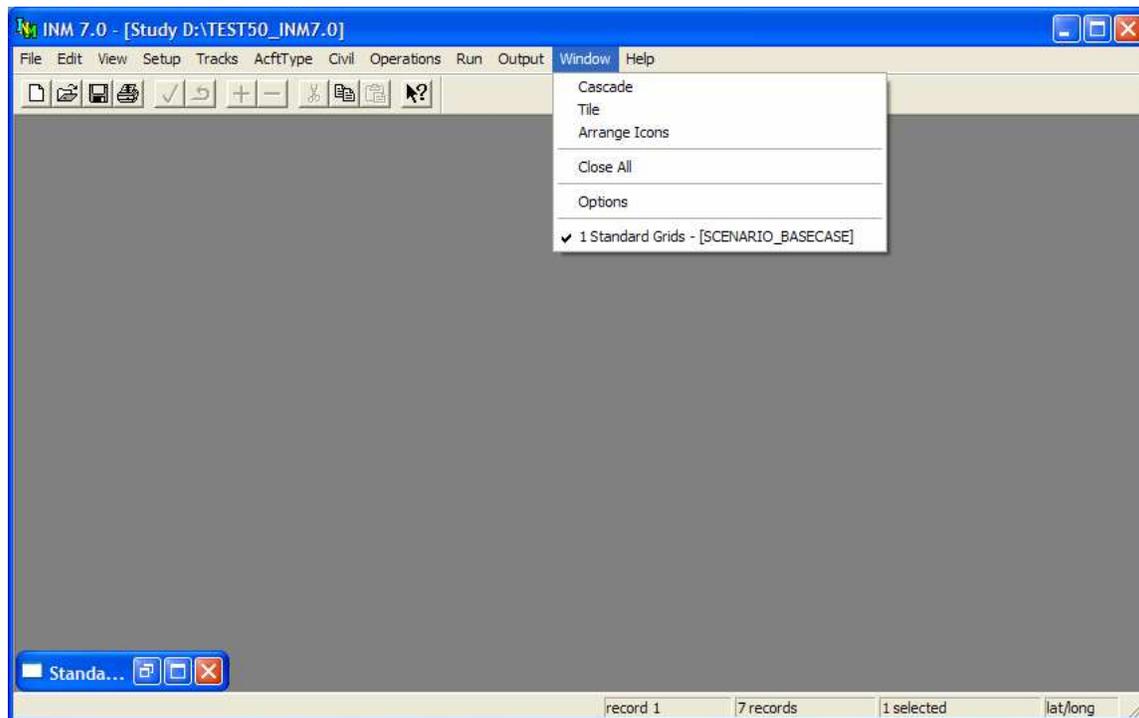
## 14.12 Flight Path Report

Menu Item: *Output // Flight Path Report*

Use this function to create text files containing detailed data used to compute noise for a scenario. INM calculates flight paths and compiles detailed data for noise calculations separately for each case in a scenario.

- The *FLIGHT.PTH* file must exist for each case in the scenario. This binary file is created during a run.
- A *FLIGHT.TXT* file is written to each case subdirectory within the scenario subdirectory.

You can view the file with a text editor. It is too large to display in an INM window.



## 15 WINDOW MENU

The *Window* menu contains a variety of standard Microsoft windows-management functions. Also, you can set INM system options.

### 15.1 Cascade

Menu Item: *Window // Cascade*

Use this function to rearrange the set of visible (non-iconified) windows.

- Cascade means that the visible windows are stacked on top of each other, starting in the upper left-hand corner. Each succeeding window is placed on top of the preceding window and offset to the right and down.
- If a window is maximized (thus covering all of the other windows), this function restores the window to its previous size before cascading.

## **15.2 Tile**

Menu Item: Window // Tile

Use this function to rearrange the visible windows.

- Tile means that the windows are arranged side-by-side without overlapping.
- The Tile function does not work very well when there are *DBF* windows open. The reason is that the *DBF* windows are fixed in size and therefore they cannot be resized to fit side-by-side.
- The Tile function is more useful for arranging graphics windows and output windows.

## **15.3 Arrange Icons**

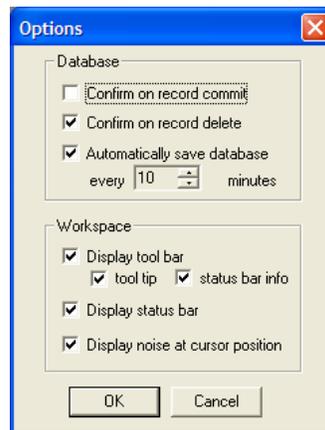
Menu Item: Window // Arrange Icons

Use this function to line up icons across the bottom of the main window. Sometimes this function is useful for finding an icon that is hidden under a window.

## **15.4 Close All Windows**

Menu Item: Window // Close All

This function is used to close all open windows, including minimized (iconified) windows.



## 15.5 INM Options

Menu Item: Window // Options

Use this function to turn on or turn off various INM system options. Put a check mark in a box to turn on an option.

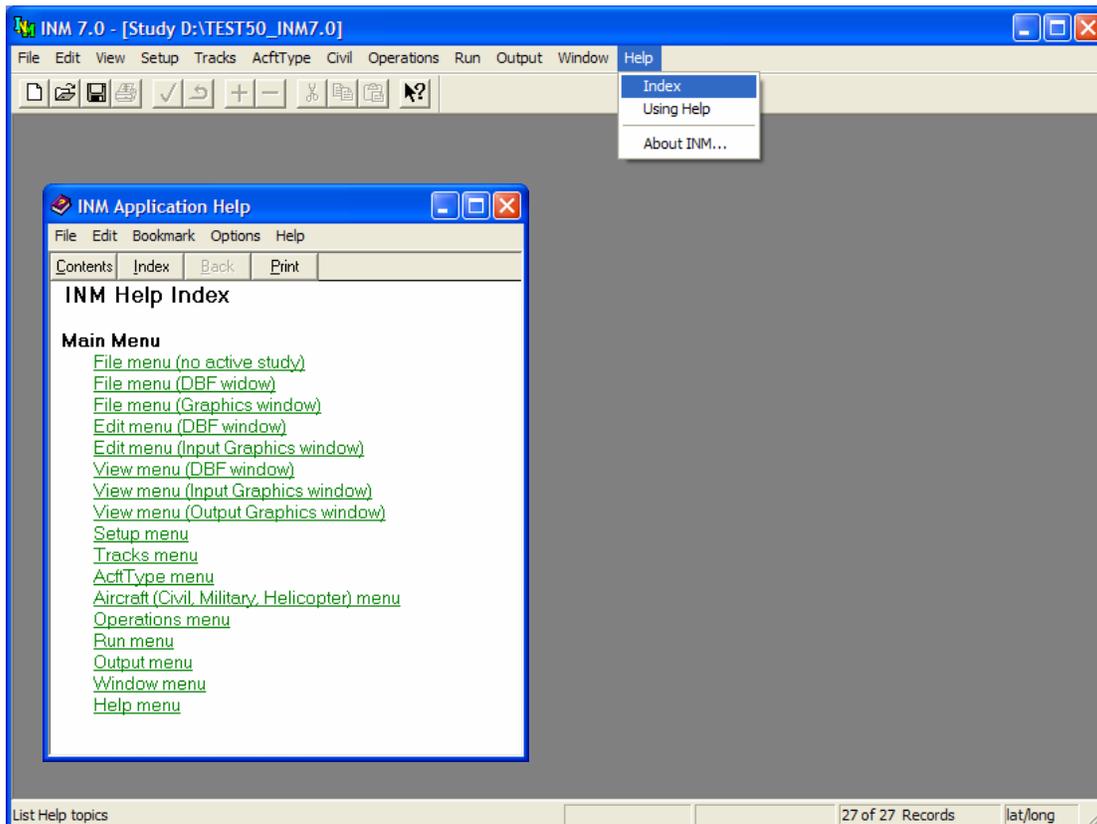
- Confirm on record commit – INM displays a message box asking to continue committing the record.
- Confirm on record delete – INM displays a message box asking to continue deleting the record or group of records.
- Automatically save database – INM saves data every few minutes so that changes made while working in INM are not lost in case of a power failure. You can set the time between saves.
- Display toolbar – INM displays icon buttons on a toolbar under the main window title. The toolbars on *Input Graphics* and *Output Graphics* windows are displayed all the time.
  - Tool tip – a help box appears when you leave the mouse cursor on the icon for a second.
  - Status bar info – a short help phrase appears on left part of the status bar when you put the mouse cursor on menu items.
- Display status bar – INM displays a bar of information at the bottom of the main window. Status items are:
  - A short help phrase
  - *DBF* file that is currently being read from disk
  - Origin of the current record (standard or user-generated data)
  - Number of records in a table
  - Noise metric value at the mouse cursor position
  - X,Y or lat/long at the mouse cursor position.
- Display noise at cursor position – INM displays on the status bar the noise metric value at the mouse cursor position.
  - INM reads the output *NMPLOT .GRD* file when an *Output Graphics* window is activated.
  - INM displays the hourglass wait cursor while the file is being read and processed.

- You may want to turn off this option if your *GRD* files are large and the wait time is too long. Do to the size of the *GRD* files typically produced, INM automatically disables this function when the *Output Graphics* window is opened for a scenario that was run using Fixed contour grids.

## **15.6 Window List**

The window list shows all open windows, including those that are minimized.

- Activate a window in the list by clicking on the name of the window.
- When there are too many windows to fit on the list, Windows provides a scroll box filled with window titles.



## 16 HELP MENU

The *Help* menu contains functions that provide information about the INM system.

### 16.1 Index

Menu Item: *Help // Index*

Use this function to run the Microsoft Help program and INM help file. You can also run the Help system by double clicking on the *INM.HLP* file name in the INM system directory.

Accessing this function puts you into the Index window of the Help system. You can learn how to use the Help system by accessing the *Help // Using Help* function.

Toolbar question-mark button – allows you to jump directly to a Help section of interest.

1. Click on the button and get the question-mark cursor to follow the mouse.
2. Click on a menu item of interest. You will go directly to the menu item help text.

Another way to jump directly to a Help section is to select (highlight) a menu item and then press the F1 key.

## **16.2 Using Help**

Menu Item: *Help // Using Help*

Use this function to run the standard Microsoft module for learning how to use the Microsoft Help program. This function is not part of the INM system, other than being on the menu.

## **16.3 About INM**

Menu Item: *Help // About INM*

Use this function to see sponsoring agency name, program name, version number, and program author credits.

# **APPENDICES**

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## **A SOURCES AND CONTACTS**

### **A.1 Federal Aviation Administration**

The INM program is managed in the Office of Environment and Energy (AEE, Noise Division (AEE-100) at the following address:

Federal Aviation Administration  
Office of Environment and Energy, AEE-100  
Noise Division, Room 900W  
800 Independence Ave. SW  
Washington, DC 20591  
FAX (202) 267-5594  
[http://www.faa.gov/about/office\\_org/headquarters\\_offices/aep/models/](http://www.faa.gov/about/office_org/headquarters_offices/aep/models/)

You may also contact the AEE Noise Division at (202) 267-3565 for questions concerning INM.

The use of non-standard INM input for Part 150/Part 161 studies and FAA Order 1050.1E environmental assessments (EA) and environmental impact statements (EIS) requires prior written approval by the FAA. Please contact the AEE Noise Division.

### **A.2 Technical Assistance**

For INM noise/acoustic modeling questions, please contact Eric Boeker at the U.S.D.O.T. John A. Volpe National Transportation Systems Center Acoustics Facility:

E-mail: [Eric.Boeker@volpe.dot.gov](mailto:Eric.Boeker@volpe.dot.gov)  
Phone: (617) 494-2372

For INM software and aircraft performance modeling questions, please contact Eric Dinges at the ATAC Corporation:

E-mail: [inm@atac.com](mailto:inm@atac.com)  
Phone: (408) 736-2822

For INM policy questions, please contact Dr. Hua (Bill) He at the Federal Aviation Administration, Office of Environment and Energy (AEE), Noise Division:

E-mail: [hua.he@faa.gov](mailto:hua.he@faa.gov)  
Phone: (202) 267-3565

## **A.3 U.S. Terrain Elevation Data**

INM can import three elevation data formats. Refer to the references given below for more information about the formats and obtaining elevation data.

### **Micropath data (3CD/3TX)**

You can purchase U.S. terrain elevation data from Micropath Corporation. USGS formatted Digital Elevation Model (DEM) 3-arc-second elevation data are distributed on four CD-ROMs. The price of a CD-ROM is \$50. Each CD-ROM contains data as follows:

- CD#1 East: AL, CT, DE, FL, GA, IN, KY, MA, MD, ME, MI, MS, NC, NH, NJ, NY, OH, PA, PR, RI, SC, TN, VA, VI, VT, WV
- CD#2 Central: AR, IA, IL, KS, LA, MN, MO, NE, ND, OK, SD, TX, WI
- CD#3 West: AZ, CA, CO, HI, ID, MT, NM, NV, OR, UT, WA, WY
- CD#4 Alaska

Contact:

Micropath Corporation  
2023 Montane Drive East  
Golden, CO 80401-8099  
PHN (303) 526-5454  
FAX (303) 233-4026  
Email [support@micropath.com](mailto:support@micropath.com)  
WEB <http://www.micropath.com>

### **NED Gridfloat**

The National Elevation Dataset (NED) is a newer USGS product which is available at 1/3 arc second resolution from the USGS website. Gridfloat is a non-proprietary binary data format. See the USGS NED website for more information.

WEB <http://seamless.usgs.gov/website/seamless/products/3arc.asp>

### **Digital Elevation Model (DEM)**

The USGS has supplied DEM data since 2000. However, the USGS has stopped offering DEM data as of November 14, 2006. For the most recent elevation data, please use NED data described above.

INM continues to support the DEM format. Information about DEM data is available from the USGS website.

WEB <http://edc.usgs.gov/products/elevation/dem.html>

## **A.4 U.S. Census Data**

INM can import census population data and street map data.

### **A.4.1 Population data**

Population data for the U.S. are distributed on a single DVD-ROM. Order "Census 2000 Redistricting File (PL 94-171) Summary File DVD: All States, V1-D00-PLF1-07-US1". The DVD is \$70. Note that the DBF format data used by INM are no longer available on CD-ROM.

Contact:

PHN Customer Services Center (orders), 301-763-INFO (4636)  
WEB [http://www.census.gov/mp/www/cat/decennial\\_census\\_2000/005960.html](http://www.census.gov/mp/www/cat/decennial_census_2000/005960.html)

### **A.4.2 Street map data**

Street map data for the U.S. are available for download from the U.S. Census Bureau. INM can import TIGER line files. Visit the web site below for download information.

Contact:

WEB <http://www.census.gov/geo/www/tiger/>

## **A.5 SAE Reports**

Three SAE reports are the basis for the INM 7.0 noise model:

- "Procedure for the Calculation of Airplane Noise in the Vicinity of Airports", SAE-AIR-1845, prepared by SAE Committee A-21, March 1986. The price is \$59.
- "Method for Predicting Lateral Attenuation of Airplane Noise", SAE-AIR-5662, April 2006. The price is \$59.
- "Standard Values of Atmospheric Absorption as a Function of Temperature and Humidity", SAE-ARP-866A, August 1964, revised March 1975. The price is \$59.

Contact:

SAE World Headquarters.  
400 Commonwealth Drive  
Warrendale, PA 15096-0001  
PHN (724) 776-4841  
FAX (724) 776-0790  
Email [sae@sae.org](mailto:sae@sae.org)  
WEB <http://www.sae.org>

## **A.6 ECAC Guidelines**

INM 7.0 is designed to comply with standards set by the European Civil Aviation Conference (ECAC) Doc 29, titled "Report on Standard Method of Computing Noise Contours Around Civil Airports". The report is available from ECAC as a free download.

**Contact:**

3, bis Villa Emile Bergerat  
92522 Neuilly sur Seine Cedex  
France  
PHN +33 1 46 41 85 44  
Email [info@ecac-ceac.org](mailto:info@ecac-ceac.org)  
WEB <http://www.ecac-ceac.org/>

## **A.7 NMPlot Software**

INM uses the NMPlot contouring engine to produce terrain and noise contours. The contouring engine is part of the NMPlot computer program.

- NMPlot is a 32-bit Microsoft Windows application designed to manipulate georeferenced scalar data sets. NMPlot can produce contour and color gradient plots, apply mathematical transformations to the data, combine two or more data sets, and interface with GIS systems.
- INM `NMLOT.GRD` files are in NMPlot format. Using NMPlot, you can read a `GRD` file and see the underlying array of subdivided grid points that are used to construct the contours.

NMPlot software is available as acknowledgement-ware – it may be freely downloaded, used, and distributed, provided that Wasmer Consulting is acknowledged as the author.

NMPlot is included with INM in two forms: a library of functions (version 4.3) that is called within INM (DLL), and a complete stand-alone executable `nmpplot.exe` version 4.957. Refer to the NMPlot documentation for more information about the stand-alone version of the program.

**Contact:**

Dr. Fred Wasmer  
Wasmer Consulting  
Email [wasmer@wasmerconsulting.com](mailto:wasmer@wasmerconsulting.com)  
WEB <http://www.wasmerconsulting.com>

## **B FAA PROFILE REVIEW CHECKLIST**

The Office of Environment and Energy (AEE) requires prior written approval for all user changes to the Integrated Noise Model (INM) standard profiles for FAR Part 150 and Part 161 studies. A similar requirement under National Environmental Policy Act (NEPA) will take effect with FAA Order 1050.1E.

User-specified modifications to standard INM profiles affect both the estimated thrust of the engine and the distance from source to receiver, critical parameters in the final computation of noise for contours and grid point analysis.

This checklist is intended to streamline and expedite the approval process. It should save substantial time for all parties and provide assurance that user-specified profiles conform to actual aircraft performance and INM procedures.

Complete information for items listed below is necessary for AEE to initiate its review. Please submit your checklist package to: Office of Environment and Energy (Noise Division, AEE-100), Federal Aviation Administration, Rm. 900W, 800 Independence Ave., SW, Washington, DC 20591.

### **Section 1 Background**

Briefly describe the project for which user-specified INM profiles are required. State if the project is for a Part 150 or Part 161 study, an Environmental Assessment (EA), an Environmental Impact Statement (EIS), or other type of analysis. List the sponsoring agency of the study, and note the version of the model used.

### **Section 2 Statement of Benefit**

State why the new profiles are needed for this project and describe how the new profiles more accurately model the aircraft performance in terms of altitude, speed, and thrust.

### **Section 3 Analysis Demonstrating Benefit**

For departure tracks, provide SEL values for a series of grid points spaced 0.5 nautical miles apart underneath the flight track, beginning at the start of takeoff roll and ending at the end of the profile, or at 10 nautical miles from the start of takeoff roll (whichever is shorter). For arrival tracks, place the grid points 0.5 nautical miles apart underneath the flight track, beginning at the start of the profile, or at 10 nautical miles away from the runway threshold (whichever is shorter), and ending at the last point of the landing roll-out on the runway. Also include grid points for any noise sensitive areas. Interpret the results of the analysis and explain how the results correlate with the "Statement of Benefit" in Section 2. For each profile, provide a table with the following information.

INM Aircraft Model \_\_\_\_\_ Profile Weight \_\_\_\_\_

Grid Points (nmi)	INM Standard Profile (SEL dB)	User Defined Profile (SEL dB)	Difference (dB)
0.5			
1.0			
1.5			
2.0			
...			
10.0			
Noise Sensitive Areas (nmi)			
x1, y1			
x2, y2			
...			
Xn, yn			

Submit the INM files needed to perform the above analysis. These files include all input DBF files contained in the study and case directories.

#### **Section 4 Concurrence on Aircraft Performance**

In this section, verification is needed from an airline operator or aircraft manufacturer familiar with the performance characteristics of the aircraft. This verification could be either:

1. A description of the performance characteristics of the aircraft, such as a profile description copied from a flight manual. Define all abbreviations and terms used on the copied material. Or,
2. A statement by the operator or manufacturer certifying that the proposed profile falls within reasonable bounds of the aircraft's performance for the modeled airport location.

#### **Section 5 Certification of New Parameters**

State that the aircraft performance characteristics submitted by the operator or manufacturer (Section 4) have been correctly translated into the INM formatted profile or procedure. Specifically, certify that:

If the new profiles are in terms of profile points:

1. Altitude is above field elevation in feet.
2. Speed is true airspeed in knots.
3. State the units of thrust-setting (for example, pounds). State that the units match the units of the thrust-setting parameter used in the aircraft's associated noise-power-distance curves.

If the new profiles are defined in terms of procedure steps:

1. If new aircraft performance coefficient data were developed, they were developed in full accordance with the procedures specified in SAE-AIR-1845 (information about obtaining SAE-AIR-1845 is in the INM User's Guide, Appendix A).

2. The procedure step data conform to the rules given in the INM User's Guide.
3. If percent units are used for thrust-setting, give the value of the aircraft's static thrust parameter used in the denominator when calculating percents. State that this value is in units of pounds.
4. If profile thrust setting is in terms of RPM, EPR, or other parameters, show method for converting thrust to pounds.

### **Section 6 Graphical and Tabular Comparison**

Provide three graphics for each proposed change in profile:

1. Altitude vs. Distance
2. Speed vs. Distance
3. Thrust vs. Distance

Plot the standard profile and the proposed profile on the same graph. Also, submit tables of numbers used to plot the graphs.

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## C NPD DATA DEVELOPMENT CRITERIA

The noise-power-distance (NPD) data currently in INM were developed according to a rigid set of field measurement and data reduction criteria. In the most general terms, these criteria include the following:

1. Soft ground under the measurement microphone, similar to the terrain around the microphone during aircraft certification tests.
2. For  $L_{AE}$  and  $L_{EPN}$  values, an integrated calculation procedure (involving time integration over the full spectrum time history) for airplanes where adequate field data are available.
3. Atmospheric absorption coefficients as specified by SAE, rather than standard-day conditions of 59 degrees Fahrenheit and 70 percent relative humidity, which was used prior to INM Version 3.9.
4.  $L_{AE}$  and  $L_{EPN}$  values time-integrated over the upper 10 dB of the noise event as prescribed by FAA and SAE. (The time interval from  $t_1$  to  $t_2$  designates the time in seconds, from the beginning to the end of the integration period for the sound produced by an airplane. The duration ( $t_2-t_1$ ) should be long enough to include all significant contributions to the total sound exposure. Sufficient accuracy is usually achieved by integration over the time interval during which the frequency-weighted sound level is within 10 dB of its maximum value.)
5.  $L_{AE}$  and  $L_{EPN}$  values normalized to a reference ground speed of 160 knots. For helicopters,  $L_{AE}$  and  $L_{EPN}$  values were normalized to helicopter-specific reference ground speed.
6. Maximum sound levels and exposure-based sound levels specified as a function power per engine.
7. The FAA's position is to adhere closely to the above criteria, both for the development and the validation of the INM NPD data. Diligent compliance is needed to ensure confidence in having consistent and comparable aircraft NPD and performance data. An NPD data submittal form can be found in the INM 7.0 Technical Manual.

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## D INM DIRECTORIES

### INM70\ INM system directory

inm.exe	INM main program
inm.hlp	help file
inm.ini	initialization file (text)
*.dll	dynamic link libraries
gmdll_regkey.txt	GlobalMapper registration key (text)
NMPlot.exe	NMPlot Windows application program
Standard.nmplot_legend	NMPlot legend file
flight.exe	Generates flight path data
compute.exe	Generates noise data

### SYS\_DATA\ INM standard data subdirectory

acdb70.bin	compressed file of dbf files (binary)
spectra.bin	average noise spectra data (binary)
metric.dbf	default noise metric parameters
aircraft.dbf	civil aircraft data
acft_sub.dbf	aircraft substitutions
nois_grp.dbf	civil aircraft noise groups
npd_curv.dbf	civil aircraft noise-power-distance curves
profile.dbf	civil aircraft profile definition & weight data
procedur.dbf	profile procedure steps for civil aircraft
prof_pts.dbf	profile points data for civil aircraft w/o procedures
flaps.dbf	approach & departure flap coefficients for civil aircraft
thr_jet.dbf	jet thrust coefficients
thr_prop.dbf	propeller power coefficients
thr_gnrl.dbf	general jet thrust coefficients
milacft.dbf	military aircraft data
milnois_grp.dbf	military aircraft noise groups
milnpd_curv.dbf	military aircraft noise-power-distance curves
milprofile.dbf	military aircraft profile definition & weight data
milprof_pts.dbf	profile points data for military aircraft
helicopter.dbf	helicopter data
helo_nois_grp.dbf	helicopter noise groups
npd_helo.dbf	helicopter noise-power-distance curves
direct_grp.dbf	helicopter directivity group ids
directivity.dbf	helicopter directivity data
prof_helo.dbf	helicopter profile definition data
proc_helo.dbf	profile procedure steps for helicopters

### SYS\_DBF\ System dbf-template subdirectory

*.dbf	dbf file headers
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### USR\_DATA\ User data subdirectory

sys_aprt.dbf	NFDC airport data
sys_rwy.dbf	NFDC runway data
loc_pts.dbf	NFDC nav aids and fixes

### COMPUTE\ Noise computation subdirectory

<b>PROCESS\CENSUS</b>	Census CD conversion subdirectory
census.exe	program to extract census data
census.cfg	population configuration file (text)
tiger.cfg	tiger configuration file (text)
tiger2000.exe	program to extract street data
fipstate.dat	list of state codes (text)
fipscode.dat	list of county codes (text)
shapefile.dbf	template for shapefile export function
shapefile.track.dbf	template for shapefile export function
<b>PROCESS\DXF</b>	DXF file conversion subdirectory
cadcvrt.exe	program to convert dxf to cad format
cadcvrt.cfg	configuration file (text)
<b>PROCESS\TEXT</b>	Example text files
gcnp.txt	example polyline lat/long file
ambient.txt	example ambient noise file
<b>UTILITY\</b>	Utility programs
Alaska3CD.exe	program to convert an Alaska 3CD file to an INM compatible format
WriteCpBin.exe	program to create a binary _cp.bin file from a pop_pts.dbf file
WriteDbfTxt.exe	program to see the contents of a DBF file
PopConr.exe	program to compute population numbers above given noise levels
SpectralCutoffCalculator.exe	program to create a flight_ptn_taud_cutoff.txt file
Read3cd.exe	program to convert a 3CD binary file to text
Write3cd.exe	program to convert a text 3CD file to binary

<b>TEST50\</b>	Study directory (user-assigned name)
	(user input data)
study.inm	study airport configuration info (binary)
study.csv	study configuration info
scenario.dbf	scenario setup and run options
case.dbf	case setup
output.dbf	output setup definitions
runway.dbf	runways/helipads for all scenarios
rwy_end.dbf	runway end/helipad data for defined runways/helipads
track.dbf	tracks for all scenarios
trk_segs.dbf	track segment data for each track
*.dbf	changes & additions to standard data
	(source data)
*.3cd	Micropath 3CD terrain elevation data (binary)
*.hdr,*flt,*prj	GridFloat terrain elevation data (binary)
*.dem	Digital Elevation Model terrain elevation data
pop_pts.dbf	population-point data
loc_pts.dbf	location-point data
scr_pts.dbf	screening-point data
	(source graphics data)
_fp.bin	radar-track file 1 of 2 (binary)
_tk.bin	radar-track file 2 of 2 (binary)
_tiger.bin	street-map file 1 of 2 (binary)
_tiger.idx	street-map file 2 of 2 (binary)
_cp.bin	population-point data (binary)
_terrain70.bin	terrain contours (binary)
terrain.grd	Nmplot input terrain contour file (binary)
*.cad	drawing of airport (binary)
track.opt	recent input graphics display settings (binary)
lut.dat	recent look-up table of display settings (binary)
	(other)
inmerror.txt	temporary error file
version.txt	info on conversion from 6.x to 7.0 (text)
output.bin	output setup definitions (binary)
<b>SCENARIO01\</b>	Scenario subdirectory (user-assigned name)
	(user input data)
scen_par.dbf	scenario annualization parameters
grid.dbf	grid definitions
	(output intermediate)
nmplot*.grd	individual nmplot.grd files for each case
*nmplot.grd	non-annualized nmplot.grd files per case
*grid_dtl.dbf	non-annualized grid_dtl.dbf files per case
*grid_std.dbf	non-annualized grid_std.dbf files per case
*loc_nois.dbf	non-annualized loc_nois.dbf files per case
*pop_nois.dbf	non-annualized pop_nois.dbf files per case
_rwy_trk.bin	runway/track graphics data (binary)
scen_log.dbf	scenario run options data (by case)
	(output tables)
scr_nois.dbf	noise at screening points
report.txt	scenario run input report (text)
scen_ops_calc.dbf	non-annualized scenario calculated ops file
annual_scen_ops_calc.dbf	annualized scenario calculated ops file
grid_dtl.dbf	annualized detailed analysis of grids
grid_std.dbf	annualized standard analysis of grids
loc_nois.dbf	annualized noise at location points
pop_nois.dbf	annualized noise at population points
	(other)
Error&Warning.txt	flight path calculation error file
ThrustLevelInformation.txt	Thrust level information

**CASE1\** Case subdirectory for scenario run output  
(input calculated)  
ops\_calc.dbf calculated flight operations  
ops\_err.txt ops calc error file (text)  
flight.pth flight paths (binary)  
flight.txt flight path data (text)  
flt\_err.txt flight path error file (text)  
(output intermediate)  
grid recursive grid noise file 1 (binary)  
contour recursive grid noise file 2 (binary)  
(or)  
fixedgrid fixed grid noise file 1 (binary)  
  
grid\_dtl.dbf detailed analysis of grids  
grid\_std.dbf standard analysis of grids  
loc\_nois.dbf noise at location points  
pop\_nois.dbf noise at population points

**CASE1\** Case subdirectory (user-assigned name)  
(user input data)  
ops\_aprt.dbf airport operations  
grp\_pct.dbf civil aircraft group percentages  
ops\_flt.dbf civil aircraft flight operations  
ops\_rnup.dbf civil aircraft run-up operations  
mil\_grp\_pct.dbf military aircraft group percentages  
milops\_flt.dbf military aircraft flight operations  
milops\_rnup.dbf military aircraft run-up operations  
helo\_grp\_pct.dbf helicopter group percentages  
ops\_helo.dbf helicopter flight operations  
(input calculated)  
ops\_calc.dbf calculated flight operations  
ops\_err.txt ops calc error file (text)

**SCENARIO1.OUT\** Output subdirectory (user-assigned name)  
(output intermediate)  
nmplot.grd nmplot input file (NMBG binary)  
contours.dat recursive grid nmplot output file (binary)  
(or)  
nmplot.nmp nmplot plot options file  
nmplot\_ContourLine\_Lines.dbf, \*.shp, \*.shx  
fixed grid output shapefiles  
(output tables)  
conr\_pts.dbf noise contour points  
pop\_conr.dbf area and population inside contours  
pct\_bound.dbf percent boundary table  
(output graphics)  
\_inm.bin contour graphics data (binary)  
\_rwy\_trk.bin runway/track graphics data (binary)  
\_overlay.bin overlay contour graphics data (\_inm.bin)  
grid.dbf copy of grid data for graphics presentation  
output.opt recent output graphics display settings (binary)  
\*.dxf contour/runway/track graphics (dxf)  
screening.bin screening point graphics data (binary)

**SCENARIO2\** Another scenario subdirectory

**CASE2\** Another case subdirectory

**SCENARIO2.OUT\** Another scenario output subdirectory

## **E DBF FILE FORMATS**

This Appendix documents INM 7.0 DBF file formats in terms of:

- Name of the DBF file
- Names of the fields
- Type of field
- Size of field
- Description of field, including minimum and maximum values.

Details are given for all input and output DBF files used or generated by INM, but not for intermediate DBF files used for internal INM housekeeping.

Two types of fields are used: C = character, and N = number.

The size of the field and the size of the decimal portion of a number field are indicated by integers following C and N. For example,

- "C 20" is a 20-byte string
- "N 8 3" is an 8-byte number (including the minus sign, decimal point, and all digits), and there are 3 digits after the decimal point (for example, "234.678").

When an N-type field has "0" digits after the decimal point, the decimal point is not stored (for example, "N 3 0" designates a 3-byte integer, such as "123").

When a number is given in exponential notation, a C-type field is used instead of a N-type field.

An asterisk (\*) next to a field name means that the field is part of the record key. If there are two or more key fields, they are concatenated to make a unique identifier for a record.

### **ACFT\_SUB.DBF**

Aircraft Substitution Table

- \* 1 SUB\_ID C 12  
Substitution identifier
- 2 SUB\_DESCR C 40  
Description of the substitution aircraft type
- 3 ACFT\_ID1 C 12  
First INM aircraft identifier
- 4 PERCENT1 N 5.1  
Percent of SUB\_ID that is assigned to ACFT\_ID1  
Min= 0.0 Max= 100.0
- 5 ACFT\_ID2 C 12  
Second INM aircraft identifier
- 6 PERCENT2 N 5.1  
Percent of SUB\_ID that is assigned to ACFT\_ID2  
Min= 0.0 Max= 100.0
- 7 ACFT\_ID3 C 12  
Third INM aircraft identifier
- 8 PERCENT3 N 5.1  
Percent of SUB\_ID that is assigned to ACFT\_ID3  
Min= 0.0 Max= 100.0
- 9 ACFT\_ID4 C 12  
Forth INM aircraft identifier
- 10 PERCENT4 N 5.1  
Percent of SUB\_ID that is assigned to ACFT\_ID4  
Min= 0.0 Max= 100.0
- 11 ACFT\_ID5 C 12  
Fifth INM aircraft identifier
- 12 PERCENT5 N 5.1  
Percent of SUB\_ID that is assigned to ACFT\_ID5  
Min= 0.0 Max= 100.0

### **AIRCRAFT.DBF**

Aircraft Table

- \* 1 ACFT\_ID C 12  
INM Aircraft identifier
- 2 ACFT\_DESCR C 40  
Aircraft type and engine type names
- 3 WGT\_CAT C 1  
Weight class (S = Small, L = Large, H = Heavy)
- 4 OWNER\_CAT C 1  
Owner category (C = Commercial, G = GenAviation, M = Military)
- 5 ENG\_TYPE C 1  
Engine type (J = Jet, T = Turboprop, P = Piston)
- 6 NOISE\_CAT C 1  
Noise stage number (0=none, 1, 2, 3)
- 7 NOISE\_ID C 12  
Noise identifier
- 8 NUMB\_ENG N 1.0  
Number of engines  
Min= 1 Max= 8
- 9 THR\_RESTOR C 1  
Aircraft has Automated Thrust Restoration System (Y = Yes, N = No)
- 10 MX\_GW\_TKO N 7.0  
Maximum gross takeoff weight (lb)  
Min= 0 Max= 999999
- 11 MX\_GW\_LND N 7.0

Maximum gross landing weight (lb)  
 Min= 0 Max= 999999  
 12 MX\_DS\_STOP N 5.0  
 FAR landing field length at maximum landing weight (ft)  
 Min= 0 Max= 20000  
 13 COEFF\_TYPE C 1  
 Type of departure thrust coefficients (J = Jet, P = Prop)  
 14 THR\_STATIC N 6.0  
 Static rated thrust or 100% thrust (lb)  
 Min= 0 Max= 200000

### **ANNUAL\_SCEN\_OPS\_CALC.DBF**

Annualized Combined Flight Operations Calculation Table

- \* 1 ACFT\_ID C 12  
INM or substitution aircraft identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID1 C 8  
Profile group identifier
- \* 4 PROF\_ID2 C 1  
Profile stage number
- \* 5 RWY\_ID C 8  
Runway end identifier
- \* 6 TRK\_ID1 C 8  
Track identifier
- \* 7 TRK\_ID2 C 1  
Sub-track identifier (0..8)
- 8 GROUP\_ID C 12  
User-defined aircraft group identifier
- 9 OPS\_DAY N 11.6  
Number of day operations  
Min= 0.0000 Max= 9999.9999
- 10 OPS\_EVE N 11.6  
Number of evening operations  
Min= 0.0000 Max= 9999.9999
- 11 OPS\_NIGHT N 11.6  
Number of night operations  
Min= 0.0000 Max= 9999.9999

### **CALC\_PROF\_PTS.DBF**

Brief\_description\_of\_dbf

- \* 1 CASE\_ID C 40  
Case identifier (subdirectory under the study directory)
- \* 2 ACFT\_ID C 12  
INM Aircraft identifier
- \* 3 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 4 RWY\_ID C 8  
Runway end identifier
- \* 5 PROF\_ID1 C 8  
Profile group identifier
- \* 6 PROF\_ID2 C 1  
Profile stage number (1..9)
- 7 PT\_NUM N 3.0  
Point number of the profile  
Min= 1 Max= 999
- 8 DISTANCE N 10.1  
Distance along the ground relative to start (ft)

Min= -9999999.9 Max= 9999999.9  
9 ALTITUDE N 7.1  
Altitude of aircraft AFE (ft)  
Min= -9999.0 Max= 60000.0  
10 SPEED N 5.1  
Ground speed at this point (knots)  
Min= 0.0 Max= 600.0  
11 THR\_SET N 9.2  
Corrected net thrust per engine at this point (lb, %, other)  
Min= 0.10 Max= 99999.00  
12 OP\_MODE C 1  
Operational mode (A, D, X)  
13 FLAP\_ID C 6  
Flap-setting identifier

### **CASE.DBF**

Case Definition Table  
\* 1 CASE\_ID C 40  
Case identifier (subdirectory under the study directory)  
2 CASE\_DESC C 80  
Case description  
3 DATE C 15  
Date and time that the subdirectory was created  
4 TEMPERATUR N 5.1  
Average temperature on the airport runways (deg F)  
Min= -30.0 Max= 120.0  
5 PRESSURE N 6.2  
Average atmospheric pressure on the airport runways (in-Hg)  
Min= 27.00 Max= 33.00  
6 DO\_HUMID C 1  
Use ARP866A atmospheric absorption (Y, N)  
7 HUMIDITY N 5.1  
Average relative humidity on the airport runways (%)  
Min= 0.0 Max= 100.0  
8 HEADWIND N 4.1  
Average headwind on the airport runways (knots)  
Min= -9.9 Max= 40.0

### **CONR\_PTS.DBF**

Contour Points Table  
\* 1 LEVEL N 6.1  
Contour level (dB or minutes)  
Min= -99.9 Max= 9999.9  
\* 2 ISLAND\_NUM N 2.0  
Island number (for multiple contours at same level)  
Min= 1 Max= 99  
3 ISLAND\_TYP C 1  
Type of island (P = Positive, N = Negative)  
\* 4 X\_COORD N 9.4  
X coordinate on contour (nmi)  
Min= -999.0000 Max= 999.0000  
\* 5 Y\_COORD N 9.4  
Y coordinate on contour (nmi)  
Min= -999.0000 Max= 999.0000  
6 POINT\_OK C 1  
This point is on the contour and not on the border (Y, N)  
7 LATITUDE N 10.6  
Latitude of the point (degrees)

```

Min= -89.999999 Max= 89.999999
8 LONGITUDE N 11.6
Longitude of the point (degrees)
Min= -180.000000 Max= 180.000000

```

**DIRECTIVITY.DBF**

```

Helicopter noise directivity table
* 1 DIRECT_ID C 12
Unique directivity indentifier tied to a specific helicopter
2 GROUND_TYP C 1
Type of ground resistivity, (H = hard, S = soft, F = File, N = None)
3 OP_MODE C 1
Operational mode (A = Approach, D = Depart)
4 L180 N 5.1
dB adjustment at 180 degrees left of nose
Min= -99.9 Max= 999.9
5 L165 N 5.1
dB adjustment at 165 degrees left of nose
Min= -99.9 Max= 999.9
6 L150 N 5.1
dB adjustment at 150 degrees left of nose
Min= -99.9 Max= 999.9
7 L135 N 5.1
dB adjustment at 135 degrees left of nose
Min= -99.9 Max= 999.9
8 L120 N 5.1
dB adjustment at 120 degrees left of nose
Min= -99.9 Max= 999.9
9 L105 N 5.1
dB adjustment at 105 degrees left of nose
Min= -99.9 Max= 999.9
10 L090 N 5.1
dB adjustment at 090 degrees left of nose
Min= -99.9 Max= 999.9
11 L075 N 5.1
dB adjustment at 075 degrees left of nose
Min= -99.9 Max= 999.9
12 L060 N 5.1
dB adjustment at 060 degrees left of nose
Min= -99.9 Max= 999.9
13 L045 N 5.1
dB adjustment at 045 degrees left of nose
Min= -99.9 Max= 999.9
14 L030 N 5.1
dB adjustment at 030 degrees left of nose
Min= -99.9 Max= 999.9
15 L015 N 5.1
dB adjustment at 015 degrees left of nose
Min= -99.9 Max= 999.9
16 C000 N 5.1
dB adjustment at 0 degrees - along the nose
Min= -99.9 Max= 999.9
17 R015 N 5.1
dB adjustment at 015 degrees right of nose
Min= -99.9 Max= 999.9
18 R030 N 5.1
dB adjustment at 030 degrees right of nose
Min= -99.9 Max= 999.9
19 R045 N 5.1

```

```
        dB adjustment at 045 degrees right of nose
        Min= -99.9 Max= 999.9
20 R060          N 5.1
        dB adjustment at 060 degrees right of nose
        Min= -99.9 Max= 999.9
21 R075          N 5.1
        dB adjustment at 075 degrees right of nose
        Min= -99.9 Max= 999.9
22 R090          N 5.1
        dB adjustment at 090 degrees right of nose
        Min= -99.9 Max= 999.9
23 R105          N 5.1
        dB adjustment at 105 degrees right of nose
        Min= -99.9 Max= 999.9
24 R120          N 5.1
        dB adjustment at 120 degrees right of nose
        Min= -99.9 Max= 999.9
25 R135          N 5.1
        dB adjustment at 135 degrees right of nose
        Min= -99.9 Max= 999.9
26 R150          N 5.1
        dB adjustment at 150 degrees right of nose
        Min= -99.9 Max= 999.9
27 R165          N 5.1
        dB adjustment at 165 degrees right of nose
        Min= -99.9 Max= 999.9
28 R180          N 5.1
        dB adjustment at 180 degrees right of nose
        Min= -99.9 Max= 999.9
```

### **DIRECT\_GRP.DBF**

```
Directivity group
1 DIRECT_ID C 12
    Directivity identifier
```

### **FLAPS.DBF**

```
Flaps Table -- aerodynamic coefficients
* 1 ACFT_ID C 12
    Aircraft identifier
2 OP_TYPE C 1
    Type of operation (A, D, T, F, V)
* 3 FLAP_ID C 6
    Flap-setting identifier
4 COEFF_R N 8.6
    Drag-over-lift ratio
    Min= 0.000000 Max= 1.340000
5 COEFF_C_D N 8.6
    Takeoff and landing calibrated airspeed coefficient (knt/lb1/2)
    Min= 0.000000 Max= 1.340000
6 COEFF_B N 8.6
    Takeoff distance coefficient (ft/lb)
    Min= 0.000000 Max= 1.340000
```

**GRID.DBF**

```

Grid Definition Table
* 1 GRID_ID    C 8
    Grid identifier
2 GRID_TYPE   C 1
    C = Contour, S = Standard, D = Detailed, L = Location, P = Population
3 X_COORD    N 9.4
    X coordinate of the lower-left corner of the grid (nmi)
    Min= -999.0000 Max= 999.0000
4 Y_COORD    N 9.4
    Y coordinate of the lower-left corner of the grid (nmi)
    Min= -999.0000 Max= 999.0000
5 ANGLE      N 5.1
    Grid rotation angle (deg) from the X-axis to the I-axis
    Min= -90.0 Max= 90.0
6 DIST_I     N 8.4
    Distance between points in the I direction (nmi)
    Min= 0.0000 Max= 999.0000
7 DIST_J     N 8.4
    Distance between points in the J direction (nmi)
    Min= 0.0000 Max= 999.0000
8 NUMB_I     N 3.0
    Number of points in the I direction
    Min= 1 Max= 999
9 NUMB_J     N 3.0
    Number of points in the J directions
    Min= 1 Max= 999
10 TA_THRESH N 5.1
    Noise-level threshold for time-above metric (dB)
    Min= 0.0 Max= 150.0
11 DO_AMBIENT C 1
    Use ambient noise levels from a file (Y, N)
12 DELTA_AMB N 5.1
    Time-above threshold is ambient plus this delta value (dB)
    Min= -10.0 Max= 20.0
13 DO_PERCENT C 1
    Output percent of reference time instead of time-above (Y, N)
14 REF_TIME  N 5.2
    Time duration used in percent of time above threshold (hr)
    Min= 0.10 Max= 48.00
15 DEF_COORD C 1
    Default coordinates for GUI display only (Y = Latitude/Longitude in decimal
    degrees, N = X,Y in NMI)

```

**GRID\_DTL.DBF**

```

Detailed Grid Analysis Table
* 1 METRIC_ID C 6
    Metric Identifier
* 2 GRID_ID   C 8
    Grid identifier
* 3 I_INDEX  N 3.0
    I index of the grid point
    Min= 1 Max= 999
* 4 J_INDEX  N 3.0
    J index of the grid point
    Min= 1 Max= 999
* 5 ACFT_ID  C 12

```

```

    Aircraft identifier
* 6 OP_TYPE      C 1
    Type of operation (A, D, T, F, V)
* 7 PROF_ID1    C 8
    Profile group identifier
* 8 PROF_ID2    C 1
    Profile stage number (1..9)
* 9 RWY_ID      C 8
    Runway end identifier
*10 TRK_ID1     C 8
    Track identifier
*11 TRK_ID2     C 1
    Sub-track identifier (0..8)
12 DISTANCE     N 9.1
    Distance to aircraft at CPA (ft)
    Min= 0.0 Max= 9999999.0
13 ALTITUDE     N 5.0
    Altitude of aircraft at CPA AFE (ft)
    Min= -9999 Max= 60000
14 ELEV_ANG     N 4.1
    Elevation angle at CPA (deg above ground plane)
    Min= 0.0 Max= 90.0
15 SPEED        N 5.1
    Speed of aircraft at CPA TAS (knots)
    Min= 0.0 Max= 600.0
16 THR_SET      N 9.2
    Corrected net thrust per engine (lb, %, other)
    Min= 0.10 Max= 99999.00
17 OPS_EQUIV   N 11.6
    Equivalent number of operations for this flight
    Min= 0.0000 Max= 9999.9999
18 METRIC_ONE   N 6.1
    Metric value caused by one operation (dB or minutes)
    Min= -99.9 Max= 9999.9
19 METRIC_ALL   N 6.1
    Metric value caused by all operations (dB or minutes)
    Min= -99.9 Max= 9999.9
20 PERCENT      N 7.3
    Percent of total metric due to this aircraft's operations
    Min= 0.000 Max= 100.000
```

### **GRID\_PTS.DBF**

```

    Brief_description_of_dbf
1 POINT_ID      C 8
    Point identifier
2 LATITUDE      N 10.6
    Latitude of the point (degrees)
    Min= -89.999999 Max= 89.999999
3 LONGITUDE     N 11.6
    Longitude of the point (degrees)
    Min= -180.000000 Max= 180.000000
```

**GRID\_STD.DBF**

Standard Grid Analysis Table

```

* 1 GRID_ID      C 8
    Grid identifier
* 2 I_INDEX      N 3.0
    I index of the grid point
    Min= 1 Max= 999
* 3 J_INDEX      N 3.0
    J index of the grid point
    Min= 1 Max= 999
4 X_COORD      N 9.4
    X coordinate value (nmi)
    Min= -999.0000 Max= 999.0000
5 Y_COORD      N 9.4
    Y coordinate value (nmi)
    Min= -999.0000 Max= 999.0000
6 Z_COORD      N 7.1
    Z coordinate value MSL (ft)
    Min= -9999.0 Max= 60000.0
7 LATITUDE      N 10.6
    Latitude of the point (degrees)
    Min= -89.999999 Max= 89.999999
8 LONGITUDE     N 11.6
    Longitude of the point (degrees)
    Min= -180.000000 Max= 180.000000
9 METRIC        N 6.1
    User-defined metric value (dB or minutes)
    Min= -99.9 Max= 9999.9
10 DNL          N 5.1
    Day-night average sound level (dB)
    Min= -99.9 Max= 999.9
11 CNEL         N 5.1
    Community noise equivalent level (dB)
    Min= -99.9 Max= 999.9
12 LAEQ         N 5.1
    Equivalent sound level for 24 hours (dB)
    Min= -99.9 Max= 999.9
13 LAEQD        N 5.1
    Equivalent sound level for day 0700-2200 (dB)
    Min= -99.9 Max= 999.9
14 LAEQN        N 5.1
    Equivalent sound level for night 2200-0700 (dB)
    Min= -99.9 Max= 999.9
15 SEL          N 5.1
    Sound exposure level (dB)
    Min= -99.9 Max= 999.9
16 LAMAX        N 5.1
    Maximum A-weighted sound level (dB)
    Min= -99.9 Max= 999.9
17 TALA         N 6.1
    Time above an A-weighted sound level threshold (minutes or % of time)
    Min= -99.9 Max= 9999.9
18 NEF          N 5.1
    Noise exposure forecast (dB)
    Min= -99.9 Max= 999.9
19 WECPNL       N 5.1
    Weighted equivalent continuous perceived noise level (dB)
    Min= -99.9 Max= 999.9
20 EPNL         N 5.1
  
```

Effective perceived tone-corrected noise level (dB)  
Min= -99.9 Max= 999.9

21 PNLTM N 5.1  
Maximum perceived tone-corrected noise level (dB)  
Min= -99.9 Max= 999.9

22 TAPNL N 6.1  
Time above a perceived tone-corrected noise level threshold (minutes or %)  
Min= -99.9 Max= 9999.9

23 CEXP N 5.1  
C-weighted exposure level (dB)  
Min= -99.9 Max= 999.9

24 LCMAX N 5.1  
Maximum C-weighted level (dB)  
Min= -99.9 Max= 999.9

25 TALC N 6.1  
Time above a C-weighted threshold (minutes or % of time)  
Min= -99.9 Max= 9999.9

### **GROUP.DBF**

Aircraft group assignments

\* 1 ACFT\_ID C 12  
Aircraft identifier for an aircraft in the group

2 GROUP\_ID C 12  
User-defined aircraft group identifier

3 ACFT\_TYPE C 1  
Aircraft type (C = Commercial, M = Military, H = Helicopter)

### **GRP\_PCT.DBF**

Group Percentage Table

\* 1 GROUP\_ID C 12  
User-defined aircraft group identifier

\* 2 RWY\_ID C 8  
Runway end identifier

\* 3 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)

\* 4 TRK\_ID1 C 8  
Track identifier

\* 5 PROF\_ID1 C 8  
Profile group identifier

6 PCT\_DAY N 6.2  
Group percentage of daytime operations  
Min= 0.00 Max=100.00

7 PCT\_EVE N 6.2  
Group percentage of evening operations  
Min= 0.00 Max=100.00

8 PCT\_NGT N 6.2  
Group percentage of nighttime operations  
Min= 0.00 Max=100.00

**HELICOPTER.DBF**

```

Helicopter definition table
1 HELO_ID      C 12
   Helicopter identifier
2 HELO_DESCR  C 40
   Description of the helicopter and engines
3 OWNER_CAT   C 1
   Owner category (C = Commercial, M = Military)
4 ENG_TYPE    C 1
   Engine type: Turboprop or Piston (T, P)
5 NUM_ROTOR   N 1.0
   Number of rotors
   Min= 1 Max= 9
6 DIAMETER    N 6.1
   Rotor diameter in feet
   Min = 0.0 Max = 1000.0
7 RPM         N 6.1
   Rotor speed in revolutions per minute
   Min = 0.0 Max = 1000.0
8 MAX_TOW     N 7.0
   Maximum gross takeoff weight (pounds)
   Min = 0 Max = 50000
9 NOISE_ID    C 12
   Associates helicopter with noise data
10 DIRECT_ID  C 12
   Associates helicopter with directivity data
11 HAS_WHEELS C 1
   Does the helicopter have wheels? (Y = Yes, N = No)
12 B_LEFT_0   N 10.2
   Adjust flyover noise as a function of speed, left
   Min = -999.99 Max = 999.99
13 B_LEFT_1   N 10.2
   Adjust flyover noise as a function of speed, left
   Min = -999.99 Max = 999.99
14 B_LEFT_2   N 10.2
   Adjust flyover noise as a function of speed, left
   Min = -999.99 Max = 999.99
15 B_CENTER_0 N 10.2
   Adjust flyover noise as a function of speed, center
   Min = -999.99 Max = 999.99
16 B_CENTER_1 N 10.2
   Adjust flyover noise as a function of speed, center
   Min = -999.99 Max = 999.99
17 B_CENTER_2 N 10.2
   Adjust flyover noise as a function of speed, center
   Min = -999.99 Max = 999.99
18 B_RIGHT_0  N 10.2
   Adjust flyover noise as a function of speed, right
   Min = -999.99 Max = 999.99
19 B_RIGHT_1  N 10.2
   Adjust flyover noise as a function of speed, right
   Min = -999.99 Max = 999.99
20 B_RIGHT_2  N 10.2
   Adjust flyover noise as a function of speed, right
   Min = -999.99 Max = 999.99
21 DB_VER_ASC N 5.1
   dB offset added to NPD levels, vertical ascent
   Min = -50.0 Max = 50.0
22 DB_VER_DES N 5.1

```

dB offset added to NPD levels, vertical descent  
Min = -50.0 Max = 50.0

23 DB\_ACC\_HOR N 5.1  
dB offset added to NPD levels, depart with horizontal acceleration  
Min = -50.0 Max = 50.0

24 DB\_ACC\_CLM N 5.1  
dB offset added to NPD levels, depart with climbing acceleration  
Min = -50.0 Max = 50.0

25 DB\_DEC\_HOR N 5.1  
dB offset added to NPD levels, approach with horizontal deceleration  
Min = -50.0 Max = 50.0

26 DB\_DEC\_DSC N 5.1  
dB offset added to NPD levels, approach with descending deceleration  
Min = -50.0 Max = 50.0

### **HELO\_GRP\_PCT.DBF**

Helicopter Group Percentage Table

\* 1 GROUP\_ID C 12  
User-defined helicopter group identifier

\* 2 RWY\_ID C 8  
Runway / helipad identifier

\* 3 OP\_TYPE C 1  
Operation type (A = Approach, D = Departure, X = Taxi, V = Overflight)

\* 4 TRK\_ID1 C 8  
Track identifier

\* 5 PROF\_ID1 C 8  
Profile group identifier

6 PCT\_DAY N 6.2  
Percent of daytime flights for this helicopter group using this track and profile  
Min= 0.00 Max=100.00

7 PCT\_EVE N 6.2  
Percent of evening flights for this helicopter group using this track and profile  
Min= 0.00 Max=100.00

8 PCT\_NGT N 6.2  
Percent of night flights for this helicopter group using this track and profile  
Min= 0.00 Max=100.00

### **HELO\_NOIS\_GRP.DBF**

Helicopter noise group table

\* 1 NOISE\_ID C 12  
Noise identifier

2 SPECT\_APP N 3.0  
Spectral class number for approach  
Min = 0 Max = 999

3 SPECT\_DEP N 3.0  
Spectral class number for departure  
Min = 0 Max = 999

4 SPECT\_LEV N 3.0  
Spectral class number for flyover  
Min = 0 Max = 999

5 SPEED\_APP N 6.1  
Approach reference speed (knots)  
Min = 0.0 Max = 250.0

6 SPEED\_DEP N 6.1  
Depart reference speed (knots)

Min = 0.0 Max = 250.0  
 7 SPEED\_LEV N 6.1  
 Flyover reference speed (knots)  
 Min = 0.0 Max = 250.0

### **LOC\_NOIS.DBF**

Location Point Noise Table  
 \* 1 POINT\_ID C 6  
 Point identifier (defined in LOC\_PTS)  
 2 METRIC N 6.1  
 Metric value (dB or minutes)  
 Min= -99.9 Max= 9999.9

### **LOC\_PTS.DBF**

Location Points Table  
 \* 1 POINT\_ID C 6  
 User-defined point identifier  
 2 POINT\_CAT C 1  
 User-defined point category (S = school, ...)  
 3 LATITUDE N 10.6  
 Latitude of the point (degrees)  
 Min= -89.999999 Max= 89.999999  
 4 LONGITUDE N 11.6  
 Longitude of the point (degrees)  
 Min= -180.000000 Max= 180.000000  
 5 HEIGHT N 5.0  
 Height above the ground of the point (ft)  
 Min= -9999 Max= 60000  
 6 DEF\_COORD C 1  
 Default coordinates for GUI display only (Y = Latitude/Longitude in decimal degrees, N = X,Y in NMI)

### **METRIC.DBF**

Noise Metric Definition Table  
 \* 1 METRIC\_ID C 6  
 Noise metric identifier  
 2 METRIC\_TYP C 1  
 Type of metric (E = Exposure, M = MaxLevel, T = TimeAbove)  
 3 FREQ\_TYPE C 1  
 Type of frequency weighting (A = A-Weighted, P = Perceived)  
 4 WGT\_DAY N 6.2  
 Weight multiplying day operations (0 or 1 for M and T types)  
 Min= 0.00 Max= 999.99  
 5 WGT\_EVE N 6.2  
 Weight multiplying evening operations  
 Min= 0.00 Max= 999.99  
 6 WGT\_NIGHT N 6.2  
 Weight multiplying night operations  
 Min= 0.00 Max= 999.99  
 7 DB\_MINUS N 5.2  
 Decibel amount subtracted from exposure level  
 Min= 0.00 Max= 99.99

### **MILACFT.DBF**

Aircraft description table

- \* 1 ACFT\_ID C 12  
INM Aircraft identifier
- 2 ACFT\_DESCR C 40  
Aircraft type and engine type names
- 3 WGT\_CAT C 1  
Weight class (S = Small, L = Large, H = Heavy)
- 4 OWNER\_CAT C 1  
Owner category (C = Commercial, G = GenAviation, M = Military)
- 5 ENG\_TYPE C 1  
Engine type (J = Jet, T = Turboprop, P = Piston)
- 6 NOISE\_CAT C 1  
Noise stage number (0=none, 1, 2, 3)
- 7 NOISE\_ID C 12  
Noise identifier
- 8 NUMB\_ENG N 1.0  
Number of engines  
Min= 1 Max= 8
- 9 THR\_RESTOR C 1  
Aircraft has Automated Thrust Restoration System (Y = Yes, N = No)
- 10 MX\_GW\_TKO N 7.0  
Maximum gross takeoff weight (lb)  
Min= 0 Max= 999999
- 11 MX\_GW\_LND N 7.0  
Maximum gross landing weight (lb)  
Min= 0 Max= 999999
- 12 MX\_DS\_STOP N 5.0  
FAR landing field length at maximum landing weight (ft)  
Min= 0 Max= 20000
- 13 COEFF\_TYPE C 1  
Type of departure thrust coefficients (J = Jet, P = Prop)
- 14 THR\_STATIC N 6.0  
Static rated thrust or 100% thrust (lb)  
Min= 0 Max= 200000

### **MILNOIS\_GRP.DBF**

Noise identification table for military aircraft

- \* 1 NOISE\_ID C 12  
Noise identifier
- 2 THRSET\_TYP C 1  
Type of thrust setting (L = Pounds, P = Percent, X = Other)
- 3 MODEL\_TYPE C 1  
Type of distance-duration model (I = INM, N = NoiseMap)
- 4 SPECT\_APP N 3.0  
Spectral class number for approach  
Min= 0 Max= 999
- 5 SPECT\_DEP N 3.0  
Spectral class number for departure  
Min= 0 Max= 999
- 6 SPECT\_AFB N 3.0  
Spectral class number for afterburner  
Min= 0 Max= 999

**MILNPD\_CURV.DBF**

Noise-Power-Distance Curve Table for military aircraft

- \* 1 NOISE\_ID C 12  
Noise identifier
- \* 2 NOISE\_TYPE C 1  
Type of noise (S = SEL, M = LAMAX, E = EPNL, P = PNLTM)
- \* 3 OP\_MODE C 1  
Operational mode (A = Approach, D = Depart, X = AfterBurner)
- \* 4 THR\_SET N 9.2  
Corrected net thrust per engine (lb, %, other)  
Min= 0.10 Max= 99999.00
- 5 L\_200 N 5.1  
Level for 200 feet (dB)  
Min= -50.0 Max= 999.9
- 6 L\_400 N 5.1  
Level for 400 feet (dB)  
Min= -50.0 Max= 999.9
- 7 L\_630 N 5.1  
Level for 630 feet (dB)  
Min= -50.0 Max= 999.9
- 8 L\_1000 N 5.1  
Level for 1000 feet (dB)  
Min= -50.0 Max= 999.9
- 9 L\_2000 N 5.1  
Level for 2000 feet (dB)  
Min= -50.0 Max= 999.9
- 10 L\_4000 N 5.1  
Level for 4000 feet (dB)  
Min= -50.0 Max= 999.9
- 11 L\_6300 N 5.1  
Level for 6000 feet (dB)  
Min= -50.0 Max= 999.9
- 12 L\_10000 N 5.1  
Level for 10,000 feet (dB)  
Min= -50.0 Max= 999.9
- 13 L\_16000 N 5.1  
Level for 16,000 feet (dB)  
Min= -50.0 Max= 999.9
- 14 L\_25000 N 5.1  
Level for 25,000 feet (dB)  
Min= -50.0 Max= 999.9

**MILOPS\_FLT.DBF**

Flight Operations Table for military aircraft

- \* 1 ACFT\_ID C 12  
INM or substitution aircraft identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID1 C 8  
Profile group identifier
- \* 4 PROF\_ID2 C 1  
Profile stage number (1..9)
- \* 5 RWY\_ID C 8  
Runway end identifier
- \* 6 TRK\_ID1 C 8  
Track identifier
- 7 OPS\_DAY N 11.6

Number of day operations  
Min= 0.000000 Max= 9999.999999  
8 OPS\_EVE N 11.6  
Number of evening operations  
Min= 0.000000 Max= 9999.999999  
9 OPS\_NIGHT N 11.6  
Number of night operations  
Min= 0.000000 Max= 9999.999999

**MILOPS\_RNUP.DBF**

Runup Operations Table for military aircraft  
\* 1 ACFT\_ID C 12  
INM aircraft identifier  
\* 2 RUNUP\_ID C 8  
Runup identifier  
3 X\_COORD N 9.4  
X coordinate at runup position (nmi)  
Min= -999.0000 Max= 999.0000  
4 Y\_COORD N 9.4  
Y coordinate at runup position (nmi)  
Min= -999.0000 Max= 999.0000  
5 HEADING N 5.1  
Aircraft heading (deg from true North)  
Min= 0.0 Max= 359.9  
6 THR\_SET N 9.2  
Corrected net thrust per engine (lb, %, other)  
Min= 0.10 Max= 99999.00  
7 DURATION N 7.1  
Duration of runup event (seconds)  
Min= 0.0 Max= 86400.0  
8 OPS\_DAY N 11.6  
Number of day operations  
Min= 0.0000 Max= 9999.9999  
9 OPS\_EVE N 11.6  
Number of evening operations  
Min= 0.0000 Max= 9999.9999  
10 OPS\_NIGHT N 11.6  
Number of night operations  
Min= 0.0000 Max= 9999.9999

**MILPROFILE.DBF**

Profile Identification Table for military aircraft  
\* 1 ACFT\_ID C 12  
Aircraft identifier  
\* 2 OP\_TYPE C 1  
A = Approach, D = Depart, T = Touch&Go, F = CircuitFlt, V = OverFlt  
\* 3 PROF\_ID1 C 8  
Profile group identifier (STANDARD = INM standard data)  
\* 4 PROF\_ID2 C 1  
Profile stage number (1..9)  
5 WEIGHT N 7.0  
Aircraft weight during this operation (lb)  
Min= 0 Max= 999999

**MILPROF\_PTS.DBF**

Profile Points Table -- fixed-point profiles

- \* 1 ACFT\_ID C 12  
Aircraft identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID1 C 8  
Profile group identifier (STANDARD = INM standard data)
- \* 4 PROF\_ID2 C 1  
Profile stage number (1..9)
- \* 5 PT\_NUM N 3.0  
Point number of the profile  
Min= 1 Max= 999
- 6 DISTANCE N 10.1  
Distance along the ground relative to start (ft)  
Min= -9999999.9 Max= 9999999.9
- 7 ALTITUDE N 7.1  
Altitude of aircraft AFE (ft)  
Min= -9999.0 Max= 60000.0
- 8 SPEED N 5.1  
Ground speed at this point (knots)  
Min= 0.0 Max= 600.0
- 9 THR\_SET N 9.2  
Corrected net thrust per engine at this point (lb, %, other)  
Min= 0.10 Max= 99999.00
- 10 OP\_MODE C 1  
Operational mode (A, D, X)

**MIL\_GRP\_PCT.DBF**

Group Percentage Table for military aircraft

- \* 1 GROUP\_ID C 12  
User-defined aircraft group identifier
- \* 2 RWY\_ID C 8  
Runway end identifier
- \* 3 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 4 TRK\_ID1 C 8  
Track identifier
- \* 5 PROF\_ID1 C 8  
Profile group identifier
- 6 PCT\_DAY N 6.2  
Group percentage of daytime operations  
Min= 0.00 Max=100.00
- 7 PCT\_EVE N 6.2  
Group percentage of evening operations  
Min= 0.00 Max=100.00
- 8 PCT\_NGT N 6.2  
Group percentage of nighttime operations  
Min= 0.00 Max=100.00

### **NOIS\_GRP.DBF**

Noise Identification Table

- \* 1 NOISE\_ID C 12  
Noise identifier
- 2 THRSET\_TYP C 1  
Type of thrust setting (L = Pounds, P = Percent, X = Other)
- 3 MODEL\_TYPE C 1  
Type of distance-duration model (I = INM, N = NoiseMap)
- 4 SPECT\_APP N 3.0  
Spectral class number for approach  
Min= 0 Max= 999
- 5 SPECT\_DEP N 3.0  
Spectral class number for departure  
Min= 0 Max= 999
- 6 SPECT\_AFB N 3.0  
Spectral class number for afterburner  
Min= 0 Max= 999

### **NPD\_CURV.DBF**

Noise-Power-Distance Curve Table

- \* 1 NOISE\_ID C 12  
Noise identifier
- \* 2 NOISE\_TYPE C 1  
Type of noise (S = SEL, M = LAMAX, E = EPNL, P = PNLTM)
- \* 3 OP\_MODE C 1  
Operational mode (A = Approach, D = Depart, X = AfterBurner)
- 4 THR\_SET N 9.2  
Corrected net thrust per engine (lb, %, other)  
Min= 0.10 Max= 99999.00
- 5 L\_200 N 5.1  
Level for 200 feet (dB)  
Min= -50.0 Max= 999.9
- 6 L\_400 N 5.1  
Level for 400 feet (dB)  
Min= -50.0 Max= 999.9
- 7 L\_630 N 5.1  
Level for 630 feet (dB)  
Min= -50.0 Max= 999.9
- 8 L\_1000 N 5.1  
Level for 1000 feet (dB)  
Min= -50.0 Max= 999.9
- 9 L\_2000 N 5.1  
Level for 2000 feet (dB)  
Min= -50.0 Max= 999.9
- 10 L\_4000 N 5.1  
Level for 4000 feet (dB)  
Min= -50.0 Max= 999.9
- 11 L\_6300 N 5.1  
Level for 6000 feet (dB)  
Min= -50.0 Max= 999.9
- 12 L\_10000 N 5.1  
Level for 10,000 feet (dB)  
Min= -50.0 Max= 999.9
- 13 L\_16000 N 5.1  
Level for 16,000 feet (dB)  
Min= -50.0 Max= 999.9
- 14 L\_25000 N 5.1

Level for 25,000 feet (dB)  
 Min= -50.0 Max= 999.9

**NPD\_HELO.DBF**

Noise-Power-Distance Curve Table for helicopters

- \* 1 NOISE\_ID C 12  
     Noise identifier
- \* 2 NOISE\_TYPE C 1  
     S = SEL, M = LAMAX, E = EPNL, P = PNLTM
- \* 3 OP\_MODE C 1  
     Operation step type, see Appendix J (A D X G H I J V W Y Z B C E F T S)
- 4 SIDE\_TYPE C 1  
     L = Left, C = Center, R = Right, S = Static
- 5 L\_200 N 5.1  
     Level for 200 feet (dB)  
     Min= -50.0 Max= 999.9
- 6 L\_400 N 5.1  
     Level for 400 feet (dB)  
     Min= -50.0 Max= 999.9
- 7 L\_630 N 5.1  
     Level for 630 feet (dB)  
     Min= -50.0 Max= 999.9
- 8 L\_1000 N 5.1  
     Level for 1000 feet (dB)  
     Min= -50.0 Max= 999.9
- 9 L\_2000 N 5.1  
     Level for 2000 feet (dB)  
     Min= -50.0 Max= 999.9
- 10 L\_4000 N 5.1  
     Level for 4000 feet (dB)  
     Min= -50.0 Max= 999.9
- 11 L\_6300 N 5.1  
     Level for 6000 feet (dB)  
     Min= -50.0 Max= 999.9
- 12 L\_10000 N 5.1  
     Level for 10,000 feet (dB)  
     Min= -50.0 Max= 999.9
- 13 L\_16000 N 5.1  
     Level for 16,000 feet (dB)  
     Min= -50.0 Max= 999.9
- 14 L\_25000 N 5.1  
     Level for 25,000 feet (dB)  
     Min= -50.0 Max= 999.9

**OPS\_APRT.DBF**

Airport Operations Table

- \* 1 ACFT\_ID C 12  
     INM or substitution aircraft identifier
- \* 2 OP\_TYPE C 1  
     Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID2 C 1  
     Profile stage number (1..9)
- 4 OPS\_DAY N 11.6  
     Number of day operations on all tracks  
     Min= 0.0000 Max= 9999.9999
- 5 OPS\_EVE N 11.6  
     Number of evening operations on all tracks  
     Min= 0.0000 Max= 9999.9999

6 OPS\_NIGHT N 11.6  
Number of night operations on all tracks  
Min= 0.0000 Max= 9999.9999

**OPS\_CALC.DBF**

Flight Operations Calculation Table

- \* 1 ACFT\_ID C 12  
INM or substitution aircraft identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID1 C 8  
Profile group identifier
- \* 4 PROF\_ID2 C 1  
Profile stage number
- \* 5 RWY\_ID C 8  
Runway end identifier
- \* 6 TRK\_ID1 C 8  
Track identifier
- \* 7 TRK\_ID2 C 1  
Sub-track identifier (0..8)
- 8 GROUP\_ID C 12  
User-defined aircraft group identifier
- 9 OPS\_DAY N 11.6  
Number of day operations  
Min= 0.0000 Max= 9999.9999
- 10 OPS\_EVE N 11.6  
Number of evening operations  
Min= 0.0000 Max= 9999.9999
- 11 OPS\_NIGHT N 11.6  
Number of night operations  
Min= 0.0000 Max= 9999.9999

**OPS\_FLT.DBF**

Flight Operations Table

- \* 1 ACFT\_ID C 12  
INM or substitution aircraft identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)
- \* 3 PROF\_ID1 C 8  
Profile group identifier
- \* 4 PROF\_ID2 C 1  
Profile stage number (1..9)
- \* 5 RWY\_ID C 8  
Runway end identifier
- \* 6 TRK\_ID1 C 8  
Track identifier
- 7 OPS\_DAY N 11.6  
Number of day operations  
Min= 0.000000 Max= 9999.999999
- 8 OPS\_EVE N 11.6  
Number of evening operations  
Min= 0.000000 Max= 9999.999999
- 9 OPS\_NIGHT N 11.6  
Number of night operations  
Min= 0.000000 Max= 9999.999999

**OPS\_HELO.DBF**

```

Brief_description_of_dbf
* 1 HELO_ID    C 12
    INM helicopter identifier
* 2 OP_TYPE    C 1
    Type of operation (A = Approach, D = Depart, T = Taxi, V = Overflight)
* 3 PROF_ID1   C 8
    Profile group identifier
* 4 PROF_ID2   C 1
    Profile stage number (1..9)
* 5 PAD_ID     C 8
    Heli pad identifier or OVF
* 6 TRK_ID1    C 8
    Track identifier
7 OPS_DAY      N 11.6
    Number of day operations
    Min= 0.000000 Max= 9999.999999
8 OPS_EVE      N 11.6
    Number of evening operations
    Min= 0.000000 Max= 9999.999999
9 OPS_NIGHT    N 11.6
    Number of night operations
    Min= 0.000000 Max= 9999.999999

```

**OPS\_RNUP.DBF**

```

Runup Operations Table
* 1 ACFT_ID    C 12
    INM aircraft identifier
* 2 RUNUP_ID   C 8
    Runup identifier
3 X_COORD      N 9.4
    X coordinate at runup position (nmi)
    Min= -999.0000 Max= 999.0000
4 Y_COORD      N 9.4
    Y coordinate at runup position (nmi)
    Min= -999.0000 Max= 999.0000
5 HEADING      N 5.1
    Aircraft heading (deg from true North)
    Min= 0.0 Max= 359.9
6 THR_SET      N 9.2
    Corrected net thrust per engine (lb, %, other)
    Min= 0.10 Max= 99999.00
7 DURATION     N 7.1
    Duration of runup event (seconds)
    Min= 0.0 Max= 86400.0
8 OPS_DAY      N 11.6
    Number of day operations
    Min= 0.0000 Max= 9999.9999
9 OPS_EVE      N 11.6
    Number of evening operations
    Min= 0.0000 Max= 9999.9999
10 OPS_NIGHT   N 11.6
    Number of night operations
    Min= 0.0000 Max= 9999.9999

```

### **OUTPUT.DBF**

Output Definition Table

- \* 1 OUTPUT\_ID C 40  
Subdirectory used to store the output files
- 2 METRIC\_ID C 6  
Metric identifier
- 3 OUT\_TYPE C 1  
Type or output (S = OneCase, D = Difference, A = LogAdd, M = Merge)
- 4 CASE\_ID1 C 40  
Case identifier (types S, D, A, and M)
- 5 CASE\_ID2 C 40  
Case identifier (types D, A, and M)
- 6 CASE\_ID3 C 40  
Case identifier (types A and M)
- 7 CASE\_ID4 C 40  
Case identifier (types A and M)
- 8 CASE\_ID5 C 40  
Case identifier (types A and M)
- 9 CONR\_MIN N 6.1  
Minimum contour level (dB or minutes)  
Min= -999.9 Max= 1440.0
- 10 CONR\_MAX N 6.1  
Maximum contour level (dB or minutes)  
Min= -999.9 Max= 1440.0
- 11 CONR\_INC N 6.1  
Increment level (dB or minutes)  
Min= 0.1 Max= 1440.0

### **PCT\_AREA.DBF**

Boundary Area Percentages

- 1 LEVEL N 6.1  
dB Level  
Min = -99.9 Max = 9999.9
- 2 CONR\_OK C 1  
Contour completely contained inside boundary? (Y = Yes, N = No)
- 3 BOUND\_OK C 1  
Boundary completely contained inside the contour grid? (Y = yes, N = No)
- 4 PCT\_BOUND N 6.2  
Percentage of the boundary covered by the contour  
Min = -99.00 Max = 100.00

### **POP\_CONR.DBF**

Contour Area and Population Table

- \* 1 LEVEL N 6.1  
Contour level (dB or minutes)  
Min= -99.9 Max= 9999.9
- 2 CONR\_OK C 1  
Contour completely contained inside grid boundary (Y, N)
- 3 POPULATION N 6.0  
Number of people inside all islands of this contour  
Min= 0 Max= 999999
- 4 SQ\_KM N 9.3  
Square kilometers inside all islands of this contour (km<sup>2</sup>)  
Min= 0.000 Max= 99999.999
- 5 SQ\_MILE N 9.3  
Square statute miles inside all islands of this contour (mi<sup>2</sup>)

```

        Min= 0.000 Max= 99999.999
6 M_SQ_FEET  N 9.2
    Millions of square feet inside all islands of this contour (M ft^2)
    Min= 0.00 Max= 999999.99
7 ACRES      N 9.1
    Acres inside all islands of this contour (acres)
    Min= 0.0 Max= 9999999.9

```

### **POP\_NOIS.DBF**

```

Population Point Noise Table
* 1 POINT_ID  C 15
    Point identifier (defined in POP_PTS)
2 METRIC      N 6.1
    Metric value (dB or minutes)
    Min= -99.9 Max= 9999.9

```

### **POP\_PTS.DBF**

```

Population Points Table -- US Census PL94-171 CD data
* 1 POINT_ID  C 15
    Point identifier (state + county + census block identifier)
2 LATITUDE    N 10.6
    Latitude of the center of the block (degrees)
    Min= -89.999999 Max= 89.999999
3 LONGITUDE   N 11.6
    Longitude of the center of the block (degrees)
    Min= -180.000000 Max= 180.000000
4 POPULATION  N 5.0
    Number of people in the census block
    Min= 0 Max= 99999
5 AREA_BLOCK  N 8.3
    Census block area (km^2) -- not used
    Min= 0.000 Max= 9999.999
6 LAND_USE    C 3
    User-defined land-use identifier (XXX) -- not used
7 DEF_COORD   C 1
    Default coordinates for GUI display only (Y = Latitude/Longitude in decimal
    degrees, N = X,Y in NMI)

```

### **PROCEDUR.DBF**

```

Procedure Steps Table -- procedural profiles
* 1 ACFT_ID    C 12
    Aircraft identifier
* 2 OP_TYPE    C 1
    Type of operation (A, D, T, F, V)
* 3 PROF_ID1   C 8
    Profile group identifier (STANDARD = INM standard data)
* 4 PROF_ID2   C 1
    Profile stage number (1..9)
* 5 STEP_NUM   N 2.0
    Step number of the procedure
    Min= 1 Max= 99
6 STEP_TYPE   C 1
    Type of step (T, C, A, M, V, S, D, L, B) see Appendix J
7 FLAP_ID     C 6
    Flap-setting identifier

```

```
8 THR_TYPE    C 1
    Type of thrust (T = MaxTakeoff, C = MaxClimb, N = MaxContinuous)
9 PARAM1      N 7.1
    Parameter for this step type (see User's Guide)
    Min= -9999.0 Max= 60000.0
10 PARAM2     N 5.1
    Parameter for this step type (see User's Guide)
    Min= 0.0 Max= 600.0
11 PARAM3     N 9.1
    Parameter for this step type (see User's Guide)
    Min= 0.0 Max= 9999999.9
```

### **PROC\_HELO.DBF**

```
    Helicopter procedure steps
* 1 HELO_ID    C 12
    Helicopter identifier
* 2 OP_TYPE    C 1
    Operation type (A = Approach, D = Departure, X = Taxi, V = Overflight)
* 3 PROF_ID1   C 8
    Profile identifier
* 4 PROF_ID2   C 1
    Stage length identifier (1..9)
* 5 STEP_NUM   N 2.0
    Step number
    Min = 1 Max = 99
6 STEP_TYPE    C 1
    Field_description
7 DURATION     N 7.1
    Field_description
8 DISTANCE     N 9.1
    Field_description
9 ALTITUDE     N 7.1
    Field_description
10 SPEED       N 5.1
    Ground speed on step(knots)
```

### **PROFILE.DBF**

```
    Profile Identification Table
* 1 ACFT_ID    C 12
    Aircraft identifier
* 2 OP_TYPE    C 1
    A = Approach, D = Depart, T = Touch&Go, F = CircuitFlt, V = OverFlt
* 3 PROF_ID1   C 8
    Profile group identifier (STANDARD = INM standard data)
* 4 PROF_ID2   C 1
    Profile stage number (1..9)
5 WEIGHT       N 7.0
    Aircraft weight during this operation (lb)
    Min= 0 Max= 999999
```

**PROF\_HELO.DBF**

Helicopter Profile Identifier Table

```

* 1 HELO_ID    C 12
    Helicopter identifier
* 2 OP_TYPE    C 1
    Operation type (A = Approach, D = Departure, X = Taxi, V = Overflight)
* 3 PROF_ID1   C 8
    Profile identifier
* 4 PROF_ID2   C 1
    Stage length identifier (1..9)
5 WEIGHT      N 7.0
    Profile weight (pounds)
    Min = 0 Max = 999999
6 USE_DIREC   C 1
    Use directivity (Y = Yes, N = No)
7 USE_TRACK   C 1
    Use track (Y = Yes, N = No) Static heading is relative to track
8 HDG_TK_GND  N 6.1
    Takeoff ground heading (degrees)
    Min = -180.0 Max = 360.0
9 HDG_TK_HOV  N 6.1
    Takeoff hover heading (degrees)
    Min = -180.0 Max = 360.0
10 HDG_LD_GND N 6.1
    Land ground heading (degrees)
    Min = -180.0 Max = 360.0
11 HDG_LD_HOV N 6.1
    Land hover heading (degrees)
    Min = -180.0 Max = 360.0

```

**PROF\_PTS.DBF**

Profile Points Table -- fixed-point profiles

```

* 1 ACFT_ID    C 12
    Aircraft identifier
* 2 OP_TYPE    C 1
    Type of operation (A, D, T, F, V)
* 3 PROF_ID1   C 8
    Profile group identifier (STANDARD = INM standard data)
* 4 PROF_ID2   C 1
    Profile stage number (1..9)
* 5 PT_NUM     N 3.0
    Point number of the profile
    Min= 1 Max= 999
6 DISTANCE    N 10.1
    Distance along the ground relative to start (ft)
    Min= -9999999.9 Max= 9999999.9
7 ALTITUDE    N 7.1
    Altitude of aircraft AFE (ft)
    Min= -9999.0 Max= 60000.0
8 SPEED       N 5.1
    Ground speed at this point (knots)
    Min= 0.0 Max= 600.0
9 THR_SET     N 9.2
    Corrected net thrust per engine at this point (lb, %, other)
    Min= 0.10 Max= 99999.00
10 OP_MODE    C 1
    Operational mode (A, D, X)

```

### **RUNWAY.DBF**

Runway Identifier Table

- \* 1 RWY\_ID1 C 8  
Runway end identifier
- \* 2 RWY\_ID2 C 8  
Runway end identifier
- 3 APRT\_ID C 4  
Airport identifier
- 4 WIDTH N 3.0  
Physical runway width (ft)  
Min= 0 Max= 500
- 5 IS\_RWY C 1  
Y = Runway, N = Helipad

### **RWY\_END.DBF**

Runway End Table

- \* 1 RWY\_ID C 8  
Runway end identifier
- 2 X\_COORD N 9.4  
X coordinate of end (nmi)  
Min= -999.0000 Max= 999.0000
- 3 Y\_COORD N 9.4  
Y coordinate of end (nmi)  
Min= -999.0000 Max= 999.0000
- 4 ELEVATION N 6.1  
Elevation of end MSL (ft)  
Min= -500.0 Max= 9999.9
- 5 DIS\_TH\_TKO N 4.0  
Takeoff displaced threshold (ft)  
Min= 0 Max= 9999
- 6 DIS\_TH\_APP N 4.0  
Approach displaced threshold (ft)  
Min= 0 Max= 9999
- 7 GLIDE\_SL N 3.1  
Glide slope for runway end (deg)  
Min= 0.0 Max= 9.9
- 8 TH\_CR\_HGT N 5.1  
Approach threshold crossing height AGL (ft)  
Min= 0.0 Max= 100.0
- 9 PCT\_WIND N 6.1  
Percent change (%) in airport average headwind  
Min= -500.0 Max= 500.0
- 10 DEF\_COORD C 1  
Default coordinates for GUI display only (Y = Latitude/Longitude in decimal degrees, N = X,Y in NMI)

### **SCENARIO.DBF**

Brief\_description\_of\_dbf

- 1 SCEN\_ID C 40  
Scenario identifier (subdirectory under the study directory)
- 2 SCEN\_DESC C 80  
Scenario description
- 3 DATE C 15  
Date and time that the subdirectory was created
- 4 RUN\_TYPE C 1  
Type of run (S = SingleMetric, M = MultiMetric)
- 5 FREQ\_TYPE C 1

Type of frequency weighting (A, P)

6 METRIC\_ID C 6  
Noise metric identifier for single-metric run

7 DO\_CONTOUR C 1  
Contours computed (Y, N)

8 DO\_GRD\_STD C 1  
Standard grid analysis (Y, N)

9 DO\_GRD\_DTL C 1  
Standard & detailed grid analysis (Y, N)

10 DO\_100PCT C 1  
Output 100% of flights in detailed analysis (Y, N)

11 DO\_POP\_PTS C 1  
Population points computed (Y, N)

12 DO\_LOC\_PTS C 1  
Location points computed (Y, N)

13 RS\_REFINE N 2.0  
Maximum number of refinement levels for subdividing grid  
Min= 4 Max= 18

14 RS\_TOLER N 5.2  
Tolerance test value used in the subdivided grid method (dB)  
Min= 0.01 Max= 10.00

15 CUTOFF\_LOW N 6.1  
Low cutoff for SingleMetric noise calculation (dB or minutes)  
Min= 0.0 Max= 1440.0

16 CUTOFF\_HI N 6.1  
High cutoff for SingleMetric noise calculation (dB or minutes)  
Min= 1.0 Max= 1440.0

17 RUN\_DATE C 15  
Date and time that the case was last run

18 RUN\_DURATN C 10  
Execution time for the Noise Calculation Program for the last run

19 DO\_TERRAIN C 1  
Terrain elevation calculation (Y, N)

20 GROUND\_TYP C 1  
Type of ground resistivity (S = Soft, H = Hard, F = File, N = None)

21 DO\_DNL C 1  
Day-Night Level (Y, N)

22 DO\_CNEL C 1  
Community Noise Equivalent Level (Y, N)

23 DO\_LAEQ C 1  
Equivalent A-Level for 24h (Y, N)

24 DO\_LAEQD C 1  
Equivalent A-Level for Day 0700-2200 (Y, N)

25 DO\_LAEQN C 1  
Equivalent A-Level for Night 2200-0700 (Y, N)

26 DO\_SEL C 1  
Sound Exposure Level (Y, N)

27 DO\_LAMAX C 1  
Maximum A-Level (Y, N)

28 DO\_TALA C 1  
Time-Above an A-level threshold (Y, N)

29 DO\_NEF C 1  
Noise Exposure Forecast (Y, N)

30 DO\_WECPNL C 1  
Weighted Equivalent Continuous Perceived Noise Level (Y, N)

31 DO\_EPNL C 1  
Effective Perceived Noise Level (Y, N)

32 DO\_PNLTM C 1  
Maximum perceived noise level (Y, N)

33 DO\_TAPNL C 1  
Time-Above a perceived level threshold (Y, N)

34 DO\_CEXP C 1  
C-weighted exposure level (Y, N)  
35 DO\_LCMAX C 1  
Maximum C-level (Y, N)  
36 DO\_TALC C 1  
Time-Above a C-level threshold (Y, N)  
37 TERR\_ELEV N 5.0  
Include terrain blocking effects in noise calculations (Y, N)  
38 DO\_RECURSV C 1  
Use a recursive grid for noise calculations (Y, N)  
39 BANK\_ANGLE C 1  
Include aircraft banking effects in noise calculations (Y, N)  
40 DEFINE\_REF C 1  
Signals that the refinement value is to be used to calculate grid spacing  
(Y, N)  
41 SPACING N 7.1  
Defines the grid spacing (ft)  
Min= 0 Max = 99999.9

**SCEN\_LOG.DBF**

Log of all cases in a scenario.  
1 CASE\_ID C 30  
Case identifier (subdirectory under the study directory)  
2 CASE\_DESC C 80  
Case description  
3 DATE C 15  
Date and time that the subdirectory was created  
4 TEMPERATUR C 5  
Average temperature on the airport runways (deg F)  
Min= -30.0 Max= 120.0  
5 PRESSURE C 6  
Average atmospheric pressure on the airport runways (in-Hg)  
Min= 27.00 Max= 33.00  
6 DO\_HUMID C 1  
Use ARP866A atmospheric absorption (Y, N)  
7 HUMIDITY C 5  
Average relative humidity on the airport runways (%)  
Min= 0.0 Max= 100.0  
8 HEADWIND C 4  
Average headwind on the airport runways (knots)  
Min= -9.9 Max= 40.0  
9 RUN\_DATE C 15  
Last execution date

**SCEN\_OPS\_CALC.DBF**

\* 1 ACFT\_ID C 12  
INM or substitution aircraft identifier  
\* 2 OP\_TYPE C 1  
Type of operation (A, D, T, F, V)  
\* 3 PROF\_ID1 C 8  
Profile group identifier  
\* 4 PROF\_ID2 C 1  
Profile stage number  
\* 5 RWY\_ID C 8  
Runway end identifier  
\* 6 TRK\_ID1 C 8  
Track identifier

```
* 7 TRK_ID2    C 1
      Sub-track identifier (0..8)
  8 GROUP_ID   C 12
      User-defined aircraft group identifier
  9 OPS_DAY    N 11.6
      Number of day operations
      Min= 0.0000 Max= 9999.9999
 10 OPS_EVE    N 11.6
      Number of evening operations
      Min= 0.0000 Max= 9999.9999
 11 OPS_NIGHT  N 11.6
      Number of night operations
      Min= 0.0000 Max= 9999.9999
```

### **SCEN\_PAR.DBF**

```
Scenario parameter table
 1 CASE_ID    C 40
      Case identifier (subdirectory under the study directory)
 2 PERCENT    N 8.4
      Annualization percentage factor for this case
 3 SCALE      N 7.4
      Annualization scaling factor for this case
 4 UPDATED    C 1
      Has been updated since the last computation (Y, N)
```

### **SCR\_NOIS.DBF**

```
Screening noise
 1 POINT_ID   C 8
      Point identifier
 2 RESULT     C 1
      Ambient noise data is required for this point (Y, N)
```

### **SCR\_PTS.DBF**

```
Screening points
 1 POINT_ID   C 8
      Point identifier
 2 LATITUDE   N 10.6
      Point latitude (deg)
 3 LONGITUDE  N 11.6
      Point longitude (deg)
```

### **SYS\_APRT.DBF**

```
System Airport Table -- NFDC data
* 1 APRT_ID   C 4
      Airport identifier
 2 NAME       C 25
      City/airport name
 3 STATE      C 2
      U.S. state
 4 LATITUDE   N 10.6
      Latitude of airport reference point (degrees)
      Min= -89.999999 Max= 89.999999
 5 LONGITUDE  N 11.6
```

Longitude of airport reference point (degrees)  
Min= -180.000000 Max= 180.000000  
6 ELEVATION N 4.0  
Elevation of highest point on any runway MSL (ft)  
Min= -500 Max= 9999  
7 PATTRN\_ALT N 4.0  
Pattern altitude AFE (ft)  
Min= 0 Max= 5000  
8 YR\_OPS\_ALL N 6.0  
Yearly operations (Commercial + GenAviation + Military)  
Min= 0 Max= 999999

### **SYS\_RWY.DBF**

System Runway Table -- NFDC data  
\* 1 APRT\_ID C 4  
Airport identifier  
2 RWY\_LENGTH N 5.0  
Physical runway length (ft)  
Min= 0 Max= 30000  
3 RWY\_WIDTH N 3.0  
Physical runway width (ft)  
Min= 0 Max= 500  
\* 4 A\_RWY\_ID C 8  
Runway identifier for end A  
5 A\_LAT N 10.6  
Latitude of end A (degrees)  
Min= -89.999999 Max= 89.999999  
6 A\_LONG N 11.6  
Longitude of end A (degrees)  
Min= -180.000000 Max= 180.000000  
7 A\_ELEVATN N 6.1  
Elevation of end A MSL (ft)  
Min= -500.0 Max= 9999.9  
8 A\_DIS\_APP N 4.0  
Approach displaced threshold for end A (ft from end)  
Min= 0 Max= 9999  
9 A\_GLIIDE\_SL N 3.1  
Glide slope for end A (deg)  
Min= 0.0 Max= 9.9  
10 A\_TCH N 5.1  
Threshold crossing height at end A AGL (ft)  
Min= 0.0 Max= 100.0  
\*11 B\_RWY\_ID C 8  
Runway identifier for end B  
12 B\_LAT N 10.6  
Latitude of end B (degrees)  
Min= -89.999999 Max= 89.999999  
13 B\_LONG N 11.6  
Longitude of end B (degrees)  
Min= -180.000000 Max= 180.000000  
14 B\_ELEVATN N 6.1  
Elevation of end B MSL (ft)  
Min= -500.0 Max= 9999.9  
15 B\_DIS\_APP N 4.0  
Approach displaced threshold for end B (ft from end)  
Min= 0 Max= 9999  
16 B\_GLIIDE\_SL N 3.1  
Glide slope for end B (deg)  
Min= 0.0 Max= 9.9

17 B\_TCH N 5.1  
 Threshold crossing height for end B AGL (ft)  
 Min= 0.0 Max= 100.0

**THR\_GNRL.DBF**

General Thrust Table -- convert EPR or N1 to pounds thrust

\* 1 ACFT\_ID C 12  
 Aircraft identifier

2 GNRL\_TYPE C 1  
 Type of generalized thrust-setting (E = EPR, N = N1)

3 COEFF\_E N 9.1  
 Corrected net thrust per engine coefficient (lb)  
 Min= -199999.9 Max= 99999.9

4 COEFF\_F N 10.5  
 Speed adjustment coefficient (lb/knot TAS sea level 59F)  
 Min= -200.00000 Max= 1.00000

5 COEFF\_GA C 20  
 Altitude adjustment coefficient (lb/ft MSL)

6 COEFF\_GB C 20  
 Altitude-squared adjustment coefficient (lb/ft<sup>2</sup> MSL)

7 COEFF\_H C 10  
 Temperature adjustment coefficient (lb/degC)

8 COEFF\_K1 C 12  
 EPR or N1/sqrt(theta) adjustment coefficient (lb/EPR)

9 COEFF\_K2 C 12  
 EPR- or N1/sqrt(theta)-squared adjustment coefficient (lb/EPR<sup>2</sup>)

**THR\_JET.DBF**

Jet Thrust Table -- engine coefficients

\* 1 ACFT\_ID C 12  
 Aircraft identifier

\* 2 THR\_TYPE C 1  
 T = MaxTkoff, S = HiTempTkoff, C = MaxClimb, B = HiTempClim,  
 N = MaxCont, M = HiTempCont

3 COEFF\_E N 8.1  
 Corrected net thrust per engine coefficient (lb)  
 Min= 0.0 Max= 99999.9

4 COEFF\_F N 10.5  
 Speed adjustment coefficient (lb/knot TAS sea level 59F)  
 Min= -200.00000 Max= 1.00000

5 COEFF\_GA C 20  
 Altitude adjustment coefficient (lb/ft MSL)

6 COEFF\_GB C 20  
 Altitude-squared adjustment coefficient (lb/ft<sup>2</sup> MSL)

7 COEFF\_H C 10  
 Temperature adjustment coefficient (lb/degC)

**THR\_PROP.DBF**

Propeller Thrust Table -- engine coefficients

\* 1 ACFT\_ID C 12  
 Aircraft identifier

\* 2 THR\_TYPE C 1  
 Type of thrust (T = MaxTakeoff, C = MaxClimb)

3 EFFICIENCY N 4.2  
 Propeller efficiency ratio  
 Min= 0.50 Max= 1.00

4 POWER N 6.1  
Net propulsive power per engine (hp) for this type of thrust  
Min= 0.0 Max= 9999.9

**TRACK.DBF**

Track Identifier Table

- \* 1 RWY\_ID C 8  
Runway end identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, V)
- \* 3 TRK\_ID1 C 8  
Track identifier
- \* 4 TRK\_ID2 C 1  
Sub-track identifier (0..8) 0 = backbone track
- 5 PERCENT N 6.2  
Percent of dispersed track operations on this sub-track  
Min= 0.10 Max= 100.00
- 6 TRK\_TYPE C 1  
Type of track (V = Vectors, P = Points)
- 7 DISTANCE N 6.1  
Delta distance from nominal start-roll or touch-down point (ft)  
Min= -999.9 Max= 9999.9

**TRK\_SEGS.DBF**

Track Segments Table

- \* 1 RWY\_ID C 8  
Runway end identifier
- \* 2 OP\_TYPE C 1  
Type of operation (A, D, T, V)
- \* 3 TRK\_ID1 C 8  
Track identifier
- \* 4 TRK\_ID2 C 1  
Sub-track identifier (0..8)
- \* 5 SEG\_NUM N 3.0  
Segment or point number of the track  
Min= 1 Max= 999
- 6 SEG\_TYPE C 1  
Type of track segment (S = Straight, L = Left, R = Right, P = Point)
- 7 PARAM1 N 9.4  
Parameter S= distance(nmi), L/R= angle(deg), P= x-coord(nmi)  
Min= -999.0000 Max= 999.0000
- 8 PARAM2 N 9.4  
Parameter S= (blank), L/R= radius(nmi), P= y-coord(nmi)  
Min= -999.0000 Max= 999.0000

## F INM STANDARD DATA

This Appendix documents the INM standard database. The *DBF* files that are contained in the standard database are listed below, including an indication as to whether the printed files are complete or not.

ACFT_SUB.DBF	Complete
AIRCRAFT.DBF	Complete
DIRECTIVITY.DBF	Complete
FLAPS.DBF	Partial
HELICOPTER.DBF	Partial
HELO_NOIS_GRP.DBF	Complete
METRIC.DBF	Complete
MILACFT.DBF	Complete
MILNOIS_GRP.DBF	Complete
MILNPD_CURV.DBF	Partial
MILPROFPTS.DBF	Partial
MILPROFILE.DBF	Partial
NOIS_GRP.DBF	Complete
NPD_CURV.DBF	Partial
NPD_HELO.DBF	Partial
PROC_HELO.DBF	Partial
PROCEDUR.DBF	Partial
PROF_HELO.DBF	Complete
PROF_PTS.DBF	Partial
PROFILE.DBF	Partial
THR_GNRL.DBF	Complete
THR_JET.DBF	Partial
THR_PROP.DBF	Complete

## F.1 Acft\_sub.dbf

File: acft\_sub.dbf

Last update: 20 Feb 2007 15:00:49

Fields(12):

```

1 SUB_ID          C 12
2 SUB_DESCR       C 40
3 ACFT_ID1        C 12
4 PERCENT1        N 5.1
5 ACFT_ID2        C 12
6 PERCENT2        N 5.1
7 ACFT_ID3        C 12
8 PERCENT3        N 5.1
9 ACFT_ID4        C 12
10 PERCENT4       N 5.1
11 ACFT_ID5       C 12
12 PERCENT5       N 5.1

```

Records(259)

717	, BOEING 717-200 (MD-95) 114000 LBS	, 717200	, 100.0	, -NONE-	, 0.0						
737215	, 737-200 ADV w/JT15QN	, 737D17	, 100.0	, -NONE-	, 0.0						
737222	, Boeing 737-222	, 737QN	, 100.0	, -NONE-	, 0.0						
747122	, Boeing 747-122	, 74720A	, 100.0	, -NONE-	, 0.0						
7073SH	, 707-300 ADV/C w/Shannon H/K	, 707QN	, 100.0	, -NONE-	, 0.0						
707C56	, 707 w/CFM56	, DC870	, 100.0	, -NONE-	, 0.0						
717ER	, BOEING 717-200 (MD-95) 121000 LBS	, 717200	, 100.0	, -NONE-	, 0.0						
720TU	, B720 Turbojet	, DC820	, 100.0	, -NONE-	, 0.0						
727RR1	, 727-100 with RR TAY 650 eng.	, 727EM1	, 100.0	, -NONE-	, 0.0						
727RR2	, 727-200 with RR TAY 650 eng.	, 727EM2	, 100.0	, -NONE-	, 0.0						
73717A	, 737-100 w/JT8D-7A	, 737QN	, 100.0	, -NONE-	, 0.0						
7472G2	, 747-200 w/JT9D-7R4G2	, 747200	, 100.0	, -NONE-	, 0.0						
7473G2	, 747-300 w/JT9D-7R4G2	, 74720B	, 100.0	, -NONE-	, 0.0						
747R21	, 747 w/CF6 or RB211 engines	, 74720B	, 100.0	, -NONE-	, 0.0						
A321	, Airbus A-321	, A320-211	, 100.0	, -NONE-	, 0.0						
AA5A	, Grumman Cheetah (AA5A)	, GASEPF	, 100.0	, -NONE-	, 0.0						
AC50	, Commander 500	, BEC58P	, 100.0	, -NONE-	, 0.0						
AC56	, Commander 560	, BEC58P	, 100.0	, -NONE-	, 0.0						
AC69	, Jet Prop Commander	, CNA441	, 100.0	, -NONE-	, 0.0						
AC95	, Aero Commander 695	, CNA441	, 100.0	, -NONE-	, 0.0						
AEROJT	, Aero Commander Jet Commander	, LEAR25	, 100.0	, -NONE-	, 0.0						
AN124	, Antonov-124	, 74720B	, 100.0	, -NONE-	, 0.0						
AN26	, Antonov-26	, CVR580	, 100.0	, -NONE-	, 0.0						
AN74TK	, Antonov-74	, DC9Q9	, 100.0	, -NONE-	, 0.0						
ATR42	, Avions de Transport Regional ATR-42	, DHC8	, 100.0	, -NONE-	, 0.0						
ATR72	, Avions de Transport Regional ATR-72	, HS748A	, 100.0	, -NONE-	, 0.0						
BAEATP	, British Aerospace Advanced Turboprop ATP	, HS748A	, 100.0	, -NONE-	, 0.0						
BAEJ31	, British Aerospace BAe Jetsream 31	, DHC6	, 100.0	, -NONE-	, 0.0						
BAEJ41	, British Aerospace BAe Jetstream 41	, SF340	, 100.0	, -NONE-	, 0.0						
BEC100	, Beech King Air 100	, CNA441	, 100.0	, -NONE-	, 0.0						
BEC18	, Beechcraft Model 18	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC190	, Beech 1900	, 1900D	, 100.0	, -NONE-	, 0.0						

BEC200	, Beech Super King Air 200	, DHC6	, 100.0	, -NONE-	, 0.0						
BEC20A	, Beech Starship 2000	, SD330	, 100.0	, -NONE-	, 0.0						
BEC23	, Beechcraft Model 23 Musketeer	, GASEPF	, 100.0	, -NONE-	, 0.0						
BEC24	, Beechcraft Model 24 Sierra	, GASEPF	, 100.0	, -NONE-	, 0.0						
BEC300	, Beech Super King Air 300	, DHC6	, 100.0	, -NONE-	, 0.0						
BEC30B	, Beech Super King Air 300B	, DHC6	, 100.0	, -NONE-	, 0.0						
BEC33	, Beechcraft Model 33 Debonair/Bonanza	, GASEPV	, 100.0	, -NONE-	, 0.0						
BEC400	, Beechcraft Beechjet 400	, MU3001	, 100.0	, -NONE-	, 0.0						
BEC45	, Beechcraft Model 45 Mentor (T34A & T34B)	, GASEPV	, 100.0	, -NONE-	, 0.0						
BEC50	, Beechcraft Model 50 Twin Bonanza	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC55	, Beechcraft Model 55 Barron	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC58	, Beechcraft Model 58 Barron	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC60	, Beechcraft Model 60 Duke	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC65	, Beechcraft Model 65 Queen Air	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC76	, Beechcraft Model 76 Duchess	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC80	, Beechcraft Model Queen Air 80 series	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC90	, Beech King Air C90	, CNA441	, 100.0	, -NONE-	, 0.0						
BEC95	, Beechcraft Model 95 Travel Air	, BEC58P	, 100.0	, -NONE-	, 0.0						
BEC99	, Beech Airliner Model 99	, DHC6	, 100.0	, -NONE-	, 0.0						
BEC9F	, Beech F90 Super King Air	, CNA441	, 100.0	, -NONE-	, 0.0						
BECM35	, Beechcraft Model M35 Bonanza	, GASEPV	, 100.0	, -NONE-	, 0.0						
BL14	, Bellanca Cruisair	, GASEPF	, 100.0	, -NONE-	, 0.0						
BL26	, Bellanca Super Viking Model 17-30A	, GASEPF	, 100.0	, -NONE-	, 0.0						
BLCH10	, Bellanca Champion Citabria CH10	, GASEPF	, 100.0	, -NONE-	, 0.0						
BN2A	, Britten-Norman BN-2A Islander	, BEC58P	, 100.0	, -NONE-	, 0.0						
BN3	, Britten-Norman BN-3 Nymph	, GASEPF	, 100.0	, -NONE-	, 0.0						
CL141	, Lockheed C-141 Starlifter	, 707320	, 100.0	, -NONE-	, 0.0						
C17A	, Globemaster III C-17	, DC870	, 100.0	, -NONE-	, 0.0						
C20	, US Military Gulfstream III	, GIIB	, 100.0	, -NONE-	, 0.0						
C20A	, US Military Gulfstream III	, GIIB	, 100.0	, -NONE-	, 0.0						
C26	, Military Metro/Merlin	, DHC6	, 100.0	, -NONE-	, 0.0						
C45	, Military Twin Beech 18	, BEC58P	, 100.0	, -NONE-	, 0.0						
C5	, Lockheed Galaxy	, 74720B	, 100.0	, -NONE-	, 0.0						
C8	, US Army DHC-5 Buffalo	, HS748A	, 100.0	, -NONE-	, 0.0						
C9B	, Navy DC9-30 SkyTrain	, DC9Q9	, 100.0	, -NONE-	, 0.0						
CA212	, CASA C-212 Aviocar	, DHC6	, 100.0	, -NONE-	, 0.0						
CAN235	, CACA-Nurtanio CN-235 Airtech	, SF340	, 100.0	, -NONE-	, 0.0						
CC138	, Canadian Air Force DHC-6 Twin Otter	, DHC6	, 100.0	, -NONE-	, 0.0						
CL610	, Canadair CL-610 Challenger E	, CL601	, 100.0	, -NONE-	, 0.0						
CLREGJ	, Canadair Regional Jet	, CL601	, 100.0	, -NONE-	, 0.0						
CNA150	, Cessna 150	, CNA172	, 100.0	, -NONE-	, 0.0						
CNA152	, Cessna 152	, CNA172	, 100.0	, -NONE-	, 0.0						
CNA170	, Cessna 170	, CNA172	, 100.0	, -NONE-	, 0.0						
CNA177	, Cessna 177 Cardinal	, CNA172	, 100.0	, -NONE-	, 0.0						
CNA17B	, Cessna 177B or RG Cardinal	, GASEPV	, 100.0	, -NONE-	, 0.0						
CNA180	, Cessna Skywagon	, CNA206	, 100.0	, -NONE-	, 0.0						
CNA182	, Cessna 182 Skylane	, CNA206	, 100.0	, -NONE-	, 0.0						
CNA185	, Cessna Skywagon	, CNA206	, 100.0	, -NONE-	, 0.0						
CNA205	, Cessna 205 Super Skywagon	, CNA206	, 100.0	, -NONE-	, 0.0						
CNA207	, Cessna 207 Turbo Stationair	, CNA20T	, 100.0	, -NONE-	, 0.0						
CNA208	, Cessna 208 Caravan I	, GASEPF	, 100.0	, -NONE-	, 0.0						
CNA210	, Cessna 210 Centurion/II	, CNA206	, 100.0	, -NONE-	, 0.0						
CNA303	, Cessna 303 Crusader	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA305	, Cessna 305/L-19 or O-1 Bird Dog	, GASEPF	, 100.0	, -NONE-	, 0.0						

CNA310	, Cessna 310	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA320	, Cessna 320 Skynight	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA335	, Cessna 335	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA336	, Cessna 336 Skymaster	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA337	, Cessna 337 Super Skymaster	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA340	, Cessna 340	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA401	, Cessna 401	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA402	, Cessna 402	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA404	, Cessna 404 Titan	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA414	, Cessna 414 Chancellor	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA421	, Cessna 421 Golden Eagle	, BEC58P	, 100.0	, -NONE-	, 0.0						
CNA425	, Cessna 425 Corsair/Conquest I	, CNA441	, 100.0	, -NONE-	, 0.0						
CNA501	, Cessna Citation I Single Pilot (SP)	, CNA500	, 100.0	, -NONE-	, 0.0						
CNA525	, Cessna Citation Jet	, CNA500	, 100.0	, -NONE-	, 0.0						
CNA550	, Cessna Model 550 Citation II	, MU3001	, 100.0	, -NONE-	, 0.0						
CNA551	, Cessna Citation II Single Pilot (SP)	, MU3001	, 100.0	, -NONE-	, 0.0						
CNA560	, Cessna 560 Citation V	, MU3001	, 100.0	, -NONE-	, 0.0						
CNA650	, Cessna 650 Citation VII	, CIT3	, 100.0	, -NONE-	, 0.0						
CNACAR	, Cessna AGCARRYALL	, GASEPV	, 100.0	, -NONE-	, 0.0						
CNATRK	, Cessna AGTRUCK	, GASEPV	, 100.0	, -NONE-	, 0.0						
CNAWAG	, Cessna AGWAGON	, GASEPV	, 100.0	, -NONE-	, 0.0						
CNV240	, Convair 240	, DC3	, 100.0	, -NONE-	, 0.0						
CNV600	, Convair 600	, HS748A	, 100.0	, -NONE-	, 0.0						
CNV640	, Convair 640	, HS748A	, 100.0	, -NONE-	, 0.0						
CNV880	, Convair 880	, DC820	, 100.0	, -NONE-	, 0.0						
CNV990	, Convair 990	, 707	, 100.0	, -NONE-	, 0.0						
CONSTE	, Lockheed Constellation	, DC6	, 100.0	, -NONE-	, 0.0						
CRJ701	, Canadair CRJ701	, GV	, 100.0	, -NONE-	, 0.0						
CRJ900	, Canadair CRJ900	, GV	, 100.0	, -NONE-	, 0.0						
DALPHA	, Dassault Alpha Jet	, FAL20	, 100.0	, -NONE-	, 0.0						
DBMERC	, Dassault Mercure	, 737D17	, 100.0	, -NONE-	, 0.0						
DC4	, Douglas DC-4	, DC6	, 100.0	, -NONE-	, 0.0						
DC7	, Douglas DC-7	, DC6	, 100.0	, -NONE-	, 0.0						
DC86BT	, DC8-62/63 w/Burbank Treatment	, DC8QN	, 100.0	, -NONE-	, 0.0						
DC9317	, DC930 w/JT8D-17 &15	, DC9Q9	, 100.0	, -NONE-	, 0.0						
DC937A	, DC930 w/JT8D-7 & 7A	, DC9Q9	, 100.0	, -NONE-	, 0.0						
DC9411	, DC940 w/JT8D-11	, DC9Q9	, 100.0	, -NONE-	, 0.0						
DHC2	, De Havilland DHC-2 Beaver	, GASEPV	, 100.0	, -NONE-	, 0.0						
DHC4	, De Havilland DHC-4 Caribou	, DC3	, 100.0	, -NONE-	, 0.0						
DO228	, Dornier-228	, DHC6	, 100.0	, -NONE-	, 0.0						
DO328	, Dornier-328	, DHC8	, 100.0	, -NONE-	, 0.0						
EMB110	, Embraer Bandeirante 110	, DHC6	, 100.0	, -NONE-	, 0.0						
EMB135	, Embraer EMB-135	, EMB145	, 100.0	, -NONE-	, 0.0						
EMB140	, Embraer EMB-140	, EMB145	, 100.0	, -NONE-	, 0.0						
EMB170	, Embraer EMB-170	, GV	, 100.0	, -NONE-	, 0.0						
EMB190	, Embraer EMB-190	, GV	, 100.0	, -NONE-	, 0.0						
F10	, Douglas Skyknight	, LEAR25	, 100.0	, -NONE-	, 0.0						
F90	, Beech Super King Air	, CNA441	, 100.0	, -NONE-	, 0.0						
FAL10	, Falcon 10	, LEAR35	, 100.0	, -NONE-	, 0.0						
FAL200	, Falcon 200	, LEAR35	, 100.0	, -NONE-	, 0.0						
FAL20A	, Falcon 2000	, CL600	, 100.0	, -NONE-	, 0.0						
FH227	, Fairchild-Hiller F-227 (Fokker 27 Elong)	, HS748A	, 100.0	, -NONE-	, 0.0						
FH27	, Fairchild-Hiller F-27 (Fokker 27)	, HS748A	, 100.0	, -NONE-	, 0.0						
FK27	, Fokker F.27	, HS748A	, 100.0	, -NONE-	, 0.0						

FK50	, Fokker 50	, DHC830	, 100.0	, -NONE-	, 0.0						
FK70	, Fokker 70	, F10062	, 100.0	, -NONE-	, 0.0						
G164AG	, GrummanAmerican Super Agcat	, GASEPV	, 100.0	, -NONE-	, 0.0						
GA7	, Grumman Cougar (GA7)	, BEC58P	, 100.0	, -NONE-	, 0.0						
GC1	, Vought Swift	, GASEPF	, 100.0	, -NONE-	, 0.0						
GROB15	, Burkhardt Grob G 115	, GASEPF	, 100.0	, -NONE-	, 0.0						
GSPORT	, Great Lakes Sport	, GASEPF	, 100.0	, -NONE-	, 0.0						
GULF1	, Gulfstream I (G159)	, HS748A	, 100.0	, -NONE-	, 0.0						
GULF2	, Gulfstream II	, GII	, 100.0	, -NONE-	, 0.0						
GULF3	, Gulfstream III	, GIIB	, 100.0	, -NONE-	, 0.0						
GULFCO	, Gulfstream Commander	, CNA441	, 100.0	, -NONE-	, 0.0						
HS125	, Hawker-Siddeley 125	, LEAR25	, 100.0	, -NONE-	, 0.0						
HS1258	, Bae (Hawker-Siddeley) 125-800	, LEAR35	, 100.0	, -NONE-	, 0.0						
IA1123	, IAI 1123 Westwind	, LEAR25	, 100.0	, -NONE-	, 0.0						
IA1124	, IAI 1124 Westwind	, IA1125	, 100.0	, -NONE-	, 0.0						
IARAVA	, IAI Arava	, DHC6	, 100.0	, -NONE-	, 0.0						
IL114	, Ilyushin-114	, CVR580	, 100.0	, -NONE-	, 0.0						
IL62	, Ilyushin-62	, 707QN	, 100.0	, -NONE-	, 0.0						
IL76	, Ilyushin-76	, DC8QN	, 100.0	, -NONE-	, 0.0						
IL86	, Ilyushin-86	, DC8QN	, 100.0	, -NONE-	, 0.0						
IL96	, Ilyushin-96	, 747200	, 100.0	, -NONE-	, 0.0						
JST1TF	, Jetstar 1 Turbofan	, LEAR35	, 100.0	, -NONE-	, 0.0						
JST1TJ	, Jetstar 1 Turbojet	, LEAR25	, 100.0	, -NONE-	, 0.0						
JST2TF	, Lockheed Jetstar 2	, LEAR35	, 100.0	, -NONE-	, 0.0						
KC135E	, Boeing KC135 Stratotanker (Re-engined)	, 707320	, 100.0	, -NONE-	, 0.0						
LA42	, Lake LA-4-200 Buccaneer	, GASEPV	, 100.0	, -NONE-	, 0.0						
LEAR23	, Learjet 23	, LEAR25	, 100.0	, -NONE-	, 0.0						
LEAR24	, Learjet 24	, LEAR25	, 100.0	, -NONE-	, 0.0						
LEAR31	, Learjet 31	, LEAR35	, 100.0	, -NONE-	, 0.0						
LEAR36	, Learjet 36	, LEAR35	, 100.0	, -NONE-	, 0.0						
LEAR45	, Learjet 45	, LEAR35	, 100.0	, -NONE-	, 0.0						
LEAR55	, Learjet 55	, LEAR35	, 100.0	, -NONE-	, 0.0						
LEAR60	, Learjet 60	, LEAR35	, 100.0	, -NONE-	, 0.0						
LOADMS	, Ayres LoadMaster	, SD330	, 100.0	, -NONE-	, 0.0						
M20J	, Mooney 201LM and 205 (M20J)	, GASEPV	, 100.0	, -NONE-	, 0.0						
M20K	, Mooney 252TSE (M20K)	, GASEPV	, 100.0	, -NONE-	, 0.0						
M20L	, Mooney Pegasus (M20L)	, GASEPV	, 100.0	, -NONE-	, 0.0						
MB339C	, AerMacchi M.B. 339-C	, A7D	, 100.0	, -NONE-	, 0.0						
MD80	, McDonnell-Douglas MD80	, MD81	, 100.0	, -NONE-	, 0.0						
MD87	, McDonnell-Douglas MD87	, MD81	, 100.0	, -NONE-	, 0.0						
MD88	, McDonnell-Douglas MD88	, MD83	, 100.0	, -NONE-	, 0.0						
MD8819	, MD88 w/JT8D-119	, MD81	, 100.0	, -NONE-	, 0.0						
MU2	, Mitsubishi MU-2	, DHC6	, 100.0	, -NONE-	, 0.0						
MU300	, Mitsubishi Diamond MU-300	, CNA500	, 100.0	, -NONE-	, 0.0						
N24	, Gov. Aircraft Factories N24	, CNA441	, 100.0	, -NONE-	, 0.0						
NRD262	, Nord-Aviation NORD-262	, SD330	, 100.0	, -NONE-	, 0.0						
OV1	, Grumman Mohawk OV-1	, DHC6	, 100.0	, -NONE-	, 0.0						
PA17	, Piper PA-17 Vagabond	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA18	, Piper PA-18 Super Cub	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA22CO	, Piper PA-22 Colt	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA22TR	, Piper PA-22 Tripacer	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA23AP	, Piper PA-23-235 Apache	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA23AZ	, Piper PA-23 Aztec	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA24	, Piper PA-24 Comanche	, GASEPV	, 100.0	, -NONE-	, 0.0						

PA25	, Piper PA-25 Pawnee	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA28AR	, Piper PA-28-181 Archer II	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA28C2	, Piper PA-28-235E Cherokee 235E	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA28CA	, Piper PA-28R-200 Cherokee Arrow II	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA28CC	, Piper PA-28-180 Cherokee Challenger	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA28CH	, Piper PA-28-140 Cherokee 140	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA28DK	, Piper PA-28-236 Dakota	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA28WA	, Piper PA-28-161 Warrior II	, PA28	, 100.0	, -NONE-	, 0.0						
PA31CH	, Piper PA-31-350 Chieftain	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA31T	, Piper PA-31T Cheyenne	, CNA441	, 100.0	, -NONE-	, 0.0						
PA32C6	, Piper PA-32 Cherokee Six	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA32LA	, Piper PA-32R-300 Lance	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA32SG	, Piper PA-32 Saratoga	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA34	, Piper PA-34 Seneca	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA36	, Piper 36 Brave	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA38	, Piper PA-38-112 Tomahawk	, GASEPF	, 100.0	, -NONE-	, 0.0						
PA39	, Piper PA-39 Twin Comanche C/R	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA42	, Piper PA-42 Cheyenne III	, CNA441	, 100.0	, -NONE-	, 0.0						
PA44	, Piper 44 Seminole	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA46	, Piper PA-46 Malibu	, GASEPV	, 100.0	, -NONE-	, 0.0						
PA60	, Piper Aerostar Model 600/700	, BEC58P	, 100.0	, -NONE-	, 0.0						
PA61	, Piper PA-61 Aerostar Model 601	, BEC58P	, 100.0	, -NONE-	, 0.0						
PC6	, Pilatus PC-6	, GASEPV	, 100.0	, -NONE-	, 0.0						
PITTS1	, Pitts S-1 Special	, GASEPF	, 100.0	, -NONE-	, 0.0						
RJ70	, RJ70	, BAE146	, 100.0	, -NONE-	, 0.0						
RWCM12	, Rockwell Commander 112 (Alpine)	, GASEPF	, 100.0	, -NONE-	, 0.0						
RWCM14	, Rockwell Commander 114 (Gram Turismo)	, GASEPV	, 100.0	, -NONE-	, 0.0						
RWCM50	, Rockwell Shrike Commander 500S	, BEC58P	, 100.0	, -NONE-	, 0.0						
RWCM69	, Rockwell Turbo Commander 690	, CNA441	, 100.0	, -NONE-	, 0.0						
RWCMTH	, Rockwell Thrust Commander (SR2)	, GASEPV	, 100.0	, -NONE-	, 0.0						
S2	, Grumman S-2 Tracker	, DC3	, 100.0	, -NONE-	, 0.0						
S212	, Siai Marchetti S212	, CNA500	, 100.0	, -NONE-	, 0.0						
SA226	, Swearingen Metro II	, DHC6	, 100.0	, -NONE-	, 0.0						
SA227	, Swearingen Metro III	, DHC6	, 100.0	, -NONE-	, 0.0						
SAAB20	, SAAB 2000	, HS748A	, 100.0	, -NONE-	, 0.0						
SABR40	, Sabreliner 40	, LEAR25	, 100.0	, -NONE-	, 0.0						
SABR60	, Sabreliner 60	, LEAR25	, 100.0	, -NONE-	, 0.0						
SABR65	, Sabreliner 65	, LEAR35	, 100.0	, -NONE-	, 0.0						
SABR70	, Sabreliner 70	, LEAR25	, 100.0	, -NONE-	, 0.0						
SABR75	, Sabreliner 75	, LEAR25	, 100.0	, -NONE-	, 0.0						
SAMER2	, Swearingen Merlin II	, CNA441	, 100.0	, -NONE-	, 0.0						
SAMER3	, Swearingen Merlin III	, CNA441	, 100.0	, -NONE-	, 0.0						
SAMER4	, Swearingen Merlin IV	, DHC6	, 100.0	, -NONE-	, 0.0						
SD360	, Shorts 360	, SD330	, 100.0	, -NONE-	, 0.0						
SE210	, Aerospatiale Caravelle	, 737	, 100.0	, -NONE-	, 0.0						
SF260M	, Siai Marchetti SF260M	, GASEPV	, 100.0	, -NONE-	, 0.0						
SN600	, Aerospatiale SN 600 Corvette	, CNA500	, 100.0	, -NONE-	, 0.0						
T37	, USAF Cessna T37 or 318	, LEAR25	, 100.0	, -NONE-	, 0.0						
T38	, USAF Northrop T38	, LEAR25	, 100.0	, -NONE-	, 0.0						
T43A	, USAF 737-200	, 737	, 100.0	, -NONE-	, 0.0						
T47A	, US Navy Cessna Citation S/II	, CNA500	, 100.0	, -NONE-	, 0.0						
TAYF19	, Taylorcraft Sprtsman 100 (F19)	, GASEPF	, 100.0	, -NONE-	, 0.0						
TED600	, Ted Smith Aerostar 600	, BEC58P	, 100.0	, -NONE-	, 0.0						
TU134	, Tupolev-134	, DC930	, 100.0	, -NONE-	, 0.0						

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TU154	, Tupolev-154	, 727D17	, 100.0	, -NONE-	, 0.0						
TU204	, Tupolev-204	, 757RR	, 100.0	, -NONE-	, 0.0						
TU334	, Tuploev-334	, F10065	, 100.0	, -NONE-	, 0.0						
U3	, USAF Cessna Model 310	, BEC58P	, 100.0	, -NONE-	, 0.0						
UV18	, US Military DHC-6 Twin Otter	, DHC6	, 100.0	, -NONE-	, 0.0						
VC10TF	, Vickers VC10 TurboFan	, 707	, 100.0	, -NONE-	, 0.0						
VC10TU	, Vickers VC10 TurboJet	, DC820	, 100.0	, -NONE-	, 0.0						
VC2	, Vickers VC2 Viscount	, L188	, 100.0	, -NONE-	, 0.0						
YAK42	, Yakolev Yak-42	, 727100	, 100.0	, -NONE-	, 0.0						
YS11	, Nihon Aeroplane (NAMC) YS-11	, HS748A	, 100.0	, -NONE-	, 0.0						
YS11C	, Nihon Aeroplane (NAMC) YS-11 Cargo	, HS748A	, 100.0	, -NONE-	, 0.0						

## F.2 Aircraft.dbf

File: aircraft.dbf

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Fields(14):

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Records(138)

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707      , Boeing 707-120/JT3C      , H , C , J , 1 , JT4A      , 4 , N , 302400 , 188900 , 6682 , J , 10120
720      , Boeing 720/JT3C          , L , C , J , 1 , JT4A      , 4 , N , 223500 , 155600 , 4871 , J , 10120
737      , Boeing 737/JT8D-9        , L , C , J , 1 , 2JT8DW     , 2 , N , 109000 , 98000  , 3900 , J , 14500
707120   , Boeing 707-120B/JT3D-3      , H , C , J , 1 , JT3D        , 4 , N , 302400 , 188900 , 6893 , J , 14850
707320   , Boeing 707-320B/JT3D-7      , H , C , J , 1 , JT3D        , 4 , N , 334000 , 247000 , 5622 , J , 19000
717200   , Boeing 717-200/BR 715      , L , C , J , 3 , BR715      , 2 , N , 121000 , 110000 , 4600 , J , 18000
727100   , Boeing 727-100/JT8D-7      , L , C , J , 1 , 3JT8D      , 3 , N , 169500 , 142500 , 4867 , J , 14000
727200   , Boeing 727-200/JT8D-7      , L , C , J , 1 , 3JT8D      , 3 , N , 217600 , 163300 , 5571 , J , 11895
737300   , Boeing 737-300/CFM56-3B-1   , L , C , J , 3 , CFM563     , 2 , N , 135000 , 114000 , 4580 , J , 20000
737400   , Boeing 737-400/CFM56-3C-1   , L , C , J , 3 , CFM563     , 2 , N , 150000 , 124000 , 5062 , J , 23500
737500   , Boeing 737-500/CFM56-3C-1   , L , C , J , 3 , CFM563     , 2 , N , 133500 , 111000 , 4551 , J , 20000
737700   , Boeing 737-700/CFM56-7B24   , L , C , J , 3 , CF567B     , 2 , N , 154500 , 129200 , 4445 , J , 24000
737800   , Boeing 737-800/CFM56-7B26   , L , C , J , 3 , CF567B     , 2 , N , 174200 , 146300 , 5435 , J , 27300
747100   , Boeing 747-100/JT9DBD      , H , C , J , 2 , JT9DBD     , 4 , N , 733000 , 516600 , 5727 , J , 33042
747200   , Boeing 747-200/JT9D-7      , H , C , J , 3 , JT9DFL     , 4 , N , 775000 , 564000 , 6200 , J , 45500
747400   , Boeing 747-400/PW4056      , H , C , J , 3 , PW4056     , 4 , N , 875000 , 652000 , 6989 , J , 56800
757300   , Boeing 757-300/RB211-535E4B , L , C , J , 3 , RR535E     , 2 , N , 275000 , 224000 , 5651 , J , 43100
767300   , Boeing 767-300/PW4060      , H , C , J , 3 , 2CF680     , 2 , N , 407000 , 320000 , 4710 , J , 60000
767400   , Boeing 767-400ER/CF6-80C2B(F) , H , C , J , 3 , CF680C     , 2 , Y , 450000 , 340000 , 6000 , J , 58685
777200   , Boeing 777-200ER/GE90-90B  , H , C , J , 3 , GE90        , 2 , N , 656000 , 470000 , 4450 , J , 90000
777300   , Boeing 777-300/TRENT892    , H , C , J , 0 , TRENT8      , 2 , Y , 660000 , 524000 , 6012 , J , 77000
1900D    , Beech 1900D / PT6A67      , L , C , T , 1 , PT6A67     , 2 , N , 16950  , 14940  , 1696 , J , 3367
707QN    , Boeing 707-320B/JT3D-7QN    , H , C , J , 2 , JT3DQ      , 4 , N , 334000 , 247000 , 5622 , J , 19000
720B     , Boeing 720B/JT3D-3        , L , C , J , 1 , JT3D        , 4 , N , 234000 , 175000 , 5717 , J , 18000
727D15   , Boeing 727-200/JT8D-15     , L , C , J , 1 , 3JT8D      , 3 , N , 208000 , 169000 , 4922 , J , 15500
727D17   , Boeing 727-200/JT8D-17     , L , C , J , 2 , 3JT8DQ     , 3 , N , 208000 , 169000 , 5444 , J , 16000
    
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727EM1	, FEDX 727-100/JT8D-7	, L, C, J, 3	, 3JT8E7	, 3, N, 169500	, 142500	, 4867	, J, 14000
727EM2	, FEDX 727-200/JT8D-15	, L, C, J, 3	, 3JT8E5	, 3, N, 208000	, 169000	, 4922	, J, 15500
727Q15	, Boeing 727-200/JT8D-15QN	, L, C, J, 2	, 3JT8DQ	, 3, N, 208000	, 169000	, 4922	, J, 15500
727Q7	, Boeing 727-100/JT8D-7QN	, L, C, J, 2	, 3JT8DQ	, 3, N, 169500	, 142500	, 4867	, J, 14000
727Q9	, Boeing 727-200/JT8D-9	, L, C, J, 2	, 3JT8DQ	, 3, N, 191000	, 160000	, 5444	, J, 14500
727QF	, UPS 727100 22C 25C	, L, C, J, 3	, TAY651	, 3, N, 169000	, 142500	, 4448	, J, 15380
7373B2	, Boeing 737-300/CFM56-3B-2	, L, C, J, 3	, CFM563	, 2, N, 139500	, 114000	, 4580	, J, 22000
737D17	, Boeing 737-200/JT8D-17	, L, C, J, 2	, 2JT8QW	, 2, N, 124000	, 107000	, 4244	, J, 16000
737N17	, B737-200/JT8D-17 Nordam B737 LGW Hushkit	, L, C, J, 3	, 2JT8DN	, 2, N, 124000	, 107000	, 4244	, J, 16000
737N9	, B737/JT8D-9 Nordam B737 LGW Hushkit	, L, C, J, 3	, 2JT8DN	, 2, N, 109000	, 98000	, 3900	, J, 14500
737QN	, Boeing 737/JT8D-9QN	, L, C, J, 2	, 2JT8QW	, 2, N, 109000	, 98000	, 3900	, J, 14500
74710Q	, Boeing 747-100/JT9D-7QN	, H, C, J, 3	, JT9DFL	, 4, N, 733000	, 564000	, 6200	, J, 45500
74720A	, Boeing 747-200/JT9D-7A	, H, C, J, 3	, JT9D7Q	, 4, N, 785000	, 564000	, 6200	, J, 46300
74720B	, Boeing 747-200/JT9D-7Q	, H, C, J, 3	, JT9D7Q	, 4, N, 800000	, 630000	, 6200	, J, 53000
747SP	, Boeing 747SP/JT9D-7	, H, C, J, 3	, JT9DFL	, 4, N, 702000	, 475000	, 5911	, J, 45500
757PW	, Boeing 757-200/PW2037	, L, C, J, 3	, PW2037	, 2, N, 255000	, 210000	, 4790	, J, 38300
757RR	, Boeing 757-200/RB211-535E4	, L, C, J, 3	, RR535E	, 2, N, 255000	, 210000	, 4640	, J, 40100
767CF6	, Boeing 767-200/CF6-80A	, H, C, J, 3	, 2CF680	, 2, N, 315500	, 270000	, 4700	, J, 48000
767JT9	, Boeing 767-200/JT9D-7R4D	, H, C, J, 3	, 2CF680	, 2, N, 351000	, 270000	, 4744	, J, 48000
A300B4-203	, Airbus A300B4-200/CF6-50C2	, H, C, J, 3	, 2CF650	, 2, N, 364000	, 295000	, 5367	, J, 52500
A300-622R	, Airbus A300-622R/PW4158	, H, C, J, 3	, PW4158	, 2, N, 378500	, 315900	, 5040	, J, 58000
A310-304	, Airbus A310-304/CF6-80C2A2	, H, C, J, 3	, A310	, 2, N, 346100	, 273400	, 4970	, J, 53000
A319-131	, Airbus A319-131/V2522-A5	, L, C, J, 3	, V2522A	, 2, N, 166400	, 137800	, 4740	, J, 22000
A320-211	, Airbus A320-211/CFM56-5A1	, L, C, J, 3	, CFM565	, 2, N, 169800	, 145505	, 4911	, J, 25000
A320-232	, Airbus A320-232/V2527-A5	, L, C, J, 3	, V2527A	, 2, N, 172000	, 145500	, 4920	, J, 26500
A321-232	, Airbus A321-232/IAE V2530-A5	, L, C, J, 3	, V2530	, 2, N, 206100	, 171500	, 5440	, J, 30000
A330-301	, Airbus A330-301/CF6-80 E1A2	, H, C, J, 3	, CF680E	, 2, N, 478400	, 394600	, 5703	, J, 67500
A330-343	, Airbus A330-343/RR TRENT 772B	, H, C, J, 3	, TRENT7	, 2, N, 513700	, 412300	, 5726	, J, 71100
A340-211	, Airbus A340-211/CFM 56-5C2	, H, C, J, 3	, CF565C	, 4, N, 573200	, 399000	, 5952	, J, 31200
A7D	, A-7D,E/TF-41-A-1	, L, M, J, 0	, TF41	, 1, N, 42000	, 37100	, 7356	, J, 14500
BAC111	, BAC111/SPEY MK511-14	, L, C, J, 2	, 2JT8D	, 2, N, 89600	, 82000	, 4449	, J, 11400
BAE146	, BAE146-200/ALF502R-5	, L, C, J, 3	, AL502R	, 4, N, 93000	, 81000	, 3770	, J, 6970
BAE300	, BAE146-300/ALF502R-5	, L, C, J, 3	, AL502R	, 4, N, 97500	, 84500	, 3960	, J, 6970
BEC58P	, BARON 58P/TS10-520-L	, S, G, P, 0	, TSIO52	, 2, N, 6100	, 6100	, 2733	, P, 779
C130	, C-130H/T56-A-15	, L, M, T, 3	, T56A15	, 4, N, 155000	, 135000	, 4850	, P, 8026
C130E	, C-130E/T56-A-7	, L, M, T, 0	, T56A7	, 4, N, 155000	, 130000	, 4670	, P, 7063
CIT3	, CIT 3/TFE731-3-100S	, L, G, J, 3	, TF7313	, 2, N, 20000	, 17000	, 2770	, J, 3650
CL600	, CL600/ALF502L	, L, G, J, 3	, AL502L	, 2, N, 36000	, 33000	, 3300	, J, 7500
CL601	, CL601/CF34-3A	, L, G, J, 3	, CF34	, 2, N, 43100	, 36000	, 3550	, J, 9220
CNA172	, Cessna 172R / Lycoming IO-360-L2A	, S, G, P, 0	, IO360L	, 1, N, 2450	, 2450	, 1695	, P, 436
CNA206	, Cessna 206H / Lycoming IO-540-AC	, S, G, P, 0	, IO540	, 1, N, 3600	, 3600	, 1880	, P, 798
CNA20T	, Cessna T206H / Lycoming TIO-540-AJ1A	, S, G, P, 0	, TIO540	, 1, N, 3600	, 3600	, 1880	, P, 825
CNA441	, CONQUEST II/TPE331-8	, S, C, T, 0	, TPE331	, 2, N, 9900	, 9400	, 1939	, P, 1535
CNA500	, CIT 2/JT15D-4	, L, G, J, 3	, JT15D1	, 2, N, 14700	, 14000	, 3050	, J, 2500
CNA55B	, Cessna 550 Citation Bravo / PW530A	, L, G, J, 0	, PW530A	, 2, N, 14800	, 13500	, 3010	, J, 2863
CNA750	, Citation X / Rolls Royce Allison AE3007C	, L, G, J, 3	, AE300C	, 2, N, 35700	, 31800	, 3500	, J, 6407
COMJET	, 1985 BUSINESS JET	, L, G, J, 1	, CGAJ	, 2, N, 19200	, 16200	, 2889	, J, 2900
COMSEP	, 1985 1-ENG COMP	, S, G, P, 0	, CGASEP	, 1, N, 2440	, 2400	, 1156	, P, 605

CONCRD	, CONCORDE/OLY593	, H, C, J, 0	, OLY593	, 4, N	, 400000	, 245000	, 10600	, J	, 38100
CVR580	, CV580/ALL 501-D15	, L, C, T, 0	, 501D13	, 2, N	, 58000	, 52000	, 4256	, P	, 8100
DC1010	, DC10-10/CF6-6D	, H, C, J, 3	, CF66D	, 3, N	, 455000	, 363000	, 5820	, J	, 40000
DC1030	, DC10-30/CF6-50C2	, H, C, J, 3	, CF66D	, 3, N	, 572000	, 403000	, 5418	, J	, 53200
DC1040	, DC10-40/JT9D-20	, H, C, J, 3	, CF66D	, 3, N	, 555000	, 403000	, 6020	, J	, 49400
DC3	, DC3/R1820-86	, L, C, P, 0	, 2R2800	, 2, N	, 28000	, 24500	, 2222	, P	, 3120
DC6	, DC6/R2800-CB17	, L, C, P, 0	, 4R2800	, 4, N	, 106000	, 95000	, 3010	, P	, 4180
DC820	, DC-8-20/JT4A	, H, C, J, 1	, JT4A	, 4, N	, 317600	, 194400	, 6527	, J	, 11850
DC850	, DC8-50/JT3D-3B	, H, C, J, 1	, JT3D	, 4, N	, 325000	, 240000	, 5400	, J	, 18000
DC860	, DC8-60/JT3D-7	, H, C, J, 1	, JT3D	, 4, N	, 355000	, 275000	, 5310	, J	, 19000
DC870	, DC8-70/CFM56-2C-5	, H, C, J, 3	, CFM562	, 4, N	, 355000	, 258000	, 6500	, J	, 22000
DC8QN	, DC8-60/JT8D-7QN	, H, C, J, 2	, JT3DQ	, 4, N	, 355000	, 275000	, 5310	, J	, 19000
DC910	, DC9-10/JT8D-7	, L, C, J, 1	, 2JT8D	, 2, N	, 90700	, 81700	, 5030	, J	, 14000
DC930	, DC9-30/JT8D-9	, L, C, J, 1	, 2JT8D	, 2, N	, 114000	, 102000	, 4680	, J	, 14500
DC93LW	, DC9-30/JT8D-9 w/ ABS Lightweight hushkit	, L, C, J, 3	, 2JT8DL	, 2, N	, 114000	, 102000	, 4680	, J	, 14500
DC950	, DC9-50/JT8D-17	, L, C, J, 2	, 2JT8DQ	, 2, N	, 121000	, 110000	, 4880	, J	, 16000
DC95HW	, DC9-50/JT8D17 w/ ABS Heavyweight hushkit	, L, C, J, 3	, 2JT8DH	, 2, N	, 121000	, 110000	, 4880	, J	, 16000
DC9Q7	, DC9-10/JT8D-7QN	, L, C, J, 2	, 2JT8DQ	, 2, N	, 90700	, 81700	, 5030	, J	, 14000
DC9Q9	, DC9-30/JT8D-9QN	, L, C, J, 2	, 2JT8DQ	, 2, N	, 114000	, 102000	, 4680	, J	, 14500
DHC6	, DASH 6/PT6A-27	, S, C, T, 0	, PT6A27	, 2, N	, 12500	, 12300	, 1500	, P	, 2000
DHC6QP	, DASH 6/PT6A-27 Raisbeck Quiet Prop Mod	, S, C, T, 0	, RAISQP	, 2, N	, 12500	, 12300	, 1500	, P	, 2000
DHC7	, DASH 7/PT6A-50	, L, C, T, 3	, PT6A50	, 4, N	, 41000	, 39000	, 2150	, P	, 2850
DHC8	, DASH 8-100/PW121	, L, C, T, 3	, PW120	, 2, N	, 34500	, 33900	, 3000	, J	, 4750
DHC830	, DASH 8-300/PW123	, L, C, T, 3	, PW120	, 2, N	, 43000	, 42000	, 3500	, J	, 4918
EMB120	, Embraer 120 ER/ Pratt & Whitney PW118	, L, C, T, 3	, EPW118	, 2, N	, 26433	, 25794	, 5571	, J	, 4000
EMB145	, Embraer 145 ER/Allison AE3007	, L, C, J, 3	, AE3007	, 2, N	, 45420	, 41230	, 4232	, J	, 7500
EMB14L	, Embraer 145 LR / Allison AE3007A1	, L, C, J, 3	, AE3007	, 2, N	, 48500	, 42550	, 4232	, J	, 7500
F10062	, F100/TAY 620-15	, L, C, J, 3	, TAY620	, 2, N	, 95000	, 85500	, 4560	, J	, 13900
F10065	, F100/TAY 650-15	, L, C, J, 3	, TAY650	, 2, N	, 98000	, 88000	, 4704	, J	, 15100
F28MK2	, F28-2000/RB183MK555	, L, C, J, 2	, RB183	, 2, N	, 65000	, 59000	, 3540	, J	, 9850
F28MK4	, F28-4000/RB183MK555	, L, C, J, 2	, RB183P	, 2, N	, 73000	, 64000	, 3546	, J	, 9900
F4C	, F-4C/J79-GE-15	, L, M, J, 0	, J79	, 2, N	, 52000	, 40000	, 4444	, J	, 10900
FAL20	, FALCON 20/CF700-2D-2	, L, G, J, 2	, CF700	, 2, N	, 28700	, 27300	, 2490	, J	, 4500
GASEPF	, 1985 1-ENG FP PROP	, S, G, P, 0	, SEPPF	, 1, N	, 2200	, 2200	, 1160	, P	, 560
GASEPV	, 1985 1-ENG VP PROP	, S, G, P, 0	, SEPPV	, 1, N	, 3000	, 3000	, 1111	, P	, 790
GII	, Gulfstream GII/SPEY 511-8	, L, G, J, 2	, SPEYHK	, 2, N	, 64800	, 58500	, 3200	, J	, 11400
GIIB	, Gulfstream GIIB/GIII - SPEY 511-8	, L, G, J, 2	, SPEYHK	, 2, N	, 69700	, 58500	, 3250	, J	, 11400
GIV	, Gulfstream GIV-SP/TAY 611-8	, L, G, J, 3	, TAYGIV	, 2, N	, 74600	, 66000	, 3190	, J	, 13850
GV	, Gulfstream GV/BR 710	, L, G, J, 3	, BR710	, 2, N	, 90500	, 75300	, 2760	, J	, 14750
HS748A	, HS748/DART MK532-2	, L, C, T, 2	, RDA532	, 2, N	, 46500	, 43000	, 3360	, P	, 5150
IA1125	, ASTRA 1125/TFE731-3A	, L, G, J, 3	, TF7313	, 2, N	, 23500	, 20700	, 3689	, J	, 3700
KC135	, KC135A/J57-P-59W	, H, M, J, 0	, J57	, 4, N	, 300000	, 228000	, 6689	, J	, 11750
KC135B	, KC135B/JT3D-7	, H, M, J, 0	, JT3D	, 4, N	, 300000	, 228000	, 6689	, J	, 19000
KC135R	, KC135R/CFM56-2B-1	, H, M, J, 0	, CFM56A	, 4, N	, 324000	, 244000	, 6556	, J	, 22000
L1011	, L1011/RB211-22B	, H, C, J, 3	, RB2112	, 3, N	, 430000	, 358000	, 5693	, J	, 42000
L10115	, L1011-500/RB211-224B	, H, C, J, 3	, RB2112	, 3, N	, 510000	, 368000	, 6800	, J	, 50000
L188	, L188C/ALL 501-D13	, L, C, T, 0	, T56A7	, 4, N	, 116000	, 98100	, 4960	, P	, 8000
LEAR25	, LEAR 25/CJ610-8	, L, G, J, 2	, CJ610	, 2, N	, 15000	, 13500	, 2620	, J	, 2950

LEAR35	, LEAR 36/TFE731-2	, L , G , J , 3 , TF7312	, 2 , N , 18300 , 15300 , 3076 , J , 3500
M7235C	, MAULE M-7-235C / IO540W	, S , G , P , 0 , IO540W	, 1 , N , 2500 , 2500 , 1544 , P , 798
MD11GE	, MD-11/CF6-80C2D1F	, H , C , J , 3 , 2CF68D	, 3 , N , 682400 , 433300 , 5131 , J , 61500
MD11PW	, MD-11/PW 4460	, H , C , J , 3 , PW4460	, 3 , N , 682400 , 433300 , 4681 , J , 60000
MD81	, MD-81/JT8D-217	, L , C , J , 3 , 2JT8D2	, 2 , N , 140000 , 128000 , 4860 , J , 19300
MD82	, MD-82/JT8D-217A	, L , C , J , 3 , 2JT8D2	, 2 , N , 149500 , 130000 , 4920 , J , 20900
MD83	, MD-83/JT8D-219	, L , C , J , 3 , 2JT8D2	, 2 , N , 160000 , 139500 , 5200 , J , 21700
MD9025	, MD-90/V2525-D5	, L , C , J , 3 , V2525	, 2 , Y , 156000 , 142000 , 3000 , J , 25000
MD9028	, MD-90/V2528-D5	, L , C , J , 3 , V2525	, 2 , Y , 156000 , 142000 , 3000 , J , 28000
MU3001	, MU300-10/JT15D-5	, L , G , J , 3 , JT15D5	, 2 , N , 14100 , 13200 , 2800 , J , 2500
PA28	, PIPER WARRIOR PA-28-161 / O-320-D3G	, S , G , P , 0 , O320D3	, 1 , N , 2325 , 2325 , 1695 , P , 400
PA30	, PIPER TWIN COMANCHE PA-30 / IO-320-B1A	, S , G , P , 0 , IO320B	, 2 , N , 3600 , 3600 , 1654 , P , 777
PA31	, PIPER NAVAJO CHIEFTAIN PA-31-350 / TIO-5	, S , G , P , 0 , TIO542	, 2 , N , 7000 , 7000 , 1850 , P , 1481
SABR80	, NA SABRELINER 80	, L , G , J , 2 , CF700	, 2 , N , 33720 , 27290 , 2490 , J , 3962
SD330	, SD330/PT6A-45AR	, L , C , T , 3 , PT6A45	, 2 , N , 22900 , 22600 , 3650 , P , 2670
SF340	, SF340B/CT7-9B	, L , C , T , 3 , CT75	, 2 , N , 27300 , 26500 , 3470 , P , 4067

### F.3 Directivity.dbf

File: directivity.dbf

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Fields(28):

1	DIRECT_ID	C	12
2	GROUND_TYP	C	1
3	OP_MODE	C	1
4	L180	N	5.1
5	L165	N	5.1
6	L150	N	5.1
7	L135	N	5.1
8	L120	N	5.1
9	L105	N	5.1
10	L090	N	5.1
11	L075	N	5.1
12	L060	N	5.1
13	L045	N	5.1
14	L030	N	5.1
15	L015	N	5.1
16	C000	N	5.1
17	R015	N	5.1
18	R030	N	5.1
19	R045	N	5.1
20	R060	N	5.1
21	R075	N	5.1
22	R090	N	5.1
23	R105	N	5.1
24	R120	N	5.1
25	R135	N	5.1
26	R150	N	5.1
27	R165	N	5.1
28	R180	N	5.1

Records(20)

A109	, H, I, -2.6, -1.1, 0.9, 2.6, 3.3, 2.5, 0.5, -2.0, -3.6, -3.6, -2.2, -0.6, 0.0, -0.9, -2.4, -3.1, -2.2, 0.0, 2.2, 2.9, 2.0, -0.1, -2.1, -3.1, -2.6
A109	, S, I, -3.8, -5.1, -4.0, -1.9, -0.1, 1.1, 1.9, 2.4, 2.1, 0.5, -2.1, -3.9, -3.5, -1.0, 1.7, 2.2, -0.1, -3.3, -4.8, -3.2, 0.2, 2.7, 2.2, -0.7, -3.8
AS350D	, H, I, 3.8, 5.2, 5.1, 3.8, 1.9, 0.0, -1.7, -3.2, -4.5, -5.3, -5.8, -6.0, -6.0, -5.7, -4.7, -3.0, -1.2, 0.0, 0.0, -1.2, -2.5, -2.7, -1.4, 1.2, 3.8
AS350D	, S, I, 3.4, 2.6, 1.4, 0.3, -0.6, -1.0, -1.2, -1.2, -1.3, -1.6, -2.0, -2.4, -2.6, -2.6, -2.5, -2.5, -2.5, -2.5, -2.0, -1.0, 0.4, 1.9, 3.1, 3.6, 3.4
AS355F	, H, I, 4.0, 3.8, 3.6, 3.4, 3.0, 2.4, 1.4, -0.3, -2.4, -4.7, -6.6, -7.4, -6.9, -5.8, -4.7, -4.6, -5.6, -6.8, -7.1, -6.0, -3.5, -0.4, 2.1, 3.5, 4.0
AS355F	, S, I, 3.1, 2.8, 2.3, 1.8, 1.3, 0.9, 0.5, -0.1, -1.2, -3.0, -4.9, -6.1, -5.8, -4.1, -2.0, -0.6, -0.6, -1.5, -2.4, -2.4, -1.2, 0.6, 2.1, 2.9, 3.1
B222	, H, I, -0.8, 1.6, 3.6, 4.2, 3.2, 1.1, -0.8, -1.6, -1.2, -0.3, 0.3, 0.0, -1.2, -2.5, -3.5, -3.5, -2.6, -1.4, -0.5, -0.3, -1.0, -2.1, -2.8, -2.4, -0.8
B222	, S, I, 0.1, 0.7, 0.8, 0.0, -1.3, -2.3, -2.1, -0.4, 1.6, 2.8, 2.4, 0.5, -1.7, -3.0, -3.0, -2.1, -0.9, 0.0, 0.4, 0.6, 0.4, 0.0, -0.3, -0.3, 0.1
CH47D	, H, I, -2.5, -2.1, -0.9, -0.5, -1.8, -4.0, -5.4, -5.0, -3.5, -2.5, -2.6, -2.8, -1.6, 1.3, 4.4, 5.3, 3.3, -0.3, -2.8, -2.8, -1.0, 0.4, 0.1, -1.4, -2.5

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CH47D	, S, I,	-1.4,	-1.0,	-0.3,	-1.6,	-5.5,	-10.0,	-11.9,	-9.7,	-5.2,	-2.0,	-1.5,	-2.6,	-2.3,	0.7,	4.4,	5.6,	3.0,	-1.8,	-5.1,	-4.6,	-1.5,	1.1,	1.4,	-0.2,	-1.4
EC130	, S, J,	6.4,	5.6,	4.8,	4.0,	4.5,	5.0,	5.5,	5.2,	4.9,	4.6,	3.1,	1.5,	0.0,	0.3,	0.7,	1.0,	0.6,	0.3,	-0.1,	0.9,	2.0,	3.0,	4.1,	5.3,	6.4
EC130	, S, I,	9.1,	6.8,	4.4,	2.1,	2.1,	2.0,	2.0,	0.8,	-0.3,	-1.5,	-1.0,	-0.5,	0.0,	1.7,	3.5,	5.2,	5.1,	5.0,	4.9,	4.8,	4.8,	4.7,	6.2,	7.6,	9.1
HD500D	, H, I,	2.7,	4.0,	4.8,	4.8,	4.3,	2.8,	0.3,	-2.6,	-5.0,	-6.2,	-6.0,	-5.5,	-5.9,	-7.2,	-8.8,	-9.4,	-8.1,	-5.5,	-2.9,	-1.3,	-0.9,	-0.8,	-0.2,	1.2,	2.7
HD500D	, S, I,	3.3,	5.4,	6.6,	5.6,	2.3,	-2.0,	-5.2,	-6.5,	-6.4,	-6.2,	-7.0,	-8.2,	-8.9,	-8.2,	-6.3,	-4.4,	-3.5,	-3.4,	-3.5,	-3.1,	-2.1,	-1.0,	0.0,	1.3,	3.3
R22	, S, J,	1.0,	0.7,	0.3,	0.0,	-0.1,	-0.1,	-0.2,	-0.6,	-1.1,	-1.5,	-1.0,	-0.5,	0.0,	-0.1,	-0.1,	-0.2,	-0.2,	-0.3,	-0.3,	0.3,	0.8,	1.4,	1.3,	1.1,	1.0
R22	, S, I,	0.1,	1.2,	2.4,	3.5,	2.8,	2.1,	1.4,	1.6,	1.7,	1.9,	1.3,	0.6,	0.0,	0.8,	1.7,	2.5,	2.5,	2.6,	2.6,	2.7,	2.8,	2.9,	2.0,	1.0,	0.1
S76	, H, I,	4.5,	4.4,	2.9,	0.5,	-1.5,	-2.2,	-1.3,	0.3,	1.1,	0.1,	-3.0,	-6.9,	-9.9,	-10.7,	-9.0,	-5.8,	-2.6,	-0.5,	0.0,	-0.4,	-0.7,	-0.2,	1.3,	3.2,	4.5
S76	, S, I,	3.1,	1.9,	0.4,	-1.4,	-3.3,	-4.5,	-4.1,	-2.4,	-0.8,	-0.7,	-2.6,	-5.6,	-7.9,	-8.2,	-6.8,	-4.8,	-3.2,	-2.1,	-1.0,	0.7,	2.8,	4.3,	4.8,	4.2,	3.1
SA365N	, H, I,	2.0,	0.8,	0.1,	0.1,	0.6,	1.1,	1.1,	0.3,	-1.2,	-3.1,	-4.6,	-4.8,	-3.5,	-1.3,	0.5,	0.9,	-0.3,	-2.2,	-3.3,	-2.7,	-0.6,	1.7,	3.1,	3.1,	2.0
SA365N	, S, I,	4.5,	4.0,	2.0,	0.0,	-0.7,	-0.4,	0.0,	-0.4,	-1.7,	-2.9,	-3.4,	-3.2,	-2.6,	-2.3,	-1.9,	-1.3,	-0.5,	-0.1,	-0.7,	-2.1,	-3.1,	-2.4,	-0.1,	2.8,	4.5

## F.4 Flaps.dbf

File: flaps.dbf

Last update: 05 Dec 2006 15:13:20

Fields(6):

```

1 ACFT_ID      C 12
2 OP_TYPE      C  1
3 FLAP_ID      C  6
4 COEFF_R      N  8.6
5 COEFF_C_D    N  8.6
6 COEFF_B      N  8.6
    
```

Records(863)

737	, A, D-25	, 0.113106	, 0.452885	, 0.000000	727100	, D, 15	, 0.095459	, 0.392649	, 0.008301
737	, A, D-30	, 0.124898	, 0.442783	, 0.000000	727100	, D, 2	, 0.085700	, 0.000000	, 0.000000
737	, A, D-40	, 0.155057	, 0.432682	, 0.000000	727100	, D, 25	, 0.115623	, 0.371567	, 0.007389
737	, A, U-15	, 0.088617	, 0.000000	, 0.000000	727100	, D, 5	, 0.088916	, 0.415048	, 0.008692
737	, A, U-25	, 0.097687	, 0.000000	, 0.000000	727100	, D, ZERO	, 0.063600	, 0.000000	, 0.000000
737	, D, 10	, 0.093192	, 0.457438	, 0.010935	737300	, D, 1	, 0.069000	, 0.495800	, 0.012600
737	, D, 25	, 0.109993	, 0.436124	, 0.010293	737300	, D, 15	, 0.087200	, 0.457200	, 0.011100
737	, D, 5	, 0.085235	, 0.475473	, 0.011593	737300	, D, 5	, 0.074200	, 0.477215	, 0.011600
737	, D, INT	, 0.074770	, 0.000000	, 0.000000	737300	, A, D-15	, 0.110300	, 0.463900	, 0.000000
737	, D, ZERO	, 0.064300	, 0.000000	, 0.000000	737300	, A, D-30	, 0.124700	, 0.434000	, 0.000000
707320	, A, D-25	, 0.107756	, 0.307537	, 0.000000	737300	, A, D-40	, 0.147100	, 0.421500	, 0.000000
707320	, A, D-40	, 0.134567	, 0.279116	, 0.000000	737300	, D, ZERO	, 0.062000	, 0.000000	, 0.000000
707320	, A, D-50	, 0.154720	, 0.275511	, 0.000000	737400	, D, 1	, 0.071300	, 0.000000	, 0.000000
707320	, A, U-25	, 0.098219	, 0.000000	, 0.000000	737400	, D, 15	, 0.092400	, 0.459600	, 0.010900
707320	, D, 14	, 0.089316	, 0.312431	, 0.004514	737400	, D, 5	, 0.079800	, 0.483400	, 0.011700
707320	, D, INT	, 0.072743	, 0.000000	, 0.000000	737400	, A, D-15	, 0.107900	, 0.477900	, 0.000000
707320	, D, ZERO	, 0.056170	, 0.000000	, 0.000000	737400	, A, D-30	, 0.125100	, 0.433800	, 0.000000
717200	, A, A_0U	, 0.064560	, 0.000000	, 0.000000	737400	, A, D-40	, 0.151000	, 0.423000	, 0.000000
717200	, A, A_13D	, 0.109249	, 0.000000	, 0.000000					
717200	, A, A_13U	, 0.095353	, 0.000000	, 0.000000					
717200	, A, A_18D	, 0.110090	, 0.000000	, 0.000000					
717200	, A, A_18U	, 0.095015	, 0.000000	, 0.000000					
717200	, A, A_40D	, 0.140491	, 0.416345	, 0.000000					
717200	, D, T_00B	, 0.060000	, 0.000000	, 0.000000					
717200	, D, T_00C	, 0.060000	, 0.000000	, 0.000000					
717200	, D, T_05H	, 0.075000	, 0.483254	, 0.011607					
717200	, D, T_05M	, 0.075000	, 0.489068	, 0.011795					
717200	, D, T_13A	, 0.078000	, 0.469923	, 0.010862					
727100	, A, D-25	, 0.128359	, 0.350485	, 0.000000					
727100	, A, D-30	, 0.145903	, 0.343897	, 0.000000					
727100	, A, D-40	, 0.186604	, 0.335992	, 0.000000					
727100	, A, U-15	, 0.090698	, 0.000000	, 0.000000					
727100	, A, U-25	, 0.113154	, 0.000000	, 0.000000					

## F.5 Helicopter.dbf

Fields 13 through 27 are not printed.

File: helicopter.dbf

Last update: 20 Feb 2007 15:00:50

Fields(27):

```

1 HELO_ID          C 12
2 HELO_DESCR      C 40
3 OWNER_CAT       C 1
4 ENG_TYPE        C 1
5 NUM_ROTOR       N 1.0
6 DIAMETER        N 6.1
7 RPM             N 6.1
8 MAX_TOW         N 6.0
9 NOISE_ID        C 12
10 DIRECT_ID      C 12
11 HAS_WHEELS     C 1
12 MODEL_TYPE     C 1
13 B_LEFT_0       N 10.2
14 B_LEFT_1       N 10.2
15 B_LEFT_2       N 10.2
16 B_CENTER_0    N 10.2
17 B_CENTER_1    N 10.2
18 B_CENTER_2    N 10.2
19 B_RIGHT_0     N 10.2
20 B_RIGHT_1     N 10.2
21 B_RIGHT_2     N 10.2
22 DB_VER_ASC    N 5.1
23 DB_VER_DES    N 5.1
24 DB_ACC_HOR    N 5.1
25 DB_ACC_CLM    N 5.1
26 DB_DEC_HOR    N 5.1
27 DB_DEC_DSC    N 5.1

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Records(19)

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A109      , Agusta A-109      , C , T , 2 , 36.1 , 385.0 , 5730 , A109      , A109      , Y , I
B206L    , Bell 206L Long Ranger , C , T , 2 , 37.0 , 394.0 , 4000 , B206L    , B206L    , N , I
B212    , Bell 212 Huey (UH-1N) (CH-135) , C , T , 2 , 48.2 , 324.0 , 10500 , B212    , B212    , N , I
B222    , Bell 222      , C , T , 2 , 39.8 , 348.0 , 7800 , B222    , B222    , Y , I
BO105   , Boelkow BO-105 , C , T , 2 , 32.2 , 424.0 , 5070 , BO105   , BO105   , N , I
CH47D   , Boeing Vertol 234 (CH-47D) , M , T , 2 , 60.0 , 225.0 , 48500 , CH47D   , CH47D   , Y , I
EC130   , Eurocopter EC-130 w/Arriel 2B1 , C , T , 2 , 35.1 , 394.0 , 5290 , EC130   , EC130   , N , I
H500D   , Huges 500D    , C , T , 1 , 26.4 , 492.0 , 2550 , H500D   , H500D   , N , I
MD600N  , McDonnell Douglas MD-600N w/ RR 250-C47M , C , T , 1 , 27.5 , 475.3 , 4100 , MD600N  , MD600N  , N , I
R22     , Robinson R22B w/Lycoming 0320 , C , P , 2 , 25.2 , 520.0 , 1370 , R22     , R22     , N , I

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S61	, Sikorsky S-61 (CH-3A)	, C , T , 2 ,	62.0 ,	203.0 ,	19000 ,	S61	, S61	, Y , I
S65	, Sikorsky S-65 (CH-53)	, C , T , 2 ,	72.3 ,	0.0 ,	37000 ,	S65	, S65	, Y , I
S70	, Sikorsky S-70 Blackhawk (UH-60A)	, M , T , 2 ,	53.7 ,	285.0 ,	20250 ,	S70	, S70	, Y , I
S76	, Sikorsky S-76 Spirit	, C , T , 2 ,	44.0 ,	293.0 ,	10000 ,	S76	, S76	, Y , I
SA330J	, Aerospatiale SA-330J Puma	, C , T , 2 ,	49.0 ,	265.0 ,	15432 ,	SA330J	, SA330J	, Y , I
SA341G	, Aerospatiale SA-341G/342 Gazalle	, C , T , 1 ,	34.4 ,	378.0 ,	3970 ,	SA341G	, SA341G	, N , I
SA350D	, Aerospatiale SA-350D Astar (AS-350)	, C , T , 1 ,	35.1 ,	386.0 ,	4300 ,	SA350D	, SA350D	, N , I
SA355F	, Aerospatiale SA-355F Twin Star (AS-355)	, C , T , 2 ,	35.1 ,	394.0 ,	5070 ,	SA355F	, SA355F	, N , I
SA365N	, Aerospatiale SA-365N Dauphin (AS-365N)	, C , T , 2 ,	39.1 ,	365.0 ,	8488 ,	SA365N	, SA365N	, Y , I

## F.6 Helo\_nois\_grp.dbf

File: helo\_nois\_grp.dbf

Last update: 06 Feb 2007 15:34:44

Fields(7):

1	NOISE_ID	C	12
2	SPECT_APP	N	3.0
3	SPECT_DEP	N	3.0
4	SPECT_LEV	N	3.0
5	SPEED_APP	N	6.1
6	SPEED_DEP	N	6.1
7	SPEED_LEV	N	6.1

Records(19)

A109	, 217 , 115 , 301 ,	60.0 ,	60.0 ,	116.0
B206L	, 222 , 120 , 304 ,	57.0 ,	57.0 ,	114.0
B212	, 221 , 114 , 304 ,	54.7 ,	53.4 ,	94.0
B222	, 218 , 115 , 304 ,	65.0 ,	65.0 ,	123.0
BO105	, 217 , 114 , 301 ,	69.6 ,	67.2 ,	117.0
CH47D	, 221 , 119 , 306 ,	85.0 ,	85.0 ,	120.0
EC130	, 217 , 116 , 303 ,	65.0 ,	65.0 ,	113.4
H500D	, 217 , 116 , 304 ,	62.0 ,	62.0 ,	111.0
MD600N	, 217 , 115 , 303 ,	60.0 ,	60.0 ,	105.0
R22	, 217 , 115 , 303 ,	53.0 ,	53.0 ,	91.8
S61	, 219 , 118 , 303 ,	73.6 ,	73.2 ,	129.6
S65	, 219 , 116 , 305 ,	75.6 ,	73.9 ,	146.0
S70	, 219 , 114 , 305 ,	69.0 ,	74.0 ,	150.0
S76	, 219 , 119 , 302 ,	74.0 ,	74.0 ,	130.0
SA330J	, 218 , 118 , 303 ,	69.6 ,	69.4 ,	126.0
SA341G	, 219 , 117 , 302 ,	64.6 ,	63.6 ,	127.8
SA350D	, 219 , 115 , 301 ,	63.0 ,	63.0 ,	116.0
SA355F	, 220 , 116 , 301 ,	63.0 ,	63.0 ,	116.0
SA365N	, 220 , 117 , 302 ,	75.0 ,	74.0 ,	120.0

## F.7 Metric.dbf

File: metric.dbf

Last update: 05 Dec 2006 15:13:21

Fields(7):

1	METRIC_ID	C	6
2	METRIC_TYP	C	1
3	FREQ_TYPE	C	1
4	WGT_DAY	N	6.2
5	WGT_EVE	N	6.2
6	WGT_NIGHT	N	6.2
7	DB_MINUS	N	5.2

Records(17)

DNL	,	E	,	A	,	1.00	,	1.00	,	10.00	,	49.37
CNEL	,	E	,	A	,	1.00	,	3.00	,	10.00	,	49.37
LAEQ	,	E	,	A	,	1.00	,	1.00	,	1.00	,	49.37
LAEQD	,	E	,	A	,	1.00	,	1.00	,	0.00	,	47.32
LAEQN	,	E	,	A	,	0.00	,	0.00	,	1.00	,	45.11
SEL	,	E	,	A	,	1.00	,	1.00	,	1.00	,	0.00
DDOSE	,	E	,	A	,	1.00	,	1.00	,	1.00	,	46.35
LAMAX	,	M	,	A	,	1.00	,	1.00	,	1.00	,	0.00
TALA	,	T	,	A	,	1.00	,	1.00	,	1.00	,	0.00
NEF	,	E	,	P	,	1.00	,	1.00	,	16.67	,	88.00
WECPNL	,	E	,	P	,	1.00	,	3.00	,	10.00	,	39.37
EPNL	,	E	,	P	,	1.00	,	1.00	,	1.00	,	0.00
PNLTM	,	M	,	P	,	1.00	,	1.00	,	1.00	,	0.00
TAPNL	,	T	,	P	,	1.00	,	1.00	,	1.00	,	0.00
CEXP	,	E	,	C	,	1.00	,	1.00	,	1.00	,	0.00
LCMAX	,	M	,	C	,	1.00	,	1.00	,	1.00	,	0.00
TALC	,	T	,	C	,	1.00	,	1.00	,	1.00	,	0.00

## F.8 Milacft.dbf

File: milacft.dbf

Last update: 20 Feb 2007 16:20:18

Fields(14):

```

1 ACFT_ID      C 12
2 ACFT_DESCR   C 40
3 WGT_CAT      C 1
4 OWNER_CAT    C 1
5 ENG_TYPE     C 1
6 NOISE_CAT    C 1
7 NOISE_ID     C 12
8 NUMB_ENG     N 1.0
9 THR_RESTOR   C 1
10 MX_GW_TKO   N 7.0
11 MX_GW_LND   N 7.0
12 MX_DS_STOP  N 5.0
13 COEFF_TYPE  C 1
14 THR_STATIC  N 6.0
    
```

Records(115)

A10A	, FAIRCHILD THUNDERBOLT II TF34-GE-100	NM	,	L	,	M	,	J	,	0	,	M00901	,	2	,	N	,	50000	,	33140	,	0	,	J	,	9065
A3	, MCDONNELL DOUGLAS SKYWARRIOR J79-GE-8	NM	,	L	,	M	,	J	,	0	,	M00201	,	2	,	N	,	80000	,	62923	,	0	,	J	,	11000
A37	, CESSNA DRAGONFLY J85-GE-17A	NM	,	L	,	M	,	J	,	0	,	M01001	,	2	,	N	,	14399	,	9556	,	0	,	J	,	2851
A4C	, MCDONNELL DOUGLAS SKYHAWK J52-P-8A	NM	,	L	,	M	,	J	,	0	,	M00301	,	1	,	N	,	24490	,	16103	,	0	,	J	,	9293
A5C	, J79-GE-10	NM	,	L	,	M	,	J	,	0	,	M00401	,	2	,	N	,	80000	,	62923	,	0	,	J	,	11870
A6A	, GRUMMAN INTRUDER J52-P-8B	NM	,	L	,	M	,	J	,	0	,	M00501	,	2	,	N	,	60400	,	45500	,	1900	,	J	,	9300
A7E	, VUGHT CORSAIR II TF41-A-2	NM	,	L	,	M	,	J	,	0	,	M00601	,	1	,	N	,	42000	,	29426	,	0	,	J	,	15000
AV8A	, BAE HARRIER AV8A	NM	,	L	,	M	,	J	,	0	,	M00701	,	1	,	N	,	0	,	0	,	0	,	J	,	0
AV8B	, BAE HARRIER F402-RR-408	NM	,	L	,	M	,	J	,	0	,	M00702	,	1	,	N	,	31000	,	25000	,	0	,	J	,	24000
B1	, ROCKWELL LANCER F101-GE-102	NM	,	H	,	M	,	J	,	0	,	M01201	,	4	,	N	,	477000	,	295000	,	0	,	J	,	31000
B2A	, F118-GE-110	NM	,	H	,	M	,	J	,	0	,	M01301	,	4	,	N	,	376000	,	169000	,	0	,	J	,	19000
B52BDE	, BOEING STRATOFORTRESS J57P-19W	NM	,	H	,	M	,	J	,	0	,	M01401	,	8	,	N	,	420000	,	0	,	0	,	J	,	0
B52G	, BOEING STRATOFORTRESS J57-P-43WB	NM	,	H	,	M	,	J	,	0	,	M01402	,	8	,	N	,	488000	,	0	,	0	,	J	,	14000
B52H	, BOEING STRATOFORTRESS B52H	NM	,	H	,	M	,	J	,	0	,	M01403	,	8	,	N	,	0	,	0	,	0	,	J	,	0
B57E	, ENGLISH ELECTRIC CANBERRA J57-PW-P-5	NM	,	L	,	M	,	J	,	0	,	M01501	,	2	,	N	,	54800	,	0	,	0	,	J	,	11000
BUCCAN	, RR SPEY RB 168-1A	NM	,	L	,	M	,	J	,	0	,	M45401	,	2	,	N	,	45843	,	0	,	0	,	J	,	11330
C118	, MCDONNELL DOUGLAS LIFT PW R-2800-CB17	NM	,	L	,	M	,	P	,	0	,	M02601	,	4	,	N	,	107000	,	85180	,	0	,	P	,	1865
C119L	, FAIRCHILD FLYING BOX CAR C119L	NM	,	L	,	M	,	P	,	0	,	M02701	,	2	,	N	,	74300	,	45000	,	0	,	P	,	0
C12	, BEECH SUPER KING AIR HURON PW PT6A-41	NM	,	S	,	M	,	T	,	0	,	M01901	,	2	,	N	,	12500	,	12500	,	1760	,	P	,	850
C121	, C121	NM	,	L	,	M	,	J	,	0	,	M02801	,	2	,	N	,	0	,	0	,	0	,	J	,	0
C123K	, FAIRCHILD PW R-2800-99W AUX J85-GE17	NM	,	L	,	M	,	P	,	0	,	M01101	,	2	,	N	,	60000	,	29904	,	0	,	P	,	1715
C130AD	, LOCKHEED HERCULES T56-A15	NM	,	L	,	M	,	T	,	0	,	M02901	,	4	,	N	,	175000	,	175000	,	0	,	P	,	4508
C-130E	, LOCKHEED HERCULES T56-A15 C130E	NM	,	L	,	M	,	T	,	0	,	M02902	,	4	,	N	,	175000	,	175000	,	0	,	J	,	4508
C130HP	, LOCKHEED HERCULES C130HP	NM	,	L	,	M	,	T	,	0	,	M02903	,	4	,	N	,	0	,	0	,	0	,	P	,	0
C131B	, GENERAL DYNAMICS CV34 PW R-2800-99W	NM	,	L	,	M	,	J	,	0	,	M03001	,	2	,	N	,	41740	,	38000	,	0	,	J	,	2900

C135A	, BOEING STRATOLIFTER PW J57-59W	NM	H	M	J	0	M03101	4	N	300000	157000	0	J	14000
C135B	, BOEING STRATOLIFTER C135B	NM	H	M	J	0	M03102	4	N	300000	157000	0	J	14000
C137	, JT3D-3B	NM	H	M	J	0	M03201	4	N	322000	0	0	J	18000
C140	, LOCKHEED JETSTAR TFE731-3	NM	L	M	J	0	M03301	4	N	44507	38312	0	J	3000
C141A	, LOCKHEED STARLIFTER TF-33-P-7	NM	H	M	J	0	M03401	4	N	342283	124892	0	J	21000
C17	, F117-PW-100	NM	H	M	J	0	M02001	4	N	585000	446000	3000	J	40700
C18A	, JT41-11	NM	H	M	J	0	M02101	4	N	331000	247000	2575	J	18000
C-20	, GULFSTREAM III MK611-8RR	NM	L	M	J	0	M02201	2	N	74600	66000	3190	J	13850
C21A	, LEARJET 35 TFE731-2-2B	NM	L	M	J	0	M02301	2	N	18300	15567	0	J	3500
C22	, BOEING 727 TRS18-1	NM	L	M	J	0	M02401	3	N	0	0	0	J	0
C23	, PT6A-65AR	NM	L	M	J	0	M02501	2	N	25600	25100	1920	J	1424
C5A	, LOCKHEED GALAXY TF39-GE-1	NM	H	M	J	0	M01601	4	N	769000	636000	2230	J	41000
C7A	, DEHAVILLAND CARIBOU DHC-4A	NM	L	M	P	0	M01701	2	N	0	0	0	P	0
C9A	, MCDONNELL DOUGLAS DC9 JT8D-9	NM	L	M	J	0	M01801	2	N	121000	110000	4680	J	14500
CANBER	, 2 RR AVON 109	NM	L	M	J	0	M46401	2	N	54935	27947	0	J	7396
DOMIN	, BRISTOL SIDDELEY VIPER 521	NM	L	M	J	0	M46301	2	N	20497	0	0	J	3125
E3A	, BOEING SENTRY TF33-PW-100A	NM	H	M	J	0	M03501	4	N	324909	160000	0	J	21000
E4	, BOEING 747 CF6-50E	NM	H	M	J	0	M03601	4	N	800000	564000	6170	J	52500
E8A	, JT3D-3B	NM	H	M	J	0	M03801	4	N	336000	263000	0	J	18000
EA6B	, J52-P-408	NM	L	M	J	0	M03701	2	N	65000	45500	1900	J	11200
F100D	, ROCKWELL SUPER SABRE PW J57-P-21A	NM	L	M	J	0	M04601	1	N	32839	32315	0	J	17000
F101B	, PW J57-P-55	NM	L	M	J	0	M04701	2	N	52408	44578	0	J	0
F102	, PW J57-P-23	NM	L	M	J	0	M04801	1	N	31505	0	0	J	17000
F104G	, LOCKHEED STARFIGHTER J79-GE-11A	NM	L	M	J	0	M04901	1	N	28779	23000	0	J	16000
F105D	, PW J75-P-19W	NM	L	M	J	0	M05001	1	N	52847	41321	0	J	26000
F106	, PW J57-P-17	NM	L	M	J	0	M05101	1	N	41440	37170	0	J	25000
F111AE	, GENERAL DYNAMICS F111AE PW TF30-P-100	NM	L	M	J	0	M05201	2	N	100000	72418	0	J	25000
F111D	, GENERAL DYNAMICS F111D	NM	L	M	J	0	M05202	2	N	0	0	0	J	0
F-111F	, GENERAL DYNAMICS F111F	NM	L	M	J	0	M05203	2	N	0	0	0	J	0
F117A	, F404-GE-F1D2	NM	L	M	J	0	M05301	2	N	52500	45385	0	J	11000
F14A	, GRUMMAN TOMCAT TF30-P-414A	NM	L	M	J	0	M04201	2	N	53000	36000	0	J	21000
F14B	, GRUMMAN TOMCAT F110-GE-400	NM	L	M	J	0	M04202	2	N	74349	64277	0	J	27000
F15A	, MCDONNELL DOUGLAS EAGLE F100-PW-100	NM	L	M	J	0	M04301	2	N	56000	0	2500	J	25000
F15E20	, MCDONNELL DOUGLAS EAGLE F100-PW-220	NM	L	M	J	0	M04303	2	N	81000	44300	0	J	23000
F15E29	, MCDONNELL DOUGLAS EAGLE F100-PW-229	NM	L	M	J	0	M04304	2	N	0	0	0	J	29000
F16A	, GENERAL DYNAMICS FALCON PW200	NM	L	M	J	0	M04401	1	N	0	0	0	J	0
F16GE	, GENERAL DYNAMICS FALCON F110-GE-100	NM	L	M	J	0	M04404	1	N	42300	29261	0	J	29000
F16PW0	, GENERAL DYNAMICS FALCON F100-PW-220	NM	L	M	J	0	M04402	1	N	42300	28058	0	J	24000
F16PW9	, GENERAL DYNAMICS FALCON F100-PW-229	NM	L	M	J	0	M04403	1	N	42300	28809	0	J	29000
F-18	, MCDONNELL DOUGLAS HORNET F404-GE-400	NM	L	M	J	0	M04501	2	N	56000	36665	0	J	16000
F18EF	, Boeing F-18E/F / F414-GE-400	NM	L	M	J	0	M04502	2	N	66000	0	0	J	22000
F-4C	, MCDONNELL DOUGLAS PHANTOM J79-6517A17	NM	L	M	J	0	M03901	2	N	61795	46000	3780	J	18000
F5AB	, NORTHROP TIGER J85-GE-13	NM	L	M	J	0	M04001	2	N	20576	19857	0	J	4080
F5E	, NORTHROP TIGER J85-GE-21B	NM	L	M	J	0	M04002	2	N	25152	25147	5000	J	5000
F8	, VOUGHT F-8 CRUSADER PW J57-P-201	NM	L	M	J	0	M04101	1	N	27500	0	0	J	18000
FB111A	, GENERAL DYNAMICS FB111 PW TF30-P-100	NM	L	M	J	0	M05204	2	N	100000	72418	0	J	25000
HARRIE	, BAE HARRIER AV8 RR PEGASUS 6	NM	L	M	J	0	M45501	1	N	16000	11989	0	J	19198
HAWK	, RR ADOUR MK151	NM	S	M	J	0	M46101	1	N	12000	7447	0	J	5350

HS748	, RR DART RDA7 MK 536-2	NM	, L	, M	, J	, 0	, M46501	, 2	, N	, 0	, 46486	, 0	, J	, 0
HUNTER	, RR AVON RA28	NM	, L	, M	, J	, 0	, M45601	, 1	, N	, 23990	, 13809	, 0	, J	, 9913
JAGUAR	, SEPECAT JAGUAR	NM	, L	, M	, J	, 0	, M45201	, 2	, N	, 34100	, 0	, 0	, J	, 0
JPATS	, Raytheon T-6A Texan II / PT6A-68	NM	, S	, M	, T	, 0	, M08301	, 1	, N	, 6300	, 0	, 0	, P	, 1100
KC10A	, CFG-50C2	NM	, H	, M	, J	, 0	, M05401	, 3	, N	, 590000	, 403000	, 5350	, J	, 53000
KC-135	, BOEING STRATOTANKER KC135R F108-CF100	NM	, H	, M	, J	, 0	, M03104	, 4	, N	, 323000	, 0	, 0	, J	, 22000
KC97L	, BOEING STRATOFREIGHTER PW R-436-59B	NM	, L	, M	, P	, 0	, M05501	, 4	, N	, 0	, 0	, 0	, P	, 2570
LIGHTN	, RR AVON 302C	NM	, L	, M	, J	, 0	, M45301	, 2	, N	, 41876	, 0	, 2880	, J	, 13218
NIMROD	, RR SPEY MK511	NM	, L	, M	, J	, 0	, M45901	, 4	, N	, 191748	, 0	, 0	, J	, 10947
OV10A	, ROCKWELL BRONCO T76	NM	, L	, M	, T	, 0	, M05601	, 2	, N	, 14466	, 10721	, 0	, J	, 715
P3A	, LOCKHEED ORION T56-A-14	NM	, L	, M	, T	, 0	, M05701	, 4	, N	, 142000	, 104000	, 0	, J	, 4910
P3C	, LOCKHEED ORION / T56-A-14	NM	, L	, M	, T	, 0	, M05702	, 4	, N	, 135000	, 104000	, 0	, J	, 4910
PHANTO	, MCDONNELL DOUGLAS PHANTOM F-4	NM	, L	, M	, J	, 0	, M45001	, 2	, N	, 0	, 0	, 0	, J	, 0
PROVOS	, BRISTON SIDDELEY VIPER 11	NM	, S	, M	, J	, 0	, M46201	, 1	, N	, 7295	, 4654	, 0	, J	, 2454
S3A&B	, LOCKHEED VIKING TF34-6E-2	NM	, L	, M	, J	, 0	, M05801	, 2	, N	, 52539	, 45914	, 1600	, J	, 9275
SR71	, JT11D-20B	NM	, L	, M	, J	, 0	, M05901	, 2	, N	, 170000	, 60000	, 2600	, J	, 32500
T1	, LOCKHEED SEA STAR JT15D-5	NM	, L	, M	, J	, 0	, M06001	, 1	, N	, 16100	, 15700	, 0	, J	, 2965
T29	, GENERAL DYNAMICS CV34 PW R-2800-99W	NM	, L	, M	, P	, 0	, M06401	, 2	, N	, 41740	, 0	, 0	, P	, 0
T-2C	, ROCKWELL BUCKEYE J85-6E-4	NM	, L	, M	, J	, 0	, M06101	, 2	, N	, 13284	, 12646	, 0	, J	, 2950
T3	, AEIO-540-D4A5	NM	, S	, M	, J	, 0	, M06201	, 1	, N	, 2525	, 2738	, 0	, J	, 260
T33A	, LOCKHEED T-33A J33-35	NM	, L	, M	, J	, 0	, M06501	, 2	, N	, 0	, 0	, 0	, J	, 5203
T34	, BEECH MENTOR (BE45) PT6A-25	NM	, S	, M	, P	, 0	, M06601	, 1	, N	, 4300	, 4300	, 0	, P	, 715
T37B	, CESSNA 318 J69-T-25	NM	, S	, M	, J	, 0	, M06701	, 2	, N	, 6625	, 0	, 0	, J	, 1025
T-38A	, NORTHROP TALON T-38A	NM	, S	, M	, J	, 0	, M06801	, 2	, N	, 12093	, 0	, 0	, J	, 3850
T39A	, ROCKWELL SABRELINER GEJ85	NM	, L	, M	, J	, 0	, M06901	, 2	, N	, 0	, 0	, 0	, J	, 0
T41	, CESSNA 172 O-320-E2D	NM	, S	, M	, P	, 0	, M07001	, 1	, N	, 0	, 0	, 0	, P	, 110
T42	, BEECH BARON (BE55)	NM	, S	, M	, P	, 0	, M07101	, 2	, N	, 5500	, 5400	, 2450	, P	, 300
T-43A	, BOEING 737 T43A	NM	, L	, M	, J	, 0	, M07201	, 2	, N	, 0	, 0	, 0	, J	, 0
T44	, T44	NM	, L	, M	, J	, 0	, M07301	, 2	, N	, 0	, 0	, 0	, J	, 0
T45	, PT6A-45AG	NM	, L	, M	, J	, 0	, M07401	, 2	, N	, 14081	, 15129	, 0	, J	, 5450
TORNAD	, RB199-34R	NM	, L	, M	, J	, 0	, M45101	, 2	, N	, 45000	, 30620	, 1215	, J	, 16075
TR1	, J75-P-13B	NM	, L	, M	, J	, 0	, M07501	, 1	, N	, 40000	, 0	, 0	, J	, 17000
U2	, LOCKHEED U2 J75-P-13	NM	, L	, M	, J	, 0	, M07601	, 1	, N	, 40000	, 10000	, 0	, J	, 11000
U21	, BEECH UTE PW PT6A-20	NM	, S	, M	, T	, 0	, M08001	, 2	, N	, 12500	, 12500	, 1760	, P	, 850
U4B	, ROCKWELL SUPER COMMANDER 1G0-540B1A	NM	, S	, M	, P	, 0	, M07701	, 2	, N	, 0	, 0	, 0	, P	, 350
U6	, DEHAVILLAND BEAVER PW R-985 DHC-2	NM	, S	, M	, P	, 0	, M07801	, 1	, N	, 0	, 0	, 0	, P	, 330
U8F	, BEECH SEMINOLE 0-480-1 D50	NM	, S	, M	, P	, 0	, M07901	, 2	, N	, 0	, 0	, 0	, P	, 254
VC10	, RR CONWAY RC0-42	NM	, H	, M	, J	, 0	, M46001	, 4	, N	, 311912	, 147875	, 0	, J	, 20996
VICTOR	, BRITISH AEROSPACE VICTOR	NM	, L	, M	, J	, 0	, M45701	, 4	, N	, 0	, 0	, 0	, J	, 0
VULCAN	, BRITTEN NORMAN VULCAN RR OLYMPUS 301	NM	, L	, M	, J	, 0	, M45801	, 4	, N	, 200564	, 0	, 0	, J	, 20007
YC14	, GE CF6-50D	NM	, L	, M	, J	, 0	, M08101	, 2	, N	, 237000	, 181000	, 0	, J	, 51000
YC15	, PWJT8D-17	NM	, L	, M	, J	, 0	, M08201	, 4	, N	, 0	, 0	, 0	, J	, 16000

## F.9 Milnois\_grp.dbf

File: milnois\_grp.dbf

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Fields(6):

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1 NOISE_ID      C 12
2 THRSET_TYP    C  1
3 MODEL_TYPE    C  1
4 SPECT_APP     N  3.0
5 SPECT_DEP     N  3.0
6 SPECT_AFB     N  3.0
    
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Records(115)

M00201	, R , N , 230 , 128 , 0	M03101	, E , N , 230 , 126 , 126
M00301	, N , N , 230 , 127 , 0	M03102	, E , N , 223 , 130 , 0
M00401	, R , N , 227 , 127 , 127	M03104	, V , N , 233 , 124 , 0
M00501	, R , N , 233 , 128 , 0	M03201	, E , N , 223 , 130 , 0
M00601	, N , N , 230 , 126 , 0	M03301	, R , N , 230 , 127 , 0
M00701	, R , N , 231 , 128 , 0	M03401	, E , N , 223 , 127 , 0
M00702	, R , N , 231 , 128 , 0	M03501	, E , N , 224 , 126 , 0
M00901	, F , N , 223 , 128 , 0	M03601	, O , N , 224 , 126 , 0
M01001	, R , N , 231 , 128 , 0	M03701	, R , N , 233 , 128 , 0
M01101	, M , N , 227 , 122 , 0	M03801	, E , N , 224 , 130 , 0
M01201	, R , N , 229 , 126 , 126	M03901	, R , N , 233 , 127 , 127
M01301	, A , N , 224 , 127 , 0	M04001	, R , N , 228 , 131 , 131
M01401	, R , N , 230 , 127 , 127	M04002	, R , N , 228 , 131 , 131
M01402	, E , N , 230 , 127 , 127	M04101	, R , N , 230 , 127 , 127
M01403	, E , N , 223 , 130 , 0	M04201	, N , N , 223 , 127 , 127
M01501	, R , N , 230 , 126 , 0	M04202	, N , N , 232 , 128 , 128
M01601	, E , N , 224 , 131 , 0	M04301	, N , N , 228 , 126 , 126
M01701	, M , N , 225 , 125 , 0	M04303	, N , N , 228 , 126 , 126
M01801	, E , N , 224 , 126 , 0	M04304	, N , N , 228 , 126 , 126
M01901	, R , N , 228 , 111 , 0	M04401	, N , N , 229 , 126 , 126
M02001	, E , N , 224 , 126 , 0	M04402	, N , N , 229 , 126 , 126
M02101	, E , N , 224 , 130 , 0	M04403	, X , N , 232 , 126 , 126
M02201	, B , N , 229 , 125 , 0	M04404	, N , N , 232 , 126 , 126
M02301	, N , N , 228 , 126 , 0	M04501	, N , N , 232 , 126 , 126
M02401	, E , N , 224 , 126 , 0	M04502	, N , N , 232 , 126 , 126
M02501	, R , N , 228 , 111 , 0	M04601	, R , N , 230 , 127 , 127
M02601	, I , N , 227 , 122 , 0	M04701	, N , N , 230 , 128 , 128
M02701	, M , N , 225 , 125 , 0	M04801	, N , N , 230 , 127 , 127
M02801	, M , N , 225 , 125 , 0	M04901	, R , N , 231 , 127 , 127
M02901	, C , N , 234 , 112 , 0	M05001	, N , N , 233 , 128 , 128
M02902	, C , N , 234 , 112 , 0	M05101	, R , N , 233 , 127 , 127
M02903	, C , N , 234 , 112 , 0	M05201	, N , N , 229 , 127 , 127
M03001	, I , N , 227 , 122 , 0	M05202	, N , N , 229 , 127 , 127

M05203	, N , N , 229 , 127 , 127	M46501	, R , N , 224 , 127 , 0
M05204	, N , N , 229 , 126 , 126		
M05301	, R , N , 233 , 127 , 0		
M05401	, O , N , 224 , 126 , 0		
M05501	, I , N , 225 , 121 , 0		
M05601	, R , N , 228 , 123 , 0		
M05701	, H , N , 225 , 121 , 0		
M05702	, H , N , 225 , 121 , 0		
M05801	, N , N , 223 , 129 , 0		
M05901	, N , N , 226 , 121 , 121		
M06001	, N , N , 224 , 124 , 0		
M06101	, R , N , 230 , 128 , 0		
M06201	, R , N , 225 , 123 , 0		
M06401	, I , N , 227 , 122 , 0		
M06501	, R , N , 231 , 127 , 0		
M06601	, R , N , 226 , 123 , 0		
M06701	, R , N , 232 , 126 , 0		
M06801	, R , N , 231 , 128 , 128		
M06901	, E , N , 230 , 127 , 0		
M07001	, R , N , 226 , 123 , 0		
M07101	, R , N , 225 , 123 , 0		
M07201	, E , N , 224 , 126 , 0		
M07301	, R , N , 228 , 111 , 0		
M07401	, R , N , 227 , 124 , 0		
M07501	, R , N , 233 , 128 , 0		
M07601	, R , N , 233 , 128 , 0		
M07701	, I , N , 228 , 126 , 0		
M07801	, R , N , 226 , 123 , 0		
M07901	, R , N , 225 , 123 , 0		
M08001	, R , N , 228 , 111 , 0		
M08101	, V , N , 225 , 122 , 0		
M08201	, E , N , 231 , 127 , 0		
M08301	, O , N , 211 , 109 , 0		
M45001	, R , N , 229 , 125 , 125		
M45101	, R , N , 233 , 128 , 128		
M45201	, R , N , 230 , 127 , 127		
M45301	, R , N , 230 , 125 , 125		
M45401	, R , N , 230 , 128 , 0		
M45501	, R , N , 231 , 127 , 0		
M45601	, R , N , 230 , 127 , 0		
M45701	, R , N , 230 , 126 , 0		
M45801	, R , N , 233 , 125 , 0		
M45901	, R , N , 233 , 128 , 0		
M46001	, R , N , 231 , 126 , 0		
M46101	, R , N , 231 , 127 , 0		
M46201	, R , N , 230 , 124 , 0		
M46301	, R , N , 231 , 128 , 0		
M46401	, R , N , 230 , 127 , 0		

## F.10 MilNpd\_curv.dbf

File: milnpgd\_curv.dbf

Last update: 19 Jan 2007 12:13:44

Fields(14):

1	NOISE_ID	C	12
2	NOISE_TYPE	C	1
3	OP_MODE	C	1
4	THR_SET	N	9.2
5	L_200	N	5.1
6	L_400	N	5.1
7	L_630	N	5.1
8	L_1000	N	5.1
9	L_2000	N	5.1
10	L_4000	N	5.1
11	L_6300	N	5.1
12	L_10000	N	5.1
13	L_16000	N	5.1
14	L_25000	N	5.1

Records(5016)

M00201	, E, D ,	85.20	, 112.1	, 106.8	, 102.9	, 98.4	, 91.0	, 81.6	, 75.4	, 68.9	, 61.3	, 53.7
M00201	, E, D ,	86.00	, 113.4	, 108.1	, 104.2	, 99.7	, 92.3	, 83.0	, 76.8	, 70.1	, 62.5	, 54.9
M00201	, E, D ,	87.00	, 115.0	, 109.7	, 105.8	, 101.4	, 94.0	, 84.7	, 78.4	, 71.6	, 64.0	, 56.2
M00201	, E, A ,	88.00	, 118.0	, 112.9	, 109.1	, 104.9	, 97.6	, 89.8	, 83.8	, 77.3	, 70.2	, 62.0
M00201	, E, D ,	88.00	, 116.6	, 111.3	, 107.4	, 103.0	, 95.6	, 86.4	, 80.0	, 73.2	, 65.6	, 57.6
M00201	, E, A ,	89.00	, 119.6	, 114.5	, 110.7	, 106.6	, 99.3	, 91.5	, 85.4	, 78.9	, 71.8	, 63.4
M00201	, E, D ,	89.00	, 118.1	, 113.0	, 109.1	, 104.7	, 97.3	, 88.1	, 81.7	, 74.7	, 67.1	, 59.0
M00201	, E, A ,	90.00	, 121.2	, 116.1	, 112.4	, 108.2	, 100.9	, 93.2	, 87.0	, 80.4	, 73.3	, 64.8
M00201	, E, D ,	90.00	, 119.7	, 114.6	, 110.7	, 106.3	, 98.9	, 89.8	, 83.3	, 76.2	, 68.6	, 60.4
M00201	, E, D ,	92.00	, 122.9	, 117.8	, 114.0	, 109.7	, 102.3	, 93.2	, 86.6	, 79.3	, 71.7	, 63.2
M00201	, E, D ,	94.00	, 126.1	, 121.0	, 117.3	, 113.0	, 105.6	, 96.5	, 89.9	, 82.3	, 74.7	, 66.0
M00201	, E, D ,	96.00	, 129.3	, 124.3	, 120.5	, 116.3	, 108.9	, 99.9	, 93.2	, 85.4	, 77.8	, 68.8
M00201	, E, D ,	97.00	, 130.9	, 125.9	, 122.2	, 118.0	, 110.6	, 101.6	, 94.8	, 86.9	, 79.3	, 70.2
M00201	, E, D ,	98.00	, 132.5	, 127.5	, 123.8	, 119.6	, 112.2	, 103.3	, 96.5	, 88.4	, 80.8	, 71.6
M00201	, E, D ,	98.80	, 133.8	, 128.8	, 125.1	, 121.0	, 113.6	, 104.7	, 97.8	, 89.6	, 82.1	, 72.7
M00201	, M, D ,	85.20	, 103.2	, 96.5	, 91.8	, 86.8	, 78.6	, 69.5	, 62.9	, 55.7	, 48.0	, 39.5
M00201	, M, D ,	86.00	, 104.5	, 97.8	, 93.1	, 88.2	, 80.0	, 70.9	, 64.2	, 57.0	, 49.1	, 40.6
M00201	, M, D ,	87.00	, 106.2	, 99.5	, 94.8	, 89.8	, 81.7	, 72.5	, 65.8	, 58.5	, 50.5	, 41.8
M00201	, M, A ,	88.00	, 111.8	, 105.2	, 100.7	, 95.8	, 88.0	, 79.3	, 72.8	, 65.7	, 57.7	, 48.9
M00201	, M, D ,	88.00	, 107.9	, 101.2	, 96.5	, 91.5	, 83.3	, 74.2	, 67.4	, 60.1	, 52.0	, 43.1
M00201	, M, A ,	89.00	, 113.4	, 106.9	, 102.3	, 97.5	, 89.7	, 81.0	, 74.4	, 67.2	, 59.1	, 50.2
M00201	, M, D ,	89.00	, 109.5	, 102.8	, 98.1	, 93.2	, 85.0	, 75.9	, 69.1	, 61.6	, 53.4	, 44.4
M00201	, M, A ,	90.00	, 115.1	, 108.5	, 104.0	, 99.2	, 91.4	, 82.6	, 76.1	, 68.8	, 60.6	, 51.4
M00201	, M, D ,	90.00	, 111.2	, 104.5	, 99.8	, 94.8	, 86.7	, 77.6	, 70.7	, 63.2	, 54.8	, 45.7

## F.11 MilProfPts.dbf

File: milprof\_pts.dbf

Last update: 20 Feb 2007 13:20:33

Fields(10):

1	ACFT_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	PT_NUM	N	3.0
6	DISTANCE	N	10.1
7	ALTITUDE	N	7.1
8	SPEED	N	5.1
9	THR_SET	N	9.2
10	OP_MODE	C	1

Records(1304)

A10A	, A , NOISEMAP , 1 , 1 ,	-201200.0 , 10532.0 , 250.0 ,	5325.00 , A
A10A	, A , NOISEMAP , 1 , 2 ,	-91200.0 , 5000.0 , 250.0 ,	5325.00 , A
A10A	, A , NOISEMAP , 1 , 3 ,	-31200.0 , 1575.0 , 130.0 ,	5225.00 , A
A10A	, A , NOISEMAP , 1 , 4 ,	-7200.0 , 300.0 , 130.0 ,	5000.00 , A
A10A	, A , NOISEMAP , 1 , 5 ,	-1200.0 , 50.0 , 130.0 ,	5000.00 , A
A10A	, A , NOISEMAP , 1 , 6 ,	0.0 , 0.0 , 130.0 ,	5000.00 , A
A10A	, A , NOISEMAP , 1 , 7 ,	10.0 , 0.0 , 130.0 ,	5000.00 , A
A10A	, D , NOISEMAP , 1 , 1 ,	0.0 , 0.0 , 0.0 ,	5970.00 , D
A10A	, D , NOISEMAP , 1 , 2 ,	2700.0 , 0.0 , 135.0 ,	6700.00 , D
A10A	, D , NOISEMAP , 1 , 3 ,	9600.0 , 400.0 , 160.0 ,	6700.00 , D
A10A	, D , NOISEMAP , 1 , 4 ,	34600.0 , 9000.0 , 250.0 ,	6700.00 , D
A10A	, D , NOISEMAP , 1 , 5 ,	200000.0 , 11000.0 , 250.0 ,	6700.00 , D
A3	, A , NOISEMAP , 1 , 1 ,	-200980.6 , 10532.0 , 200.0 ,	87.00 , A
A3	, A , NOISEMAP , 1 , 2 ,	-31380.6 , 1600.0 , 135.0 ,	87.00 , A
A3	, A , NOISEMAP , 1 , 3 ,	-980.6 , 50.0 , 135.0 ,	87.00 , A
A3	, A , NOISEMAP , 1 , 4 ,	0.0 , 0.0 , 135.0 ,	87.00 , A
A3	, A , NOISEMAP , 1 , 5 ,	10.0 , 0.0 , 135.0 ,	87.00 , A
A3	, D , NOISEMAP , 1 , 1 ,	0.0 , 0.0 , 0.0 ,	97.00 , D
A3	, D , NOISEMAP , 1 , 2 ,	1200.0 , 0.0 , 105.0 ,	98.00 , D
A3	, D , NOISEMAP , 1 , 3 ,	9000.0 , 400.0 , 190.0 ,	98.00 , D
A3	, D , NOISEMAP , 1 , 4 ,	11000.0 , 700.0 , 250.0 ,	93.00 , D
A3	, D , NOISEMAP , 1 , 5 ,	19000.0 , 1400.0 , 250.0 ,	93.00 , D
A3	, D , NOISEMAP , 1 , 6 ,	29000.0 , 2100.0 , 250.0 ,	93.00 , D
A3	, D , NOISEMAP , 1 , 7 ,	37000.0 , 3000.0 , 250.0 ,	93.00 , D
A3	, D , NOISEMAP , 1 , 8 ,	200000.0 , 5000.0 , 250.0 ,	93.00 , D
A37	, A , NOISEMAP , 1 , 1 ,	-200973.0 , 10532.0 , 200.0 ,	88.20 , A
A37	, A , NOISEMAP , 1 , 2 ,	-48973.0 , 2566.0 , 130.0 ,	88.20 , A

## F.12 MilProfile.dbf

File: milprofile.dbf

Last update: 05 Dec 2006 15:13:21

Fields(5):

1	ACFT_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	WEIGHT	N	7.0

Records(200)

A10A	, D , NOISEMAP , 1 , 42500	C130HP	, D , NOISEMAP , 1 , 85000
A10A	, A , NOISEMAP , 1 , 29826	C130HP	, A , NOISEMAP , 1 , 90000
A3	, D , NOISEMAP , 1 , 68000	C131B	, D , NOISEMAP , 1 , 35479
A3	, A , NOISEMAP , 1 , 56630	C131B	, A , NOISEMAP , 1 , 34200
A37	, D , NOISEMAP , 1 , 12239	C135A	, D , NOISEMAP , 1 , 255000
A37	, A , NOISEMAP , 1 , 8600	C135A	, D , NOISEMAP , 2 , 255000
A4C	, D , NOISEMAP , 1 , 20816	C135A	, A , NOISEMAP , 1 , 141300
A4C	, A , NOISEMAP , 1 , 14492	C135B	, D , NOISEMAP , 1 , 255000
A6A	, D , NOISEMAP , 1 , 51340	C135B	, A , NOISEMAP , 1 , 141300
A6A	, A , NOISEMAP , 1 , 40950	C137	, D , NOISEMAP , 1 , 273700
A6A	, A , NOISEMAP , 2 , 40950	C137	, A , NOISEMAP , 1 , 90000
A7E	, D , NOISEMAP , 1 , 35700	C140	, A , NOISEMAP , 1 , 34480
A7E	, A , NOISEMAP , 1 , 26483	C140	, D , NOISEMAP , 1 , 37830
B1	, D , NOISEMAP , 1 , 405450	C141A	, D , NOISEMAP , 1 , 290940
B1	, A , NOISEMAP , 1 , 265500	C141A	, A , NOISEMAP , 1 , 112402
B2A	, D , NOISEMAP , 1 , 319600	C17	, D , NOISEMAP , 1 , 497250
B2A	, A , NOISEMAP , 1 , 152100	C17	, A , NOISEMAP , 1 , 401400
B52BDE	, D , NOISEMAP , 1 , 357000	C18A	, D , NOISEMAP , 1 , 281350
B52BDE	, A , NOISEMAP , 1 , 90000	C18A	, A , NOISEMAP , 1 , 222300
B52G	, D , NOISEMAP , 1 , 414800	C-20	, D , NOISEMAP , 1 , 63410
B52G	, D , NOISEMAP , 2 , 414800	C-20	, A , NOISEMAP , 1 , 59400
B52G	, A , NOISEMAP , 1 , 90000	C21A	, D , NOISEMAP , 1 , 15555
B52H	, D , NOISEMAP , 1 , 85000	C21A	, A , NOISEMAP , 1 , 14010
B52H	, A , NOISEMAP , 1 , 90000	C22	, D , NOISEMAP , 1 , 85000
B57E	, D , NOISEMAP , 1 , 46580	C22	, A , NOISEMAP , 1 , 90000
B57E	, A , NOISEMAP , 1 , 90000	C23	, D , NOISEMAP , 1 , 21760
C118	, D , NOISEMAP , 1 , 90950	C23	, A , NOISEMAP , 1 , 22590
C118	, A , NOISEMAP , 1 , 76662	C5A	, D , NOISEMAP , 1 , 653650
C12	, D , NOISEMAP , 1 , 10625	C5A	, A , NOISEMAP , 1 , 572400
C12	, A , NOISEMAP , 1 , 11250	C7A	, D , NOISEMAP , 1 , 85000
C130AD	, D , NOISEMAP , 1 , 148750	C7A	, A , NOISEMAP , 1 , 90000
C130AD	, A , NOISEMAP , 1 , 157500	C9A	, D , NOISEMAP , 1 , 102850
C-130E	, D , NOISEMAP , 1 , 148750	C9A	, A , NOISEMAP , 1 , 99000
C-130E	, A , NOISEMAP , 1 , 157500	E3A	, A , NOISEMAP , 1 , 144000

## F.13 Noise\_grp.dbf

File: nois\_grp.dbf  
 Last update: 05 Dec 2006 15:13:20

Fields(6):

```

1 NOISE_ID      C 12
2 THRSET_TYP   C 1
3 MODEL_TYPE    C 1
4 SPECT_APP     N 3.0
5 SPECT_DEP    N 3.0
6 SPECT_AFB    N 3.0
    
```

Records(97)

BR715	, L , I , 203 , 134 , 0	PT6A27	, P , I , 210 , 109 , 0
AE300C	, L , I , 202 , 134 , 0	PT6A45	, P , I , 211 , 109 , 0
TRENT8	, L , I , 203 , 105 , 0	PT6A50	, P , I , 213 , 112 , 0
2CF650	, L , I , 203 , 103 , 0	PW120	, P , I , 213 , 112 , 0
2CF680	, L , I , 203 , 103 , 0	PW2037	, L , I , 203 , 103 , 0
2CF68D	, L , I , 203 , 103 , 0	PW4056	, L , I , 207 , 107 , 0
2JT8D	, L , I , 201 , 132 , 0	PW4460	, L , I , 203 , 103 , 0
2JT8DW	, L , I , 201 , 101 , 0	RB183	, L , I , 216 , 133 , 0
2JT8D2	, L , I , 204 , 133 , 0	RB183P	, L , I , 216 , 133 , 0
2JT8DQ	, L , I , 201 , 132 , 0	RB2112	, L , I , 203 , 101 , 0
2JT8QW	, L , I , 201 , 101 , 0	RDA532	, P , I , 212 , 110 , 0
2R2800	, P , I , 213 , 110 , 0	RR535E	, L , I , 203 , 103 , 0
3JT8D	, L , I , 201 , 132 , 0	SEPPF	, P , I , 215 , 109 , 0
3JT8DQ	, L , I , 201 , 132 , 0	SEPVP	, P , I , 215 , 109 , 0
3JT8E5	, L , I , 201 , 132 , 0	T56A15	, P , I , 234 , 112 , 0
3JT8E7	, L , I , 201 , 132 , 0	T56A7	, P , I , 214 , 112 , 0
4R2800	, P , I , 213 , 110 , 0	TAY620	, L , I , 201 , 132 , 0
501D13	, P , I , 214 , 112 , 0	TAY650	, L , I , 201 , 132 , 0
AL502L	, L , I , 216 , 113 , 0	TAY651	, L , I , 201 , 132 , 0
AL502R	, L , I , 206 , 108 , 0	TF41	, L , I , 230 , 126 , 0
CF34	, L , I , 216 , 113 , 0	TF7312	, L , I , 216 , 113 , 0
CF66D	, L , I , 203 , 101 , 0	TF7313	, L , I , 216 , 113 , 0
CF700	, L , I , 203 , 113 , 0	TPE331	, P , I , 210 , 111 , 0
CFM562	, L , I , 206 , 106 , 0	TSIO52	, P , I , 215 , 109 , 0
CFM563	, L , I , 202 , 102 , 0	V2525	, L , I , 205 , 134 , 0
CFM56A	, L , I , 233 , 124 , 0	2JT8DN	, L , I , 202 , 104 , 0
CGAJ	, P , I , 216 , 113 , 0	2JT8DH	, L , I , 201 , 132 , 0
CGASEP	, P , I , 215 , 109 , 0	2JT8DL	, L , I , 201 , 132 , 0
CJ610	, L , I , 202 , 113 , 0	AE3007	, L , I , 216 , 113 , 0
CT75	, P , I , 211 , 110 , 0	GE9076	, L , I , 205 , 105 , 0
J57	, L , I , 233 , 124 , 0	GE90	, L , I , 205 , 105 , 0
J79	, L , I , 233 , 127 , 0	RAISQP	, P , I , 210 , 109 , 0
JT15D1	, L , I , 216 , 113 , 0	CF565C	, L , I , 206 , 107 , 0
JT15D5	, L , I , 203 , 113 , 0	EPW118	, L , I , 213 , 109 , 0
JT3D	, L , I , 208 , 107 , 0	CFM565	, L , I , 202 , 103 , 0
JT3DQ	, L , I , 208 , 106 , 0	IO320B	, L , I , 213 , 113 , 213
JT4A	, L , I , 208 , 107 , 0	IO360L	, P , I , 215 , 109 , 0
JT9D7Q	, L , I , 207 , 107 , 0	IO540	, X , I , 215 , 109 , 0
JT9DBD	, L , I , 209 , 107 , 0	IO540W	, X , I , 0 , 0 , 112
JT9DFL	, L , I , 207 , 107 , 0	TIO540	, X , I , 215 , 109 , 0
OLY593	, L , I , 206 , 106 , 0	CF680E	, L , I , 202 , 102 , 0
		CF567B	, L , I , 203 , 104 , 0

## F.14 NPD\_curv.dbf

File: npd\_curv.dbf

Last update: 19 Jan 2007 12:17:59

Fields(14):

1	NOISE_ID	C	12
2	NOISE_TYPE	C	1
3	OP_MODE	C	1
4	THR_SET	N	9.2
5	L_200	N	5.1
6	L_400	N	5.1
7	L_630	N	5.1
8	L_1000	N	5.1
9	L_2000	N	5.1
10	L_4000	N	5.1
11	L_6300	N	5.1
12	L_10000	N	5.1
13	L_16000	N	5.1
14	L_25000	N	5.1

Records(1957)

2CF650	, E , A ,	10000.00	, 106.2	, 101.1	, 97.2	, 92.5	, 84.2	, 75.0	, 68.0	, 61.4	, 53.4	, 43.3
2CF650	, E , A ,	25000.00	, 109.8	, 105.1	, 101.5	, 97.3	, 90.3	, 82.0	, 76.0	, 70.0	, 62.7	, 53.9
2CF650	, E , D ,	25000.00	, 109.8	, 105.1	, 101.5	, 97.3	, 90.3	, 82.0	, 76.0	, 70.0	, 62.7	, 53.9
2CF650	, E , D ,	40000.00	, 113.0	, 108.6	, 105.2	, 101.5	, 95.6	, 88.2	, 83.1	, 77.5	, 70.8	, 63.3
2CF650	, M , A ,	10000.00	, 99.2	, 91.9	, 86.7	, 81.0	, 72.1	, 63.0	, 56.7	, 49.6	, 41.6	, 33.1
2CF650	, M , A ,	25000.00	, 105.3	, 98.3	, 93.4	, 88.0	, 79.5	, 70.5	, 64.3	, 57.4	, 49.7	, 41.5
2CF650	, M , D ,	25000.00	, 105.3	, 98.3	, 93.4	, 88.0	, 79.5	, 70.5	, 64.3	, 57.4	, 49.7	, 41.5
2CF650	, M , D ,	40000.00	, 109.1	, 102.3	, 97.6	, 92.5	, 84.3	, 75.4	, 69.3	, 62.6	, 55.1	, 47.2
2CF650	, S , A ,	10000.00	, 99.9	, 95.0	, 91.4	, 87.5	, 81.3	, 74.6	, 69.7	, 64.2	, 57.7	, 50.7
2CF650	, S , A ,	25000.00	, 103.7	, 99.3	, 96.1	, 92.7	, 87.1	, 80.6	, 75.8	, 70.5	, 64.3	, 57.5
2CF650	, S , D ,	25000.00	, 103.7	, 99.3	, 96.1	, 92.7	, 87.1	, 80.6	, 75.8	, 70.5	, 64.3	, 57.5
2CF650	, S , D ,	40000.00	, 106.8	, 102.9	, 100.1	, 97.1	, 92.0	, 85.8	, 81.0	, 75.9	, 69.9	, 63.4
2CF680	, E , A ,	7000.00	, 104.4	, 99.5	, 95.8	, 91.6	, 84.1	, 76.3	, 71.1	, 65.8	, 60.3	, 55.1
2CF680	, E , A ,	12000.00	, 106.5	, 101.5	, 97.7	, 93.5	, 85.7	, 78.1	, 73.0	, 67.9	, 62.6	, 57.6
2CF680	, E , D ,	17000.00	, 107.1	, 102.5	, 99.1	, 94.5	, 86.9	, 79.5	, 75.3	, 69.5	, 64.0	, 58.4
2CF680	, E , D ,	25000.00	, 107.4	, 102.9	, 99.5	, 95.9	, 89.2	, 82.2	, 77.4	, 71.8	, 65.9	, 59.8
2CF680	, E , D ,	33000.00	, 107.7	, 103.7	, 100.7	, 97.1	, 91.8	, 85.5	, 80.7	, 75.2	, 69.0	, 62.6
2CF680	, E , D ,	41000.00	, 111.6	, 107.8	, 105.0	, 102.1	, 96.9	, 90.6	, 85.8	, 80.3	, 74.1	, 67.7
2CF680	, S , A ,	7000.00	, 98.1	, 93.9	, 90.8	, 87.4	, 81.4	, 75.0	, 70.3	, 65.7	, 60.6	, 55.7
2CF680	, S , A ,	12000.00	, 99.3	, 95.0	, 91.9	, 88.5	, 82.5	, 76.2	, 71.7	, 67.2	, 62.3	, 57.6
2CF680	, S , D ,	17000.00	, 100.0	, 95.6	, 92.6	, 89.3	, 83.7	, 77.6	, 73.1	, 68.5	, 63.4	, 58.4

## F.15 NPD\_Helo.dbf

File: npd\_helo.dbf

Last update: 07 Feb 2007 15:03:21

Fields(14):

1	HELO_ID	C	12
2	NOISE_TYPE	C	1
3	OP_MODE	C	1
4	SIDE_TYPE	C	1
5	L_200	N	5.1
6	L_400	N	5.1
7	L_630	N	5.1
8	L_1000	N	5.1
9	L_2000	N	5.1
10	L_4000	N	5.1
11	L_6300	N	5.1
12	L_10000	N	5.1
13	L_16000	N	5.1
14	L_25000	N	5.1

Records(280)

A109	, S , A , L ,	97.3 ,	93.8 ,	91.4 ,	88.6 ,	84.0 ,	78.6 ,	74.5 ,	69.9 ,	65.6 ,	61.2
A109	, S , A , C ,	99.5 ,	96.2 ,	93.8 ,	91.3 ,	87.0 ,	81.8 ,	77.8 ,	72.9 ,	68.6 ,	63.9
A109	, S , A , R ,	98.5 ,	95.1 ,	92.7 ,	90.1 ,	85.8 ,	81.0 ,	77.0 ,	72.2 ,	67.9 ,	63.3
A109	, S , D , L ,	96.3 ,	92.8 ,	90.3 ,	87.6 ,	83.0 ,	77.5 ,	73.3 ,	68.2 ,	63.7 ,	58.8
A109	, S , D , C ,	93.7 ,	90.1 ,	87.6 ,	84.8 ,	79.9 ,	74.2 ,	69.7 ,	64.6 ,	59.9 ,	54.9
A109	, S , D , R ,	95.1 ,	91.6 ,	89.0 ,	86.3 ,	81.7 ,	76.2 ,	72.0 ,	67.1 ,	62.7 ,	57.9
A109	, M , G , S ,	66.2 ,	58.9 ,	54.2 ,	49.4 ,	42.2 ,	34.9 ,	29.9 ,	25.4 ,	20.5 ,	15.9
A109	, M , I , S ,	83.3 ,	76.0 ,	71.3 ,	66.5 ,	59.3 ,	52.0 ,	47.0 ,	42.5 ,	37.6 ,	33.0
A109	, S , L , L ,	94.1 ,	90.4 ,	87.7 ,	84.8 ,	79.6 ,	73.5 ,	69.0 ,	63.7 ,	58.9 ,	53.8
A109	, S , L , C ,	92.9 ,	89.3 ,	86.7 ,	83.9 ,	79.0 ,	73.2 ,	68.8 ,	63.7 ,	59.1 ,	54.1
A109	, S , L , R ,	92.3 ,	88.4 ,	85.7 ,	82.8 ,	77.8 ,	71.9 ,	67.5 ,	62.3 ,	57.6 ,	52.6
B206L	, S , A , L ,	84.0 ,	83.0 ,	81.6 ,	79.5 ,	75.4 ,	70.3 ,	66.5 ,	61.9 ,	57.8 ,	53.4
B206L	, S , A , C ,	93.1 ,	89.8 ,	87.5 ,	85.1 ,	81.1 ,	76.3 ,	72.5 ,	68.0 ,	64.0 ,	59.6
B206L	, S , A , R ,	89.5 ,	88.5 ,	87.2 ,	85.3 ,	81.5 ,	76.3 ,	72.3 ,	67.3 ,	63.0 ,	58.2
B206L	, S , D , L ,	85.4 ,	84.3 ,	82.8 ,	80.6 ,	72.2 ,	70.4 ,	66.1 ,	61.2 ,	56.7 ,	51.9
B206L	, S , D , C ,	87.9 ,	84.2 ,	81.6 ,	78.8 ,	74.1 ,	68.7 ,	64.6 ,	60.0 ,	55.7 ,	51.2
B206L	, S , D , R ,	84.8 ,	83.6 ,	82.2 ,	80.0 ,	75.7 ,	70.2 ,	66.1 ,	61.3 ,	57.0 ,	52.3
B206L	, M , G , S ,	64.3 ,	57.7 ,	53.2 ,	48.5 ,	41.0 ,	33.1 ,	27.8 ,	22.3 ,	16.9 ,	11.5
B206L	, M , I , S ,	76.1 ,	69.5 ,	65.0 ,	60.3 ,	52.8 ,	44.9 ,	39.7 ,	34.2 ,	28.9 ,	23.5
B206L	, S , L , L ,	84.2 ,	83.1 ,	81.7 ,	79.4 ,	74.9 ,	69.2 ,	65.0 ,	60.1 ,	55.7 ,	50.9
B206L	, S , L , C ,	88.2 ,	84.6 ,	82.0 ,	79.1 ,	74.3 ,	68.5 ,	64.1 ,	59.2 ,	54.6 ,	49.8
B206L	, S , L , R ,	85.1 ,	83.8 ,	82.3 ,	79.9 ,	75.0 ,	69.0 ,	64.6 ,	59.8 ,	55.3 ,	50.6
B212	, S , A , L ,	93.9 ,	90.6 ,	88.4 ,	85.9 ,	82.0 ,	77.3 ,	73.8 ,	69.5 ,	65.7 ,	61.6
B212	, S , A , C ,	97.5 ,	94.3 ,	92.1 ,	89.7 ,	85.9 ,	81.4 ,	77.8 ,	73.4 ,	69.5 ,	65.3

## F.16 Proc\_Helo.dbf

File: proc\_helo.dbf

Last update: 07 Feb 2007 13:56:18

Fields(10):

1	HELO_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	STEP_NUM	N	2.0
6	STEP_TYPE	C	1
7	DURATION	N	7.1
8	DISTANCE	N	9.1
9	ALTITUDE	N	7.1
10	SPEED	N	5.1

Records(397)

A109	, A , STANDARD , 1 , 1 , S ,	0.0 ,	0.0 ,	1000.0 ,	116.0
A109	, A , STANDARD , 1 , 2 , L ,	0.0 ,	87250.0 ,	0.0 ,	0.0
A109	, A , STANDARD , 1 , 3 , B ,	0.0 ,	5000.0 ,	0.0 ,	60.0
A109	, A , STANDARD , 1 , 4 , A ,	0.0 ,	4800.0 ,	500.0 ,	0.0
A109	, A , STANDARD , 1 , 5 , C ,	0.0 ,	2850.0 ,	15.0 ,	0.0
A109	, A , STANDARD , 1 , 6 , Y ,	3.0 ,	0.0 ,	0.0 ,	0.0
A109	, A , STANDARD , 1 , 7 , H ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, A , STANDARD , 1 , 8 , G ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, D , STANDARD , 1 , 1 , G ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, D , STANDARD , 1 , 2 , H ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, D , STANDARD , 1 , 3 , V ,	3.0 ,	0.0 ,	15.0 ,	0.0
A109	, D , STANDARD , 1 , 4 , E ,	0.0 ,	100.0 ,	0.0 ,	30.0
A109	, D , STANDARD , 1 , 5 , F ,	0.0 ,	500.0 ,	30.0 ,	60.0
A109	, D , STANDARD , 1 , 6 , D ,	0.0 ,	3500.0 ,	1000.0 ,	0.0
A109	, D , STANDARD , 1 , 7 , E ,	0.0 ,	2800.0 ,	0.0 ,	116.0
A109	, D , STANDARD , 1 , 8 , L ,	0.0 ,	93100.0 ,	0.0 ,	0.0
A109	, X , STANDARD , 1 , 1 , G ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, X , STANDARD , 1 , 2 , H ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, X , STANDARD , 1 , 3 , X ,	0.0 ,	0.0 ,	0.0 ,	10.0
A109	, X , STANDARD , 1 , 4 , H ,	30.0 ,	0.0 ,	0.0 ,	0.0
A109	, X , STANDARD , 1 , 5 , G ,	30.0 ,	0.0 ,	0.0 ,	0.0
B206L	, A , STANDARD , 1 , 1 , S ,	0.0 ,	0.0 ,	1000.0 ,	114.0
B206L	, A , STANDARD , 1 , 2 , L ,	0.0 ,	87250.0 ,	0.0 ,	0.0
B206L	, A , STANDARD , 1 , 3 , B ,	0.0 ,	5000.0 ,	0.0 ,	57.0
B206L	, A , STANDARD , 1 , 4 , A ,	0.0 ,	4800.0 ,	500.0 ,	0.0
B206L	, A , STANDARD , 1 , 5 , C ,	0.0 ,	2850.0 ,	15.0 ,	0.0
B206L	, A , STANDARD , 1 , 6 , Y ,	3.0 ,	0.0 ,	0.0 ,	0.0
B206L	, A , STANDARD , 1 , 7 , H ,	30.0 ,	0.0 ,	0.0 ,	0.0

## F.17 Procedur.dbf

File: procedur.dbf

Last update: 05 Dec 2006 15:47:55

Fields(11):

```

1 ACFT_ID      C 12
2 OP_TYPE     C  1
3 PROF_ID1    C  8
4 PROF_ID2    C  1
5 STEP_NUM    N 2.0
6 STEP_TYPE   C  1
7 FLAP_ID     C  6
8 THR_TYPE    C  1
9 PARAM1      N 7.1
10 PARAM2     N 5.1
11 PARAM3     N 9.1

```

Records(10200)

```

1900D , A , STANDARD , 1 , 1 , D , ZERO-A , , 6000.0 , 160.0 , 3.0
1900D , A , STANDARD , 1 , 2 , D , ZERO-A , , 3000.0 , 160.0 , 3.0
1900D , A , STANDARD , 1 , 3 , D , ZERO-A , , 1500.0 , 146.0 , 3.0
1900D , A , STANDARD , 1 , 4 , D , 35-A , , 1000.0 , 118.0 , 3.0
1900D , A , STANDARD , 1 , 5 , L , 35-A , , 57.2 , 0.0 , 0.0
1900D , A , STANDARD , 1 , 6 , B , , V , 515.2 , 84.0 , 40.0
1900D , A , STANDARD , 1 , 7 , B , , L , 0.0 , 10.0 , 10.0
1900D , D , STANDARD , 1 , 1 , T , 17-D , T , 0.0 , 0.0 , 0.0
1900D , D , STANDARD , 1 , 2 , C , 17-D , T , 400.0 , 0.0 , 0.0
1900D , D , STANDARD , 1 , 3 , A , 17-D , T , 2750.0 , 128.0 , 0.0
1900D , D , STANDARD , 1 , 4 , A , ZERO-D , C , 2950.0 , 138.0 , 0.0
1900D , D , STANDARD , 1 , 5 , C , ZERO-D , C , 3000.0 , 0.0 , 0.0
1900D , D , STANDARD , 1 , 6 , A , ZERO-D , C , 1500.0 , 160.0 , 0.0
1900D , D , STANDARD , 1 , 7 , C , ZERO-D , C , 5500.0 , 0.0 , 0.0
1900D , D , STANDARD , 1 , 8 , C , ZERO-D , C , 7500.0 , 0.0 , 0.0
1900D , D , STANDARD , 1 , 9 , C , ZERO-D , C , 10000.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 1 , T , 17-D , T , 0.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 2 , C , 17-D , T , 400.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 3 , A , 17-D , T , 2400.0 , 128.0 , 0.0
1900D , D , STANDARD , 2 , 4 , A , ZERO-D , C , 2650.0 , 138.0 , 0.0
1900D , D , STANDARD , 2 , 5 , C , ZERO-D , C , 3000.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 6 , A , ZERO-D , C , 1500.0 , 160.0 , 0.0
1900D , D , STANDARD , 2 , 7 , C , ZERO-D , C , 5500.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 8 , C , ZERO-D , C , 7500.0 , 0.0 , 0.0
1900D , D , STANDARD , 2 , 9 , C , ZERO-D , C , 10000.0 , 0.0 , 0.0
1900D , F , STANDARD , 1 , 1 , T , 17-D , T , 0.0 , 0.0 , 0.0
1900D , F , STANDARD , 1 , 2 , C , 17-D , T , 1500.0 , 0.0 , 0.0

```

## F.18 Prof\_Helo.dbf

File: prof\_helo.dbf

Last update: 06 Feb 2007 15:32:34

Fields(11):

1	HELO_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	WEIGHT	N	7.0
6	USE_DIREC	C	1
7	USE_TRACK	C	1
8	HDG_TK_GND	N	6.1
9	HDG_TK_HOV	N	6.1
10	HDG_LD_GND	N	6.1
11	HDG_LD_HOV	N	6.1

Records(57)

A109	, A , STANDARD , 1 ,	5730 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
A109	, D , STANDARD , 1 ,	5730 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
A109	, X , STANDARD , 1 ,	5730 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B206L	, A , STANDARD , 1 ,	4000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B206L	, D , STANDARD , 1 ,	4000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B206L	, X , STANDARD , 1 ,	4000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B212	, A , STANDARD , 1 ,	10500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B212	, D , STANDARD , 1 ,	10500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B212	, X , STANDARD , 1 ,	10500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B222	, A , STANDARD , 1 ,	7800 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B222	, D , STANDARD , 1 ,	7800 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
B222	, X , STANDARD , 1 ,	7800 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
BO105	, A , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
BO105	, D , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
BO105	, X , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
CH47D	, A , STANDARD , 1 ,	48500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
CH47D	, D , STANDARD , 1 ,	48500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
CH47D	, X , STANDARD , 1 ,	48500 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
EC130	, A , STANDARD , 1 ,	5290 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
EC130	, D , STANDARD , 1 ,	5290 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
EC130	, X , STANDARD , 1 ,	5290 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
H500D	, A , STANDARD , 1 ,	2550 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
H500D	, D , STANDARD , 1 ,	2550 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
H500D	, X , STANDARD , 1 ,	2550 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
MD600N	, A , STANDARD , 1 ,	4100 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
MD600N	, D , STANDARD , 1 ,	4100 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
MD600N	, X , STANDARD , 1 ,	4100 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
R22	, A , STANDARD , 1 ,	1370 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0

R22	, D , STANDARD , 1 ,	1370 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
R22	, X , STANDARD , 1 ,	1370 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S61	, A , STANDARD , 1 ,	19000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S61	, D , STANDARD , 1 ,	19000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S61	, X , STANDARD , 1 ,	19000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S65	, A , STANDARD , 1 ,	37000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S65	, D , STANDARD , 1 ,	37000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S65	, X , STANDARD , 1 ,	37000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S70	, A , STANDARD , 1 ,	20250 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S70	, D , STANDARD , 1 ,	20250 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S70	, X , STANDARD , 1 ,	20250 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S76	, A , STANDARD , 1 ,	10000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S76	, D , STANDARD , 1 ,	10000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
S76	, X , STANDARD , 1 ,	10000 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA330J	, A , STANDARD , 1 ,	15432 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA330J	, D , STANDARD , 1 ,	15432 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA330J	, X , STANDARD , 1 ,	15432 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA341G	, A , STANDARD , 1 ,	3970 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA341G	, D , STANDARD , 1 ,	3970 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA341G	, X , STANDARD , 1 ,	3970 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA350D	, A , STANDARD , 1 ,	4300 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA350D	, D , STANDARD , 1 ,	4300 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA350D	, X , STANDARD , 1 ,	4300 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA355F	, A , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA355F	, D , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA355F	, X , STANDARD , 1 ,	5070 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA365N	, A , STANDARD , 1 ,	8488 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA365N	, D , STANDARD , 1 ,	8488 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0
SA365N	, X , STANDARD , 1 ,	8488 , Y , Y ,	0.0 ,	0.0 ,	0.0 ,	0.0

## F.19 Prof\_pts.dbf

File: prof\_pts.dbf

Last update: 20 Feb 2007 13:20:00

Fields(10):

1	ACFT_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	PT_NUM	N	3.0
6	DISTANCE	N	10.1
7	ALTITUDE	N	7.1
8	SPEED	N	5.1
9	THR_SET	N	9.2
10	OP_MODE	C	1

Records(1067)

707120	, A , STANDARD , 1 , 1 ,	-114487.0 ,	6000.0 ,	250.0 ,	520.00 ,	A
707120	, A , STANDARD , 1 , 2 ,	-57243.0 ,	3000.0 ,	124.0 ,	3560.00 ,	A
707120	, A , STANDARD , 1 , 3 ,	-28622.0 ,	1500.0 ,	124.0 ,	3585.00 ,	A
707120	, A , STANDARD , 1 , 4 ,	-19081.0 ,	1000.0 ,	124.0 ,	3585.00 ,	A
707120	, A , STANDARD , 1 , 5 ,	0.0 ,	0.0 ,	124.0 ,	3585.00 ,	A
707120	, A , STANDARD , 1 , 6 ,	525.0 ,	0.0 ,	124.0 ,	5940.00 ,	D
707120	, A , STANDARD , 1 , 7 ,	5250.0 ,	0.0 ,	30.0 ,	1485.00 ,	A
707120	, D , STANDARD , 1 , 1 ,	0.0 ,	0.0 ,	35.0 ,	14850.00 ,	D
707120	, D , STANDARD , 1 , 2 ,	2799.0 ,	0.0 ,	141.0 ,	14850.00 ,	D
707120	, D , STANDARD , 1 , 3 ,	7018.0 ,	1000.0 ,	141.0 ,	14850.00 ,	D
707120	, D , STANDARD , 1 , 4 ,	16711.0 ,	2461.0 ,	191.0 ,	14850.00 ,	D
707120	, D , STANDARD , 1 , 5 ,	17711.0 ,	2672.0 ,	191.0 ,	13120.00 ,	D
707120	, D , STANDARD , 1 , 6 ,	19261.0 ,	3000.0 ,	191.0 ,	13120.00 ,	D
707120	, D , STANDARD , 1 , 7 ,	30495.0 ,	4112.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 1 , 8 ,	38083.0 ,	5500.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 1 , 9 ,	49995.0 ,	7500.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 1 , 10 ,	66737.0 ,	10000.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 1 ,	0.0 ,	0.0 ,	35.0 ,	14850.00 ,	D
707120	, D , STANDARD , 2 , 2 ,	3128.0 ,	0.0 ,	145.0 ,	14850.00 ,	D
707120	, D , STANDARD , 2 , 3 ,	7729.0 ,	1000.0 ,	145.0 ,	14850.00 ,	D
707120	, D , STANDARD , 2 , 4 ,	18728.0 ,	2536.0 ,	195.0 ,	14850.00 ,	D
707120	, D , STANDARD , 2 , 5 ,	19728.0 ,	2731.0 ,	195.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 6 ,	21102.0 ,	3000.0 ,	195.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 7 ,	32638.0 ,	4080.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 8 ,	40995.0 ,	5500.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 9 ,	53843.0 ,	7500.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 2 , 10 ,	71935.0 ,	10000.0 ,	250.0 ,	13120.00 ,	D
707120	, D , STANDARD , 3 , 1 ,	0.0 ,	0.0 ,	35.0 ,	14850.00 ,	D

## F.20 Profile.dbf

File: profile.dbf

Last update: 05 Dec 2006 15:13:21

Fields(5):

1	ACFT_ID	C	12
2	OP_TYPE	C	1
3	PROF_ID1	C	8
4	PROF_ID2	C	1
5	WEIGHT	N	7.0

Records(1217)

717200	,	T	,	STANDARD	,	1	,	94900
717200	,	F	,	STANDARD	,	1	,	94900
737500	,	T	,	STANDARD	,	1	,	103400
737500	,	F	,	STANDARD	,	1	,	103400
737700	,	T	,	STANDARD	,	1	,	120000
737700	,	F	,	STANDARD	,	1	,	120000
1900D	,	T	,	STANDARD	,	1	,	15500
1900D	,	F	,	STANDARD	,	1	,	15500
CNA55B	,	T	,	STANDARD	,	1	,	14800
CNA55B	,	F	,	STANDARD	,	1	,	14800
CNA750	,	T	,	STANDARD	,	1	,	35700
CNA750	,	F	,	STANDARD	,	1	,	35700
707	,	A	,	STANDARD	,	1	,	170000
707	,	D	,	STANDARD	,	1	,	175000
707	,	D	,	STANDARD	,	2	,	185000
707	,	D	,	STANDARD	,	3	,	200000
707	,	D	,	STANDARD	,	4	,	220000
707	,	D	,	STANDARD	,	5	,	245000
707	,	D	,	STANDARD	,	6	,	257000
720	,	A	,	STANDARD	,	1	,	140000
720	,	D	,	STANDARD	,	1	,	145000
720	,	D	,	STANDARD	,	2	,	155000
720	,	D	,	STANDARD	,	3	,	165000
720	,	D	,	STANDARD	,	4	,	180000
720	,	D	,	STANDARD	,	5	,	190000
737	,	A	,	STANDARD	,	1	,	88200
737	,	D	,	STANDARD	,	1	,	82000
737	,	D	,	STANDARD	,	2	,	85000
737	,	D	,	STANDARD	,	3	,	92000
737	,	D	,	STANDARD	,	4	,	100000
737	,	F	,	STANDARD	,	1	,	82000
737	,	T	,	STANDARD	,	1	,	82000
707120	,	A	,	STANDARD	,	1	,	170000

## F.21 Thr\_gnrl.dbf

File: thr\_gnrl.dbf

Last update: 05 Dec 2006 15:13:21

Fields(9):

1	ACFT_ID	C	12
2	GNRL_TYPE	C	1
3	COEFF_E	N	9.1
4	COEFF_F	N	10.5
5	COEFF_GA	C	20
6	COEFF_GB	C	20
7	COEFF_H	C	10
8	COEFF_K1	C	12
9	COEFF_K2	C	12

Records(72)

737	, E	, -14095.4	, -4.77532	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.666620e+004	, -1.490420e+003
707320	, E	, -25447.4	, -6.79039	, -1.775000e-002	, 0.000000e+000	, 0.000000e+000	, 3.329980e+004	, -5.817000e+003
727100	, E	, -14205.5	, -4.53212	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.660280e+004	, -1.403020e+003
737300	, N	, 11106.0	, -10.09000	, -4.090000e-002	, 0.000000e+000	, 0.000000e+000	, -3.698000e+002	, 4.835000e+000
737400	, N	, 21384.0	, -13.79000	, -4.350000e-002	, 0.000000e+000	, 0.000000e+000	, -6.158000e+002	, 6.409000e+000
737500	, N	, 11106.0	, -10.09000	, 4.090000e-002	, 0.000000e+000	, 0.000000e+000	, -3.698000e+002	, 4.835000e+000
747200	, E	, -141079.0	, -11.72980	, -2.833000e-002	, 0.000000e+000	, 0.000000e+000	, 2.011050e+005	, -5.384300e+004
747400	, E	, -49250.0	, 0.00000	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 6.221000e+004	, 0.000000e+000
767300	, E	, -49250.0	, 0.00000	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 6.221000e+004	, 0.000000e+000
777200	, N	, 32710.0	, 0.00000	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, -1.258000e+003	, 1.616000e+001
707QN	, E	, -25447.4	, -6.79039	, -1.775000e-002	, 0.000000e+000	, 0.000000e+000	, 3.329980e+004	, -5.817000e+003
720B	, E	, -27419.9	, -5.81791	, -1.175000e-002	, 0.000000e+000	, 0.000000e+000	, 3.565450e+004	, -6.560900e+003
727D15	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
727D17	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
727EM2	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
727Q15	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
727Q7	, E	, -14205.5	, -4.53212	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.660280e+004	, -1.403020e+003
727Q9	, E	, -14095.4	, -4.77532	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.666620e+004	, -1.490420e+003
727QF	, E	, -10908.0	, -23.35710	, -7.230000e-002	, -1.380000e-006	, 0.000000e+000	, 1.092980e+004	, 2.380860e+003
7373B2	, N	, 11106.0	, -10.09000	, -4.090000e-002	, 0.000000e+000	, 0.000000e+000	, -3.698000e+002	, 4.835000e+000
737D17	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
737NL7	, E	, -14773.7	, -5.09534	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.771730e+004	, -1.845070e+003
737N9	, E	, -14095.4	, -4.77532	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.666620e+004	, -1.490420e+003
737QN	, E	, -14095.4	, -4.77532	, 0.000000e+000	, 0.000000e+000	, 0.000000e+000	, 1.666620e+004	, -1.490420e+003
74710Q	, E	, -141079.0	, -11.72980	, -2.833000e-002	, 0.000000e+000	, 0.000000e+000	, 2.011050e+005	, -5.384300e+004
74720A	, E	, -32370.0	, -7.83000	, -2.105000e-002	, 0.000000e+000	, 0.000000e+000	, 4.759000e+004	, 0.000000e+000
74720B	, E	, -28110.0	, -10.05000	, -3.543000e-002	, 0.000000e+000	, 0.000000e+000	, 4.637500e+004	, 0.000000e+000
747SP	, E	, -141079.0	, -11.72980	, -2.833000e-002	, 0.000000e+000	, 0.000000e+000	, 2.011050e+005	, -5.384300e+004
757PW	, E	, -44951.0	, -0.83000	, 1.980000e-002	, 0.000000e+000	, 0.000000e+000	, 5.297200e+004	, 0.000000e+000
757RR	, E	, -44907.0	, -21.97000	, -5.890000e-002	, 0.000000e+000	, 0.000000e+000	, 4.699900e+004	, 0.000000e+000

767CF6	, N	62790.0	-35.03000	-1.177000e-001	0.000000e+000	0.000000e+000	-1.610370e+003	1.400000e+001
767JT9	, E	-39777.0	-17.36700	-4.670000e-002	0.000000e+000	0.000000e+000	5.655000e+004	0.000000e+000
A300B4-203	, N	-132687.0	-30.40920	-1.079580e-001	4.026860e-007	0.000000e+000	2.535750e+003	-8.238420e+000
A300-622R	, E	-148951.6	-6.71000	-3.000000e-002	0.000000e+000	0.000000e+000	2.037400e+005	-5.010470e+004
A310-304	, E	41317.0	-32.90000	-8.570000e-002	-1.600000e-006	0.000000e+000	-1.131600e+003	1.180000e+001
A319-131	, E	-105513.0	-6.58000	6.828000e-003	-8.055000e-007	0.000000e+000	1.499000e+005	-4.230000e+004
A320-211	, N	24380.0	-18.53400	-7.842000e-002	-2.509000e-007	0.000000e+000	-6.694570e+002	6.945100e+000
A320-232	, E	-65083.3	-7.25000	-1.918000e-002	2.575000e-008	0.000000e+000	8.781760e+004	-1.869310e+004
A321-232	, E	-26190.2	-6.60000	-1.970000e-002	-3.408000e-007	0.000000e+000	3.303220e+004	0.000000e+000
A330-301	, N	-36339.3	-31.32000	-1.297000e-001	0.000000e+000	0.000000e+000	4.846450e+002	4.005600e+000
A330-343	, E	-127410.0	-9.31000	-3.860000e-002	5.690000e-007	0.000000e+000	1.629220e+005	-2.949860e+004
A340-211	, N	19716.0	-17.65000	-8.780000e-002	0.000000e+000	0.000000e+000	-5.907700e+002	7.341000e+000
BAE146	, N	-13783.0	-9.95850	5.605700e-002	-1.231240e-005	0.000000e+000	3.042950e+002	-8.432700e-001
BAE300	, N	-13783.0	-9.95850	5.605700e-002	-1.231240e-005	0.000000e+000	3.042950e+002	-8.432700e-001
CNA500	, N	1743.1	-1.64678	-2.014000e-003	-1.564200e-007	0.000000e+000	-4.967940e+001	5.450000e-001
CNA55B	, N	1373.8	-2.29030	-8.875200e-005	3.227300e-008	0.000000e+000	-4.486100e+001	6.632700e-001
CNA750	, N	4778.6	-6.56521	6.711720e-004	-4.113210e-007	0.000000e+000	-1.467120e+002	1.974800e+000
DC1010	, N	25027.6	-27.43130	-7.827740e-002	0.000000e+000	0.000000e+000	-6.945560e+002	8.023620e+000
DC1040	, E	-143602.0	-14.49960	-5.025600e-002	0.000000e+000	0.000000e+000	2.045670e+005	-5.476190e+004
DC850	, E	-22582.8	-6.58409	-2.080840e-002	0.000000e+000	0.000000e+000	2.907090e+004	-4.341840e+003
DC860	, E	-27959.5	-6.35297	-1.834990e-002	0.000000e+000	0.000000e+000	3.585030e+004	-6.157740e+003
DC870	, N	11106.0	-10.09000	-4.090000e-002	0.000000e+000	0.000000e+000	-3.698000e+002	4.835000e+000
DC8QN	, E	-27959.5	-6.35297	-1.834990e-002	0.000000e+000	0.000000e+000	3.585030e+004	-6.157740e+003
DC910	, E	-10596.5	-1.51369	-5.246600e-003	0.000000e+000	0.000000e+000	1.154170e+004	1.626980e+002
DC930	, E	-13523.2	-2.66888	-9.250500e-003	0.000000e+000	0.000000e+000	1.580360e+004	-1.257940e+003
DC93LW	, E	-13523.2	-2.66888	-9.250500e-003	0.000000e+000	0.000000e+000	1.580360e+004	-1.257940e+003
DC950	, E	-13523.2	-2.66888	-9.250500e-003	0.000000e+000	0.000000e+000	1.580360e+004	-1.257940e+003
DC95HW	, E	-13523.2	-2.66888	-9.250500e-003	0.000000e+000	0.000000e+000	1.580360e+004	-1.257940e+003
DC9Q7	, E	-10596.5	-1.51369	-5.246600e-003	0.000000e+000	0.000000e+000	1.154170e+004	1.626980e+002
DC9Q9	, E	-13523.2	-2.66888	-9.250500e-003	0.000000e+000	0.000000e+000	1.580360e+004	-1.257940e+003
DHC8	, N	2010.7	-19.40900	7.743000e-002	0.000000e+000	0.000000e+000	5.466660e+001	-8.280000e-002
DHC830	, N	1623.1	-18.41100	7.510400e-002	0.000000e+000	0.000000e+000	7.263560e+001	-1.795100e-001
KC135	, E	-6592.3	0.51613	1.797800e-003	0.000000e+000	0.000000e+000	6.735340e+003	3.783960e-001
KC135B	, E	-25447.4	-6.79039	-1.775000e-002	0.000000e+000	0.000000e+000	3.329980e+004	-5.817000e+003
KC135R	, N	11106.0	-10.09000	-4.090000e-002	0.000000e+000	0.000000e+000	-3.698000e+002	4.800000e+000
L1011	, E	-80222.2	-25.02630	0.000000e+000	0.000000e+000	0.000000e+000	9.289350e+004	-1.018610e+004
MD81	, E	-15384.0	-10.00000	1.900000e-002	0.000000e+000	0.000000e+000	1.791700e+004	0.000000e+000
MD82	, E	-13488.0	-10.00000	2.500000e-002	0.000000e+000	0.000000e+000	1.675000e+004	0.000000e+000
MD83	, E	-13845.0	-13.33000	1.900000e-002	0.000000e+000	0.000000e+000	1.750000e+004	0.000000e+000
MD9025	, E	-31899.0	-8.57180	-2.760000e-002	0.000000e+000	0.000000e+000	3.720600e+004	0.000000e+000
MD9028	, E	-31899.0	-8.57180	-2.760000e-002	0.000000e+000	0.000000e+000	3.720600e+004	0.000000e+000
MJ3001	, N	1743.1	-1.64678	-2.014000e-003	-1.564200e-007	0.000000e+000	-4.967940e+001	5.450000e-001

## F.22 Thr\_jet.dbf

File: thr\_jet.dbf

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Fields(7):

1	ACFT_ID	C	12
2	THR_TYPE	C	1
3	COEFF_E	N	8.1
4	COEFF_F	N	10.5
5	COEFF_GA	C	20
6	COEFF_GB	C	20
7	COEFF_H	C	10

Records(289)

737	, C ,	12740.1 ,	-7.93589 ,	-2.662300e-002 ,	-4.276200e-007 ,	0.000000e+000
737	, T ,	13847.9 ,	-8.62596 ,	-2.893900e-002 ,	-4.648000e-007 ,	0.000000e+000
707320	, C ,	15943.8 ,	-13.95840 ,	1.672000e-001 ,	5.707400e-006 ,	0.000000e+000
707320	, T ,	18044.7 ,	-15.79760 ,	1.893000e-001 ,	6.459500e-006 ,	0.000000e+000
717200	, B ,	22232.0 ,	-18.02500 ,	-2.010000e-001 ,	0.000000e+000 ,	-2.180000e+002
717200	, C ,	15541.5 ,	-17.82820 ,	2.534950e-001 ,	0.000000e+000 ,	0.000000e+000
717200	, S ,	22280.7 ,	-19.81900 ,	-9.700000e-002 ,	0.000000e+000 ,	-1.545000e+002
717200	, T ,	17542.7 ,	-19.58800 ,	2.349810e-001 ,	0.000000e+000 ,	0.000000e+000
727100	, C ,	12029.2 ,	-7.99864 ,	-5.202500e-002 ,	5.446170e-006 ,	0.000000e+000
727100	, T ,	13218.9 ,	-8.78972 ,	-5.717100e-002 ,	5.984800e-006 ,	0.000000e+000
737300	, B ,	20363.9 ,	-17.04521 ,	-6.578400e-002 ,	-1.000000e-006 ,	-1.190000e+002
737300	, C ,	17383.1 ,	-15.60722 ,	1.480430e-001 ,	-1.000000e-006 ,	-2.420000e+001
737300	, S ,	21143.7 ,	-26.24020 ,	3.984510e-001 ,	-1.400000e-005 ,	-7.995000e+001
737300	, T ,	19347.0 ,	-25.86886 ,	4.564990e-001 ,	-1.120000e-005 ,	-1.478000e+001
737400	, B ,	22875.1 ,	-18.00102 ,	-7.615000e-002 ,	0.000000e+000 ,	-1.247000e+002
737400	, C ,	19662.2 ,	-18.22095 ,	2.072370e-001 ,	0.000000e+000 ,	0.000000e+000
737400	, S ,	26883.2 ,	-26.17066 ,	-4.323700e-002 ,	0.000000e+000 ,	-1.597000e+002
737400	, T ,	22116.3 ,	-26.01745 ,	2.594420e-001 ,	0.000000e+000 ,	0.000000e+000
737500	, B ,	20510.5 ,	-17.13356 ,	-7.686600e-002 ,	-4.000000e-007 ,	-1.223000e+002
737500	, C ,	17530.9 ,	-16.35562 ,	1.539970e-001 ,	-1.300000e-006 ,	-2.339000e+001
737500	, S ,	22636.2 ,	-28.09371 ,	2.252630e-001 ,	4.090000e-005 ,	-1.056000e+002
737500	, T ,	19629.4 ,	-26.75042 ,	5.504330e-001 ,	-2.170000e-005 ,	-7.999000e+000
737700	, B ,	29618.1 ,	-24.59600 ,	-2.730000e-001 ,	0.000000e+000 ,	-2.491000e+002
737700	, C ,	22106.7 ,	-23.71468 ,	1.655460e-001 ,	6.500000e-006 ,	0.000000e+000
737700	, S ,	29335.5 ,	-28.63200 ,	-1.050000e-001 ,	0.000000e+000 ,	-1.956000e+002
737700	, T ,	23534.8 ,	-29.35470 ,	3.084070e-001 ,	0.000000e+000 ,	0.000000e+000
737800	, B ,	26593.3 ,	-26.29300 ,	-7.800000e-002 ,	0.000000e+000 ,	-1.744000e+002
737800	, C ,	22403.5 ,	-27.26452 ,	3.056030e-001 ,	0.000000e+000 ,	0.000000e+000
737800	, S ,	30143.2 ,	-29.77300 ,	-2.900000e-002 ,	0.000000e+000 ,	-1.452000e+002
737800	, T ,	26089.1 ,	-29.10981 ,	1.435590e-001 ,	0.000000e+000 ,	0.000000e+000
747200	, C ,	36791.4 ,	-43.50740 ,	3.004000e-001 ,	-9.200000e-006 ,	0.000000e+000
747200	, T ,	42780.7 ,	-50.59000 ,	3.492790e-001 ,	-1.069700e-005 ,	0.000000e+000
747400	, B ,	56826.2 ,	-45.49123 ,	-2.085610e-001 ,	0.000000e+000 ,	-3.923000e+002
747400	, C ,	44157.4 ,	-42.61415 ,	6.357720e-001 ,	0.000000e+000 ,	0.000000e+000
747400	, S ,	66921.4 ,	-54.56269 ,	-1.277990e-001 ,	0.000000e+000 ,	-4.102000e+002

## F.23 Thr\_prop.dbf

File: thr\_prop.dbf

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Fields(4):

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1 ACFT_ID      C 12
2 THR_TYPE    C  1
3 EFFICIENCY  N  4.2
4 POWER       N  6.1
    
```

Records(42)

PA30	, C , 0.80 , 130.5	DHC6QP	, T , 0.90 , 587.0
PA30	, T , 0.80 , 139.5	CNA172	, C , 0.69 , 140.0
BEC58P	, C , 0.90 , 261.3	CNA172	, T , 0.67 , 155.0
BEC58P	, T , 0.90 , 310.0	CNA206	, C , 0.77 , 234.0
C130	, C , 0.85 , 3575.0	CNA206	, T , 0.70 , 300.0
C130	, T , 0.85 , 4205.0	CNA20T	, C , 0.77 , 238.0
C130E	, C , 0.85 , 3200.0	CNA20T	, T , 0.69 , 310.0
C130E	, T , 0.85 , 3700.0		
CNA441	, C , 0.90 , 620.0		
CNA441	, T , 0.90 , 635.5		
COMSEP	, C , 0.85 , 154.0		
COMSEP	, T , 0.85 , 165.0		
CVR580	, C , 0.85 , 3344.0		
CVR580	, T , 0.85 , 3800.0		
DC3	, C , 0.85 , 1130.0		
DC3	, T , 0.85 , 1302.0		
DC6	, C , 0.90 , 1750.0		
DC6	, T , 0.90 , 1900.0		
DHC6	, C , 0.90 , 557.5		
DHC6	, T , 0.90 , 587.0		
DHC7	, C , 0.90 , 846.0		
DHC7	, T , 0.90 , 940.0		
GASEPF	, C , 0.85 , 133.0		
GASEPF	, T , 0.85 , 142.0		
GASEPV	, C , 0.85 , 242.0		
GASEPV	, T , 0.85 , 260.0		
HS748A	, C , 0.90 , 1805.0		
HS748A	, T , 0.90 , 2006.0		
L188	, C , 0.90 , 3180.0		
L188	, T , 0.90 , 3460.0		
SD330	, C , 0.90 , 972.0		
SD330	, T , 0.90 , 1080.0		
SF340	, C , 0.90 , 1587.0		
SF340	, T , 0.90 , 1763.0		
DHC6QP	, C , 0.90 , 557.5		



## G NOISE IDENTIFIER CROSS REFERENCE

Use this Appendix to look up a noise identifier and find the aircraft that use it.

### G.1 Civil Airplanes

<u>Noise ID</u>	<u>Aircraft ID</u>
2CF650	A300B4-203
2CF680	767300, 767JT9, 767CF6
2CF68D	MD11GE
2JT8D	BAC111, DC910, DC930
2JT8D2	MD82, MD81, MD83
2JT8DH	DC95HW
2JT8DL	DC93LW
2JT8DN	737N9, 737N17
2JT8DQ	DC950, DC9Q7, DC9Q9
2JT8DW	737
2JT8QW	737QN, 737D17
2R2800	DC3
3JT8D	727100, 727200, 727D15
3JT8DQ	727Q15, 727Q7, 727Q9, 727D17
3JT8E5	727EM2
3JT8E7	727EM1
4R2800	DC6
501D13	CVR580
A310	A310-304
AE3007	EMB145, EMB14L
AE300C	CNA750
AL502L	CL600
AL502R	BAE146, BAE300
BR710	GV
BR715	717200
CF34	CL601
CF565C	A340-211
CF567B	737800, 737700
CF66D	DC1040, DC1010, DC1030
CF680C	767400
CF680E	A330-301
CF700	SABR80, FAL20
CFM562	DC870
CFM563	7373B2, 737500, 737300, 737400
CFM565	A320-211
CFM56A	KC135R
CGAJ	COMJET
CGASEP	COMSEP
CJ610	LEAR25
CT75	SF340
EPW118	EMB120
GE90	777200
IO320B	PA30
IO360L	CNA172
IO540	CNA206
IO540W	M7235C

J57	KC135
J79	F4C
JT15D1	CNA500
JT15D5	MU3001
JT3D	DC860, DC850, 707320, 707120, KC135B, 720B
JT3DQ	DC8QN, 707QN
JT4A	707, DC820, 720
JT9D7Q	74720A, 74720B
JT9DBD	747100
JT9DFL	747200, 74710Q, 747SP
O320D3	PA28
OLY593	CONCRD
PT6A27	DHC6
PT6A45	SD330
PT6A50	DHC7
PT6A67	1900D
PW120	DHC8, DHC830
PW2037	757PW
PW4056	747400
PW4158	A300-622R
PW4460	MD11PW
PW530A	CNA55B
RAISQP	DHC6QP
RB183	F28MK2
RB183P	F28MK4
RB2112	L1011, L10115
RDA532	HS748A
RR535E	757RR, 757300
SEFPF	GASEPF
SEPPV	GASEPV
SPEYHK	GIIB, GII
T56A15	C130
T56A7	L188, C130E
TAY620	F10062
TAY650	F10065
TAY651	727QF
TAYGIV	GIV
TF41	A7D
TF7312	LEAR35
TF7313	IA1125, CIT3
TIO540	CNA20T
TIO542	PA31
TPE331	CNA441
TRENT7	A330-343
TRENT8	777300
TSIO52	BEC58P
V2522A	A319-131
V2525	MD9025, MD9028
V2527A	A320-232
V2530	A321-232

## G.2 Military Airplanes

<u>Noise ID</u>	<u>Aircraft ID</u>
M00201	A3
M00301	A4C
M00401	A5C
M00501	A6A
M00601	A7E
M00701	AV8A
M00702	AV8B
M00901	A10A
M01001	A37
M01101	C123K
M01201	B1
M01301	B2A
M01401	B52BDE
M01402	B52G
M01403	B52H
M01501	B57E
M01601	C5A
M01701	C7A
M01801	C9A
M01901	C12
M02001	C17
M02101	C18A
M02201	C-20
M02301	C21A
M02401	C22
M02501	C23
M02601	C118
M02701	C119L
M02801	C121
M02901	C130AD
M02902	C-130E
M02903	C130HP
M03001	C131B
M03101	C135A
M03102	C135B
M03104	KC-135
M03201	C137
M03301	C140
M03401	C141A
M03501	E3A
M03601	E4
M03701	EA6B
M03801	E8A
M03901	F-4C
M04001	F5AB
M04002	F5E
M04101	F8
M04201	F14A
M04202	F14B
M04301	F15A
M04303	F15E20
M04304	F15E29
M04401	F16A
M04402	F16PW0

M04403	F16PW9
M04404	F16GE
M04501	F-18
M04502	F18EF
M04601	F100D
M04701	F101B
M04801	F102
M04901	F104G
M05001	F105D
M05101	F106
M05201	F111AE
M05202	F111D
M05203	F-111F
M05204	FB111A
M05301	F117A
M05401	KC10A
M05501	KC97L
M05601	OV10A
M05701	P3A
M05702	P3C
M05801	S3A&B
M05901	SR71
M06001	T1
M06101	T-2C
M06201	T3
M06401	T29
M06501	T33A
M06601	T34
M06701	T37B
M06801	T-38A
M06901	T39A
M07001	T41
M07101	T42
M07201	T-43A
M07301	T44
M07401	T45
M07501	TR1
M07601	U2
M07701	U4B
M07801	U6
M07901	U8F
M08001	U21
M08101	YC14
M08201	YC15
M08301	JPATS
M45001	PHANTO
M45101	TORNAD
M45201	JAGUAR
M45301	LIGHTN
M45401	BUCCAN
M45501	HARRIE
M45601	HUNTER
M45701	VICTOR
M45801	VULCAN
M45901	NIMROD
M46001	VC10
M46101	HAWK
M46201	PROVOS
M46301	DOMIN
M46401	CANBER
M46501	HS748

### **G.3 Helicopters**

<u>Noise ID</u>	<u>Aircraft ID</u>
A109	A109
B206L	B206L
B212	B212
B222	B222
BO105	BO105
CH47D	CH47D
EC130	EC130
H500D	H500D
MD600N	MD600N
R22	R22
S61	S61
S65	S65
S70	S70
S76	S76
SA330J	SA330J
SA341G	SA341G
SA350D	SA350D
SA355F	SA355F
SA365N	SA365N

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## H SPECTRAL CLASSES

The spectral classes in INM are a set of aircraft one-third octave-band spectra, which are grouped together based on similar spectral characteristics at time of maximum sound level. Spectral classes are also categorized according to aircraft operation type (departure, approach, flyover and afterburner).

The addition of spectral class data (starting in Version 6.0) allowed INM to account for actual atmospheric absorption based on airport temperature and relative humidity data provided by a user. Spectral classes also give a user the ability to compute C weighted and time audible noise metrics.

INM Version 7.0 contains 81 unique spectral classes: 34 classes for departure (classes 101-134, see Section H.1); 34 classes for approach (classes 201-234, see Section H.2); and 7 classes for level flyover (classes 301-307, applicable to helicopters only, see Section H.3).

Aircraft data originating from NoiseMap are identified with a “NM”. Aircraft referencing a non-Flyover spectral Class ID for afterburner or level flyover operations are identified with parentheses and italics in the corresponding Depart and Approach tables; e.g., “(M7235C)”.

More detailed descriptions on spectral classes in INM may be found in the INM 7.0 Technical Manual and “Spectral Classes for FAA’s Integrated Noise Model Version 6.0.”

### H.1 Departure Spectral Classes

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
101	Civil aircraft	737	2JT8DW	Boeing 737/JT8D-9
		737D17	2JT8QW	Boeing 737-200/JT8D-17
		737QN	2JT8QW	Boeing 737/JT8D-9QN
		DC1010	CF66D	DC10-10/CF6-6D
		DC1030	CF66D	DC10-30/CF6-50C2
		DC1040	CF66D	DC10-40/JT9D-20
		L1011	RB2112	L1011/RB211-22B
		L10115	RB2112	L1011-500/RB211-224B
102	Civil aircraft	737300	CFM563	Boeing 737-300/CFM56-3B-1
		7373B2	CFM563	Boeing 737-300/CFM56-3B-2
		737400	CFM563	Boeing 737-400/CFM56-3C-1
		737500	CFM563	Boeing 737-500/CFM56-3C-1
		767400	CF680C	Boeing 767-400ER/CF6-80C2B(F)
		A330-301	CF680E	Airbus A330-301/CF6-80 E1A2

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		A330-343	TRENT7	Airbus A330-343/RR TRENT 772B
103	Civil aircraft	757300	RR535E	Boeing 757-300/RB211-535E4B
		757PW	PW2037	Boeing 757-200/PW2037
		757RR	RR535E	Boeing 757-200/RB211-535E4
		767300	2CF680	Boeing 767-300/PW4060
		767CF6	2CF680	Boeing 767-200/CF6-80A
		767JT9	2CF680	Boeing 767-200/JT9D-7R4D
		A300-622R	PW4158	Airbus A300-622R/PW4158
		A300B4-203	2CF650	Airbus A300B4-200/CF6-50C2
		A310-304	A310	Airbus A310-304/CF6-80C2A2
		A319-131	V2522A	Airbus A319-131/V2522-A5
		A320-211	CFM565	Airbus A320-211/CFM56-5A1
		A320-232	V2527A	Airbus A320-232/V2527-A5
		A321-232	V2530	Airbus A321-232/IAE V2530-A5
		MD11GE	2CF68D	MD-11/CF6-80C2D1F
MD11PW	PW4460	MD-11/PW 4460		
104	Civil aircraft	737700	CF567B	Boeing 737-700/CFM56-7B24
		737800	CF567B	Boeing 737-800/CFM56-7B26
		737N17	2JT8DN	B737-200/JT8D-17 Nordam B737 LGW Hushkit
		737N9	2JT8DN	B737/JT8D-9 Nordam B737 LGW Hushkit
105	Civil aircraft	777200	GE90	Boeing 777-200ER/GE90-90B
		777300	TRENT8	Boeing 777-300/TRENT892
106	Civil aircraft	707QN	JT3DQ	Boeing 707-320B/JT3D-7QN
		CONCRD	OLY593	CONCORDE/OLY593
		DC870	CFM562	DC8-70/CFM56-2C-5
		DC8QN	JT3DQ	DC8-60/JT8D-7QN
107	Civil aircraft	707	JT4A	Boeing 707-120/JT3C
		707120	JT3D	Boeing 707-120B/JT3D-3
		707320	JT3D	Boeing 707-320B/JT3D-7
		720	JT4A	Boeing 720/JT3C
		720B	JT3D	Boeing 720B/JT3D-3
		747100	JT9DBD	Boeing 747-100/JT9DBD
		74710Q	JT9DFL	Boeing 747-100/JT9D-7QN
		747200	JT9DFL	Boeing 747-200/JT9D-7
		74720A	JT9D7Q	Boeing 747-200/JT9D-7A
		74720B	JT9D7Q	Boeing 747-200/JT9D-7Q
		747400	PW4056	Boeing 747-400/PW4056
		747SP	JT9DFL	Boeing 747SP/JT9D-7
		A340-211	CF565C	Airbus A340-211/CFM 56-5C2
		DC820	JT4A	DC-8-20/JT4A
DC850	JT3D	DC8-50/JT3D-3B		

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		DC860	JT3D	DC8-60/JT3D-7
		KC135B	JT3D	KC135B/JT3D-7
108	Civil aircraft	BAE146	AL502R	BAE146-200/ALF502R-5
		BAE300	AL502R	BAE146-300/ALF502R-5
109	Mixed aircraft	1900D	PT6A67	Beech 1900D / PT6A67
		BEC58P	TSIO52	BARON 58P/TS10-520-L
		CNA172	IO360L	Cessna 172R / Lycoming IO-360-L2A
		CNA206	IO540	Cessna 206H / Lycoming IO-540-AC
		CNA20T	TIO540	Cessna T206H / Lycoming TIO-540-AJ1A
		COMSEP	CGASEP	1985 1-ENG COMP
		DHC6	PT6A27	DASH 6/PT6A-27
		DHC6QP	RAISQP	DASH 6/PT6A-27 Raisbeck Quiet Prop Mod
		EMB120	EPW118	Embraer 120 ER/ Pratt & Whitney PW118
		GASEPF	SEFPF	1985 1-ENG FP PROP
		GASEPV	SEPVP	1985 1-ENG VP PROP
		JPATS	M08301	Raytheon T-6A Texan II / PT6A-68 NM
		PA31	TIO542	PIPER NAVAJO CHIEFTAIN PA-31-350 / TIO-5
		SD330	PT6A45	SD330/PT6A-45AR
110	Civil aircraft	DC3	2R2800	DC3/R1820-86
		DC6	4R2800	DC6/R2800-CB17
		HS748A	RDA532	HS748/DART MK532-2
		SF340	CT75	SF340B/CT7-9B
111	Mixed aircraft	C12	M01901	BEECH SUPER KING AIR HURON PW PT6A-41 NM
		C23	M02501	PT6A-65AR NM
		CNA441	TPE331	CONQUEST II/TPE331-8
		T44	M07301	T44 NM
		U21	M08001	BEECH UTE PW PT6A-20 NM
112	Mixed aircraft	C130	T56A15	C-130H/T56-A-15
		C130AD	M02901	LOCKHEED HERCULES T56-A15 NM
		C130E	T56A7	C-130E/T56-A-7
		C-130E	M02902	LOCKHEED HERCULES T56-A15 C130E NM
		C130HP	M02903	LOCKHEED HERCULES C130HP NM
		CVR580	501D13	CV580/ALL 501-D15
		DHC7	PT6A50	DASH 7/PT6A-50
		DHC8	PW120	DASH 8-100/PW121
		DHC830	PW120	DASH 8-300/PW123
		L188	T56A7	L188C/ALL 501-D13
		(M7235C)	(IO540W)	(MAULE M-7-235C / IO540W)
		(PA31)	(TIO542)	(PIPER NAVAJO CHIEFTAIN PA-31-350 / TIO-5)
113	Civil aircraft	CIT3	TF7313	CIT 3/TFE731-3-100S

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		CL600	AL502L	CL600/ALF502L
		CL601	CF34	CL601/CF34-3A
		CNA500	JT15D1	CIT 2/JT15D-4
		CNA55B	PW530A	Cessna 550 Citation Bravo / PW530A
		COMJET	CGAJ	1985 BUSINESS JET
		EMB145	AE3007	Embraer 145 ER/Allison AE3007
		EMB14L	AE3007	Embraer 145 LR / Allison AE3007A1
		FAL20	CF700	FALCON 20/CF700-2D-2
		GIV	TAYGIV	Gulfstream GIV-SP/TAY 611-8
		IA1125	TF7313	ASTRA 1125/TFE731-3A
		LEAR25	CJ610	LEAR 25/CJ610-8
		LEAR35	TF7312	LEAR 36/TFE731-2
		MU3001	JT15D5	MU300-10/JT15D-5
		PA28	O320D3	PIPER WARRIOR PA-28-161 / O-320-D3G
		PA30	IO320B	PIPER TWIN COMANCHE PA-30 / IO-320-B1A
		SABR80	CF700	NA SABRELINER 80
114	Helicopter	B212	B212	Bell 212 Huey (UH-1N) (CH-135)
		BO105	BO105	Boelkow BO-105
		S70	S70	Sikorsky S-70 Blackhawk (UH-60A)
115	Helicopter	A109	A109	Agusta A-109
		B222	B222	Bell 222
		MD600N	MD600N	McDonnell Douglas MD-600N w/ RR 250-C47M
		R22	R22	Robinson R22B w/Lycoming 0320
		SA350D	SA350D	Aerospatiale SA-350D Astar (AS-350)
116	Helicopter	EC130	EC130	Eurocopter EC-130 w/Arriel 2B1
		H500D	H500D	Huges 500D
		S65	S65	Sikorsky S-65 (CH-53)
		SA355F	SA355F	Aerospatiale SA-355F Twin Star (AS-355)
117	Helicopter	SA341G	SA341G	Aerospatiale SA-341G/342 Gazalle
		SA365N	SA365N	Aerospatiale SA-365N Dauphin (AS-365N)
118	Helicopter	S61	S61	Sikorsky S-61 (CH-3A)
		SA330J	SA330J	Aerospatiale SA-330J Puma
119	Helicopter	CH47D	CH47D	Boeing Vertol 234 (CH-47D)
		S76	S76	Sikorsky S-76 Spirit
120	Helicopter	B206L	B206L	Bell 206L Long Ranger
121	Military aircraft	KC97L	M05501	BOEING STRATOFREIGHTER PW R-436-59B NM
		P3A	M05701	LOCKHEED ORION T56-A-14 NM
		P3C	M05702	LOCKHEED ORION / T56-A-14 NM
		SR71	M05901	JT11D-20B NM
		(SR71)	(M05901)	(JT11D-20B NM)

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
122	Military aircraft	C118	M02601	MCDONNELL DOUGLAS LIFT PW R-2800-CB17 NM
		C123K	M01101	FAIRCHILD PW R-2800-99W AUX J85-GE17 NM
		C131B	M03001	GENERAL DYNAMICS CV34 PW R-2800-99W NM
		T29	M06401	GENERAL DYNAMICS CV34 PW R-2800-99W NM
		YC14	M08101	GE CF6-50D NM
123	Military aircraft	OV10A	M05601	ROCKWELL BRONCO T76 NM
		T3	M06201	AEIO-540-D4A5 NM
		T34	M06601	BEECH MENTOR (BE45) PT6A-25 NM
		T41	M07001	CESSNA 172 O-320-E2D NM
		T42	M07101	BEECH BARON (BE55) NM
		U6	M07801	DEHAVILLAND BEAVER PW R-985 DHC-2 NM
		U8F	M07901	BEECH SEMINOLE 0-480-1 D50 NM
124	Military aircraft	KC135	J57	KC135A/J57-P-59W
		KC-135	M03104	BOEING STRATOTANKER KC135R F108-CF100 NM
		KC135R	CFM56A	KC135R/CFM56-2B-1
		PROVOS	M46201	BRISTON SIDDELEY VIPER 11 NM
		T1	M06001	LOCKHEED SEA STAR JT15D-5 NM
125	Military aircraft	T45	M07401	PT6A-45AG NM
		C119L	M02701	FAIRCHILD FLYING BOX CAR C119L NM
		C121	M02801	C121 NM
		C-20	M02201	GULFSTREAM III MK611-8RR NM
		C7A	M01701	DEHAVILLAND CARIBOU DHC-4A NM
		LIGHTN ( <i>LIGHTN</i> )	M45301 ( <i>M45301</i> )	RR AVON 302C NM ( <i>RR AVON 302C NM</i> )
126	Military aircraft	PHANTO ( <i>PHANTO</i> )	M45001 ( <i>M45001</i> )	MCDONNELL DOUGLAS PHANTOM F-4 NM ( <i>MCDONNELL DOUGLAS PHANTOM F-4 NM</i> )
		VULCAN	M45801	BRITTEN NORMAN VULCAN RR OLYMPUS 301 NM
		A7D	TF41	A-7D,E/TF-41-A-1
		A7E	M00601	VOUGHT CORSAIR II TF41-A-2 NM
		B1 ( <i>B1</i> )	M01201 ( <i>M01201</i> )	ROCKWELL LANCER F101-GE-102 NM ( <i>ROCKWELL LANCER F101-GE-102 NM</i> )
126	Military aircraft	B57E	M01501	ENGLISH ELECTRIC CANBERRA J57-PW-P-5 NM
		C135A ( <i>C135A</i> )	M03101 ( <i>M03101</i> )	BOEING STRATOLIFTER PW J57-59W NM ( <i>BOEING STRATOLIFTER PW J57-59W NM</i> )
		C17	M02001	F117-PW-100 NM
		C21A	M02301	LEARJET 35 TFE731-2-2B NM

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		C22	M02401	BOEING 727 TRS18-1 NM
		C9A	M01801	MCDONNELL DOUGLAS DC9 JT8D-9 NM
		E3A	M03501	BOEING SENTRY TF33-PW-100A NM
		E4	M03601	BOEING 747 CF6-50E NM
		F15A	M04301	MCDONNELL DOUGLAS EAGLE F100-PW-100 NM
		<i>(F15A)</i>	<i>(M04301)</i>	<i>(MCDONNELL DOUGLAS EAGLE F100-PW-100 NM)</i>
		F15E20	M04303	MCDONNELL DOUGLAS EAGLE F100-PW-220 NM
		<i>(F15E20)</i>	<i>(M04303)</i>	<i>(MCDONNELL DOUGLAS EAGLE F100-PW-220 NM)</i>
		F15E29	M04304	MCDONNELL DOUGLAS EAGLE F100-PW-229 NM
		<i>(F15E29)</i>	<i>(M04304)</i>	<i>(MCDONNELL DOUGLAS EAGLE F100-PW-229 NM)</i>
		F16A	M04401	GENERAL DYNAMICS FALCON PW200 NM
		<i>(F16A)</i>	<i>(M04401)</i>	<i>(GENERAL DYNAMICS FALCON PW200 NM)</i>
		F16GE	M04404	GENERAL DYNAMICS FALCON F110-GE-100 NM
		<i>(F16GE)</i>	<i>(M04404)</i>	<i>(GENERAL DYNAMICS FALCON F110-GE-100 NM)</i>
		F16PW0	M04402	GENERAL DYNAMICS FALCON F100-PW-220 NM
		<i>(F16PW0)</i>	<i>(M04402)</i>	<i>(GENERAL DYNAMICS FALCON F100-PW-220 NM)</i>
		F16PW9	M04403	GENERAL DYNAMICS F FALCON F100-PW-229 NM
		<i>(F16PW9)</i>	<i>(M04403)</i>	<i>(GENERAL DYNAMICS F FALCON F100-PW-229 NM)</i>
		F-18	M04501	MCDONNELL DOUGLAS HORNET F404-GE-400 NM
		<i>(F-18)</i>	<i>(M04501)</i>	<i>(MCDONNELL DOUGLAS HORNET F404-GE-400 NM)</i>
		F18EF	M04502	Boeing F-18E/F / F414-GE-400 NM
		<i>(F18EF)</i>	<i>(M04502)</i>	<i>(Boeing F-18E/F / F414-GE-400 NM)</i>
		FB111A	M05204	GENERAL DYNAMICS FB111 PW TF30-P-100 NM
		<i>(FB111A)</i>	<i>(M05204)</i>	<i>(GENERAL DYNAMICS FB111 PW TF30-P-100 NM)</i>
		KC10A	M05401	CFG-50C2 NM
		T37B	M06701	CESSNA 318 J69-T-25 NM
		T-43A	M07201	BOEING 737 T43A NM
		U4B	M07701	ROCKWELL SUPER COMMANDER 1G0-540B1A NM

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		VC10	M46001	RR CONWAY RC0-42 NM
		VICTOR	M45701	BRITISH AEROSPACE VICTOR NM
127	Military aircraft	A4C	M00301	MCDONNELL DOUGLAS SKYHAWK J52-P-8A NM
		A5C (A5C)	M00401 (M00401)	J79-GE-10 NM (J79-GE-10 NM)
		B2A	M01301	F118-GE-110 NM
		B52BDE (B52BDE)	M01401 (M01401)	BOEING STRATOFORTRESS J57P-19W NM (BOEING STRATOFORTRESS J57P-19W NM)
		B52G (B52G)	M01402 (M01402)	BOEING STRATOFORTRESS J57-P-43WB NM (BOEING STRATOFORTRESS J57-P-43WB NM)
		C140	M03301	LOCKHEED JETSTAR TFE731-3 NM
		C141A	M03401	LOCKHEED STARLIFTER TF-33-P-7 NM
		CANBER	M46401	2 RR AVON 109 NM
		F100D (F100D)	M04601 (M04601)	ROCKWELL SUPER SABRE PW J57-P-21A NM (ROCKWELL SUPER SABRE PW J57-P-21A NM)
		F102 (F102)	M04801 (M04801)	PW J57-P-23 NM (PW J57-P-23 NM)
		F104G (F104G)	M04901 (M04901)	LOCKHEED STARFIGHTER J79-GE-11A NM (LOCKHEED STARFIGHTER J79-GE-11A NM)
		F106 (F106)	M05101 (M05101)	PW J57-P-17 NM (PW J57-P-17 NM)
		F111AE (F111AE)	M05201 (M05201)	GENERAL DYNAMICS F111AE PW TF30-P-100 NM (GENERAL DYNAMICS F111AE PW TF30-P-100 NM)
		F111D (F111D)	M05202 (M05202)	GENERAL DYNAMICS F111D NM (GENERAL DYNAMICS F111D NM)
		F-111F (F-111F)	M05203 (M05203)	GENERAL DYNAMICS F111F NM (GENERAL DYNAMICS F111F NM)
		F117A	M05301	F404-GE-F1D2 NM
		F14A (F14A)	M04201 (M04201)	GRUMMAN TOMCAT TF30-P-414A NM (GRUMMAN TOMCAT TF30-P-414A NM)
		F4C	J79	F-4C/J79-GE-15
		F-4C (F-4C)	M03901 (M03901)	MCDONNELL DOUGLAS PHANTOM J79-6517A17 NM (MCDONNELL DOUGLAS PHANTOM J79-6517A17 NM)
		F8 (F8)	M04101 (M04101)	VOUGHT F-8 CRUSADER PW J57-P-201 NM (VOUGHT F-8 CRUSADER PW J57-P-201 NM)
HARRIE	M45501	BAE HARRIER AV8 RR PEGASUS 6 NM		
HAWK	M46101	RR ADOUR MK151 NM		

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		HS748 HUNTER JAGUAR (JAGUAR)	M46501 M45601 M45201 (M45201)	RR DART RDA7 MK 536-2 NM RR AVON RA28 NM SEPECAT JAGUAR NM (SEPECAT JAGUAR NM)
		T33A T39A YC15	M06501 M06901 M08201	LOCKHEED T-33A J33-35 NM ROCKWELL SABRELINER GEJ85 NM PWJT8D-17 NM
128	Military aircraft	A10A A3  A37 A6A AV8A AV8B BUCCAN DOMIN EA6B F101B (F101B) F105D (F105D) F14B (F14B) NIMROD T-2C T-38A (T-38A) TORNAD (TORNAD) TR1 U2	M00901 M00201  M01001 M00501 M00701 M00702 M45401 M46301 M03701 M04701 (M04701) M05001 (M05001) M04202 (M04202) M45901 M06101 M06801 (M06801) M45101 (M45101) M07501 M07601	FAIRCHILD THUNDERBOLT II TF34-GE-100 NM MCDONNELL DOUGLAS SKYWARRIOR J79-GE-8 NM  CESSNA DRAGONFLY J85-GE-17A NM GRUMMAN INTRUDER J52-P-8B NM BAE HARRIER AV8A NM BAE HARRIER F402-RR-408 NM RR SPEY RB 168-1A NM BRISTOL SIDDELEY VIPER 521 NM J52-P-408 NM PW J57-P-55 NM (PW J57-P-55 NM) PW J75-P-19W NM (PW J75-P-19W NM) GRUMMAN TOMCAT F110-GE-400 NM (GRUMMAN TOMCAT F110-GE-400 NM) RR SPEY MK511 NM ROCKWELL BUCKEYE J85-6E-4 NM NORTHROP TALON T-38A NM (NORTHROP TALON T-38A NM) RB199-34R NM (RB199-34R NM) J75-P-13B NM LOCKHEED U2 J75-P-13 NM
129	Military aircraft	S3A&B	M05801	LOCKHEED VIKING TF34-6E-2 NM
130	Military aircraft	B52H C135B C137 C18A E8A	M01403 M03102 M03201 M02101 M03801	BOEING STRATOFORTRESS B52H NM BOEING STRATOLIFTER C135B NM JT3D-3B NM JT41-11 NM JT3D-3B NM
131	Military aircraft	C5A F5AB (F5AB)	M01601 M04001 (M04001)	LOCKHEED GALAXY TF39-GE-1 NM NORTHROP TIGER J85-GE-13 NM (NORTHROP TIGER J85-GE-13 NM)

DEPARTURE				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		F5E (F5E)	M04002 (M04002)	NORTHRUP TIGER J85-GE-21B NM (NORTHRUP TIGER J85-GE-21B NM)
132	Civil aircraft	727100 727200 727D15 727D17 727EM1 727EM2 727Q15 727Q7 727Q9 727QF BAC111 DC910 DC930 DC93LW DC950 DC95HW DC9Q7 DC9Q9 F10062 F10065	3JT8D 3JT8D 3JT8D 3JT8DQ 3JT8E7 3JT8E5 3JT8DQ 3JT8DQ 3JT8DQ TAY651 2JT8D 2JT8D 2JT8D 2JT8DL 2JT8DQ 2JT8DH 2JT8DQ 2JT8DQ TAY620 TAY650	Boeing 727-100/JT8D-7 Boeing 727-200/JT8D-7 Boeing 727-200/JT8D-15 Boeing 727-200/JT8D-17 FEDX 727-100/JT8D-7 FEDX 727-200/JT8D-15 Boeing 727-200/JT8D-15QN Boeing 727-100/JT8D-7QN Boeing 727-200/JT8D-9 UPS 727100 22C 25C BAC111/SPEY MK511-14 DC9-10/JT8D-7 DC9-30/JT8D-9 DC9-30/JT8D-9 w/ ABS Lightweight hushkit DC9-50/JT8D-17 DC9-50/JT8D17 w/ ABS Heavyweight hushkit DC9-10/JT8D-7QN DC9-30/JT8D-9QN F100/TAY 620-15 F100/TAY 650-15
133	Civil aircraft	F28MK2 F28MK4 GII GIIB MD81 MD82 MD83	RB183 RB183P SPEYHK SPEYHK 2JT8D2 2JT8D2 2JT8D2	F28-2000/RB183MK555 F28-4000/RB183MK555 Gulfstream GII/SPEY 511-8 Gulfstream GIIB/GIII - SPEY 511-8 MD-81/JT8D-217 MD-82/JT8D-217A MD-83/JT8D-219
134	Civil aircraft	717200 CNA750 GV MD9025 MD9028	BR715 AE300C BR710 V2525 V2525	Boeing 717-200/BR 715 Citation X / Rolls Royce Allison AE3007C Gulfstream GV/BR 710 MD-90/V2525-D5 MD-90/V2528-D5

## H.2 Approach Spectral Classes

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
201	Civil aircraft	727100	3JT8D	Boeing 727-100/JT8D-7
		727200	3JT8D	Boeing 727-200/JT8D-7
		727D15	3JT8D	Boeing 727-200/JT8D-15
		727D17	3JT8DQ	Boeing 727-200/JT8D-17
		727EM1	3JT8E7	FEDX 727-100/JT8D-7
		727EM2	3JT8E5	FEDX 727-200/JT8D-15
		727Q15	3JT8DQ	Boeing 727-200/JT8D-15QN
		727Q7	3JT8DQ	Boeing 727-100/JT8D-7QN
		727Q9	3JT8DQ	Boeing 727-200/JT8D-9
		727QF	TAY651	UPS 727100 22C 25C
		737	2JT8DW	Boeing 737/JT8D-9
		737D17	2JT8QW	Boeing 737-200/JT8D-17
		737QN	2JT8QW	Boeing 737/JT8D-9QN
		BAC111	2JT8D	BAC111/SPEY MK511-14
		DC910	2JT8D	DC9-10/JT8D-7
		DC930	2JT8D	DC9-30/JT8D-9
		DC93LW	2JT8DL	DC9-30/JT8D-9 w/ ABS Lightweight hushkit
		DC950	2JT8DQ	DC9-50/JT8D-17
		DC95HW	2JT8DH	DC9-50/JT8D17 w/ ABS Heavyweight hushkit
		DC9Q7	2JT8DQ	DC9-10/JT8D-7QN
DC9Q9	2JT8DQ	DC9-30/JT8D-9QN		
F10062	TAY620	F100/TAY 620-15		
F10065	TAY650	F100/TAY 650-15		
202	Civil aircraft	737300	CFM563	Boeing 737-300/CFM56-3B-1
		7373B2	CFM563	Boeing 737-300/CFM56-3B-2
		737400	CFM563	Boeing 737-400/CFM56-3C-1
		737500	CFM563	Boeing 737-500/CFM56-3C-1
		737N17	2JT8DN	B737-200/JT8D-17 Nordam B737 LGW Hushkit
		737N9	2JT8DN	B737/JT8D-9 Nordam B737 LGW Hushkit
		A300-622R	PW4158	Airbus A300-622R/PW4158
		A320-211	CFM565	Airbus A320-211/CFM56-5A1
		A321-232	V2530	Airbus A321-232/IAE V2530-A5
		A330-301	CF680E	Airbus A330-301/CF6-80 E1A2
		CNA750	AE300C	Citation X / Rolls Royce Allison AE3007C
LEAR25	CJ610	LEAR 25/CJ610-8		
203	Civil aircraft	717200	BR715	Boeing 717-200/BR 715
		737700	CF567B	Boeing 737-700/CFM56-7B24

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		737800	CF567B	Boeing 737-800/CFM56-7B26
		757300	RR535E	Boeing 757-300/RB211-535E4B
		757PW	PW2037	Boeing 757-200/PW2037
		757RR	RR535E	Boeing 757-200/RB211-535E4
		767300	2CF680	Boeing 767-300/PW4060
		767CF6	2CF680	Boeing 767-200/CF6-80A
		767JT9	2CF680	Boeing 767-200/JT9D-7R4D
		777300	TRENT8	Boeing 777-300/TRENT892
		A300B4-203	2CF650	Airbus A300B4-200/CF6-50C2
		CNA55B	PW530A	Cessna 550 Citation Bravo / PW530A
		DC1010	CF66D	DC10-10/CF6-6D
		DC1030	CF66D	DC10-30/CF6-50C2
		DC1040	CF66D	DC10-40/JT9D-20
		FAL20	CF700	FALCON 20/CF700-2D-2
		GIV	TAYGIV	Gulfstream GIV-SP/TAY 611-8
		L1011	RB2112	L1011/RB211-22B
		L10115	RB2112	L1011-500/RB211-224B
		MD11GE	2CF68D	MD-11/CF6-80C2D1F
		MD11PW	PW4460	MD-11/PW 4460
		MU3001	JT15D5	MU300-10/JT15D-5
		SABR80	CF700	NA SABRELINER 80
204	Civil aircraft	A310-304	A310	Airbus A310-304/CF6-80C2A2
		MD81	2JT8D2	MD-81/JT8D-217
		MD82	2JT8D2	MD-82/JT8D-217A
		MD83	2JT8D2	MD-83/JT8D-219
205	Civil aircraft	767400	CF680C	Boeing 767-400ER/CF6-80C2B(F)
		777200	GE90	Boeing 777-200ER/GE90-90B
		A319-131	V2522A	Airbus A319-131/V2522-A5
		A320-232	V2527A	Airbus A320-232/V2527-A5
		A330-343	TRENT7	Airbus A330-343/RR TRENT 772B
		GV	BR710	Gulfstream GV/BR 710
		MD9025	V2525	MD-90/V2525-D5
		MD9028	V2525	MD-90/V2528-D5
206	Civil aircraft	A340-211	CF565C	Airbus A340-211/CFM 56-5C2
		BAE146	AL502R	BAE146-200/ALF502R-5
		BAE300	AL502R	BAE146-300/ALF502R-5
		CONCRD	OLY593	CONCORDE/OLY593
		DC870	CFM562	DC8-70/CFM56-2C-5
207	Civil aircraft	74710Q	JT9DFL	Boeing 747-100/JT9D-7QN
		747200	JT9DFL	Boeing 747-200/JT9D-7
		74720A	JT9D7Q	Boeing 747-200/JT9D-7A

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		74720B 747400 747SP	JT9D7Q PW4056 JT9DFL	Boeing 747-200/JT9D-7Q Boeing 747-400/PW4056 Boeing 747SP/JT9D-7
208	Civil aircraft	707 707120 707320 707QN 720 720B DC820 DC850 DC860 DC8QN KC135B	JT4A JT3D JT3D JT3DQ JT4A JT3D JT4A JT3D JT3D JT3DQ JT3D	Boeing 707-120/JT3C Boeing 707-120B/JT3D-3 Boeing 707-320B/JT3D-7 Boeing 707-320B/JT3D-7QN Boeing 720/JT3C Boeing 720B/JT3D-3 DC-8-20/JT4A DC8-50/JT3D-3B DC8-60/JT3D-7 DC8-60/JT8D-7QN KC135B/JT3D-7
209	Civil aircraft	747100	JT9DBD	Boeing 747-100/JT9DBD
210	Civil aircraft	CNA441 DHC6 DHC6QP	TPE331 PT6A27 RAISQP	CONQUEST II/TPE331-8 DASH 6/PT6A-27 DASH 6/PT6A-27 Raisbeck Quiet Prop Mod
211	Mixed aircraft	JPATS SD330 SF340	M08301 PT6A45 CT75	Raytheon T-6A Texan II / PT6A-68 NM SD330/PT6A-45AR SF340B/CT7-9B
212	Civil aircraft	HS748A	RDA532	HS748/DART MK532-2
213	Civil aircraft	1900D DC3 DC6 DHC7 DHC8 DHC830 EMB120 PA28 (PA28) PA30 (PA30) PA31	PT6A67 2R2800 4R2800 PT6A50 PW120 PW120 EPW118 O320D3 (O320D3) IO320B (IO320B) TIO542	Beech 1900D / PT6A67 DC3/R1820-86 DC6/R2800-CB17 DASH 7/PT6A-50 DASH 8-100/PW121 DASH 8-300/PW123 Embraer 120 ER/ Pratt & Whitney PW118 PIPER WARRIOR PA-28-161 / O-320-D3G (PIPER WARRIOR PA-28-161 / O-320-D3G) PIPER TWIN COMANCHE PA-30 / IO-320-B1A (PIPER TWIN COMANCHE PA-30 / IO-320-B1A) PIPER NAVAJO CHIEFTAIN PA-31-350 / TIO-5
214	Civil aircraft	C130E CVR580	T56A7 501D13	C-130E/T56-A-7 CV580/ALL 501-D15

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		L188	T56A7	L188C/ALL 501-D13
215	Civil aircraft	BEC58P CNA172 CNA206 CNA20T COMSEP GASEPF GASEPV	TSIO52 IO360L IO540 TIO540 CGASEP SEFPF SEPVP	BARON 58P/TS10-520-L Cessna 172R / Lycoming IO-360-L2A Cessna 206H / Lycoming IO-540-AC Cessna T206H / Lycoming TIO-540-AJ1A 1985 1-ENG COMP 1985 1-ENG FP PROP 1985 1-ENG VP PROP
216	Civil aircraft	CIT3 CL600 CL601 CNA500 COMJET EMB145 EMB14L F28MK2 F28MK4 GII GIIB IA1125 LEAR35	TF7313 AL502L CF34 JT15D1 CGAJ AE3007 AE3007 RB183 RB183P SPEYHK SPEYHK TF7313 TF7312	CIT 3/TFE731-3-100S CL600/ALF502L CL601/CF34-3A CIT 2/JT15D-4 1985 BUSINESS JET Embraer 145 ER/Allison AE3007 Embraer 145 LR / Allison AE3007A1 F28-2000/RB183MK555 F28-4000/RB183MK555 Gulfstream GII/SPEY 511-8 Gulfstream GIIB/GIII - SPEY 511-8 ASTRA 1125/TFE731-3A LEAR 36/TFE731-2
217	Helicopter	A109 BO105 EC130 H500D MD600N R22	A109 BO105 EC130 H500D MD600N R22	Agusta A-109 Boelkow BO-105 Eurocopter EC-130 w/Arriel 2B1 Huges 500D McDonnell Douglas MD-600N w/ RR 250-C47M Robinson R22B w/Lycoming 0320
218	Helicopter	B222 SA330J	B222 SA330J	Bell 222 Aerospatiale SA-330J Puma
219	Helicopter	S61 S65 S70 S76 SA341G SA350D	S61 S65 S70 S76 SA341G SA350D	Sikorsky S-61 (CH-3A) Sikorsky S-65 (CH-53) Sikorsky S-70 Blackhawk (UH-60A) Sikorsky S-76 Spirit Aerospatiale SA-341G/342 Gazalle Aerospatiale SA-350D Astar (AS-350)
220	Helicopter	SA355F SA365N	SA355F SA365N	Aerospatiale SA-355F Twin Star (AS-355) Aerospatiale SA-365N Dauphin (AS-365N)
221	Helicopter	B212 CH47D	B212 CH47D	Bell 212 Huey (UH-1N) (CH-135) Boeing Vertol 234 (CH-47D)
		B206L	B206L	Bell 206L Long Ranger

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
222	Helicopter			
223	Military Aircraft	A10A	M00901	FAIRCHILD THUNDERBOLT II TF34-GE-100 NM
		B52H	M01403	BOEING STRATOFORTRESS B52H NM
		C135B	M03102	BOEING STRATOLIFTER C135B NM
		C137	M03201	JT3D-3B NM
		C141A	M03401	LOCKHEED STARLIFTER TF-33-P-7 NM
		F14A	M04201	GRUMMAN TOMCAT TF30-P-414A NM
		S3A&B	M05801	LOCKHEED VIKING TF34-6E-2 NM
224	Military Aircraft	B2A	M01301	F118-GE-110 NM
		C17	M02001	F117-PW-100 NM
		C18A	M02101	JT41-11 NM
		C22	M02401	BOEING 727 TRS18-1 NM
		C5A	M01601	LOCKHEED GALAXY TF39-GE-1 NM
		C9A	M01801	MCDONNELL DOUGLAS DC9 JT8D-9 NM
		E3A	M03501	BOEING SENTRY TF33-PW-100A NM
		E4	M03601	BOEING 747 CF6-50E NM
		E8A	M03801	JT3D-3B NM
		HS748	M46501	RR DART RDA7 MK 536-2 NM
		KC10A	M05401	CFG-50C2 NM
		T1	M06001	LOCKHEED SEA STAR JT15D-5 NM
		T-43A	M07201	BOEING 737 T43A NM
225	Military Aircraft	C119L	M02701	FAIRCHILD FLYING BOX CAR C119L NM
		C121	M02801	C121 NM
		C7A	M01701	DEHAVILLAND CARIBOU DHC-4A NM
		KC97L	M05501	BOEING STRATOFREIGHTER PW R-436-59B NM
		P3A	M05701	LOCKHEED ORION T56-A-14 NM
		P3C	M05702	LOCKHEED ORION / T56-A-14 NM
		T3	M06201	AEIO-540-D4A5 NM
		T42	M07101	BEECH BARON (BE55) NM
		U8F	M07901	BEECH SEMINOLE 0-480-1 D50 NM
		YC14	M08101	GE CF6-50D NM
226	Military Aircraft	SR71	M05901	JT11D-20B NM
		T34	M06601	BEECH MENTOR (BE45) PT6A-25 NM
		T41	M07001	CESSNA 172 O-320-E2D NM
		U6	M07801	DEHAVILLAND BEAVER PW R-985 DHC-2 NM
227	Military Aircraft	A5C	M00401	J79-GE-10 NM
		C118	M02601	MCDONNELL DOUGLAS LIFT PW R-2800-CB17 NM
		C123K	M01101	FAIRCHILD PW R-2800-99W AUX J85-GE17

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		C131B	M03001	NM GENERAL DYNAMICS CV34 PW R-2800-99W NM
		T29	M06401	GENERAL DYNAMICS CV34 PW R-2800-99W NM
		T45	M07401	PT6A-45AG NM
228	Military Aircraft	C12	M01901	BEECH SUPER KING AIR HURON PW PT6A-41 NM
		C21A	M02301	LEARJET 35 TFE731-2-2B NM
		C23	M02501	PT6A-65AR NM
		F15A	M04301	MCDONNELL DOUGLAS EAGLE F100-PW-100 NM
		F15E20	M04303	MCDONNELL DOUGLAS EAGLE F100-PW-220 NM
		F15E29	M04304	MCDONNELL DOUGLAS EAGLE F100-PW-229 NM
		F5AB	M04001	NORTHROP TIGER J85-GE-13 NM
		F5E	M04002	NORTHROP TIGER J85-GE-21B NM
		OV10A	M05601	ROCKWELL BRONCO T76 NM
		T44	M07301	T44 NM
		U21	M08001	BEECH UTE PW PT6A-20 NM
		U4B	M07701	ROCKWELL SUPER COMMANDER 1G0-540B1A NM
229	Military Aircraft	B1	M01201	ROCKWELL LANCER F101-GE-102 NM
		C-20	M02201	GULFSTREAM III MK611-8RR NM
		F111AE	M05201	GENERAL DYNAMICS F111AE PW TF30-P-100 NM
		F111D	M05202	GENERAL DYNAMICS F111D NM
		F-111F	M05203	GENERAL DYNAMICS F111F NM
		F16A	M04401	GENERAL DYNAMICS FALCON PW200 NM
		F16PW0	M04402	GENERAL DYNAMICS FALCON F100-PW-220 NM
		FB111A	M05204	GENERAL DYNAMICS FB111 PW TF30-P-100 NM
		PHANTO	M45001	MCDONNELL DOUGLAS PHANTOM F-4 NM
230	Military Aircraft	A3	M00201	MCDONNELL DOUGLAS SKYWARRIOR J79-GE-8 NM
		A4C	M00301	MCDONNELL DOUGLAS SKYHAWK J52-P-8A NM
		A7D	TF41	A-7D,E/TF-41-A-1
		A7E	M00601	VOUGHT CORSAIR II TF41-A-2 NM
		B52BDE	M01401	BOEING STRATOFORTRESS J57P-19W NM

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
		B52G	M01402	BOEING STRATOFORTRESS J57-P-43WB NM
		B57E	M01501	ENGLISH ELECTRIC CANBERRA J57-PW-P-5 NM
		BUCCAN	M45401	RR SPEY RB 168-1A NM
		C135A	M03101	BOEING STRATOLIFTER PW J57-59W NM
		C140	M03301	LOCKHEED JETSTAR TFE731-3 NM
		CANBER	M46401	2 RR AVON 109 NM
		F100D	M04601	ROCKWELL SUPER SABRE PW J57-P-21A NM
		F101B	M04701	PW J57-P-55 NM
		F102	M04801	PW J57-P-23 NM
		F8	M04101	VOUGHT F-8 CRUSADER PW J57-P-201 NM
		HUNTER	M45601	RR AVON RA28 NM
		JAGUAR	M45201	SEPECAT JAGUAR NM
		LIGHTN	M45301	RR AVON 302C NM
		PROVOS	M46201	BRISTON SIDDELEY VIPER 11 NM
		T-2C	M06101	ROCKWELL BUCKEYE J85-6E-4 NM
		T39A	M06901	ROCKWELL SABRELINER GEJ85 NM
		VICTOR	M45701	BRITISH AEROSPACE VICTOR NM
231	Military Aircraft	A37	M01001	CESSNA DRAGONFLY J85-GE-17A NM
		AV8A	M00701	BAE HARRIER AV8A NM
		AV8B	M00702	BAE HARRIER F402-RR-408 NM
		DOMIN	M46301	BRISTOL SIDDELEY VIPER 521 NM
		F104G	M04901	LOCKHEED STARFIGHTER J79-GE-11A NM
		HARRIE	M45501	BAE HARRIER AV8 RR PEGASUS 6 NM
		HAWK	M46101	RR ADOUR MK151 NM
		T33A	M06501	LOCKHEED T-33A J33-35 NM
		T-38A	M06801	NORTHROP TALON T-38A NM
		VC10	M46001	RR CONWAY RC0-42 NM
		YC15	M08201	PWJT8D-17 NM
232	Military Aircraft	F14B	M04202	GRUMMAN TOMCAT F110-GE-400 NM
		F16GE	M04404	GENERAL DYNAMICS FALCON F110-GE-100 NM
		F16PW9	M04403	GENERAL DYNAMICS F FALCON F100-PW-229 NM
		F-18	M04501	MCDONNELL DOUGLAS HORNET F404-GE-400 NM
		F18EF	M04502	Boeing F-18E/F / F414-GE-400 NM
		T37B	M06701	CESSNA 318 J69-T-25 NM
233	Military	A6A	M00501	GRUMMAN INTRUDER J52-P-8B NM

APPROACH				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
	Aircraft	EA6B	M03701	J52-P-408 NM
		F105D	M05001	PW J75-P-19W NM
		F106	M05101	PW J57-P-17 NM
		F117A	M05301	F404-GE-F1D2 NM
		F4C	J79	F-4C/J79-GE-15
		F-4C	M03901	MCDONNELL DOUGLAS PHANTOM J79-6517A17 NM
		KC135	J57	KC135A/J57-P-59W
		KC-135	M03104	BOEING STRATOTANKER KC135R F108-CF100 NM
		KC135R	CFM56A	KC135R/CFM56-2B-1
		NIMROD	M45901	RR SPEY MK511 NM
		TORNAD	M45101	RB199-34R NM
		TR1	M07501	J75-P-13B NM
		U2	M07601	LOCKHEED U2 J75-P-13 NM
		VULCAN	M45801	BRITTEN NORMAN VULCAN RR OLYMPUS 301 NM
234	Military Aircraft	C130	T56A15	C-130H/T56-A-15
		C130AD	M02901	LOCKHEED HERCULES T56-A15 NM
		C-130E	M02902	LOCKHEED HERCULES T56-A15 C130E NM
		C130HP	M02903	LOCKHEED HERCULES C130HP NM

### H.3 Flyover Spectral Classes

FLYOVER				
Class Id	Description	Aircraft ID	Noise ID	Aircraft Description
301	Helicopter	A109 BO105 SA350D SA355F	A109 BO105 SA350D SA355F	Agusta A-109 Boelkow BO-105 Aerospatiale SA-350D Astar (AS-350) Aerospatiale SA-355F Twin Star (AS-355)
302	Helicopter	S76 SA341G SA365N	S76 SA341G SA365N	Sikorsky S-76 Spirit Aerospatiale SA-341G/342 Gazalle Aerospatiale SA-365N Dauphin (AS-365N)
303	Helicopter	EC130 MD600N R22 S61 SA330J	EC130 MD600N R22 S61 SA330J	Eurocopter EC-130 w/Arriel 2B1 McDonnell Douglas MD-600N w/ RR 250-C47M Robinson R22B w/Lycoming 0320 Sikorsky S-61 (CH-3A) Aerospatiale SA-330J Puma
304	Helicopter	B206L B212 B222 H500D	B206L B212 B222 H500D	Bell 206L Long Ranger Bell 212 Huey (UH-1N) (CH-135) Bell 222 Hughes 500D
305	Helicopter	S65 S70	S65 S70	Sikorsky S-65 (CH-53) Sikorsky S-70 Blackhawk (UH-60A)
306	Helicopter	CH47D	CH47D	Boeing Vertol 234 (CH-47D)

# I EXAMPLE NADP PROFILES

The following two *DBF* files show example data for Close-in and Distant Noise Abatement Departure Profiles. The NADP procedure steps were derived from INM standard data by using the methods in Section 9.7.19. The standard data are also shown for comparison.

File: C:\INM\CPP\TEST\SAVE\PROFILE.DBF

Last update: 13-Sep-1994

Fields(5):

```

1 ACFT_ID      C   6
2 OP_TYPE      C   1
3 PROF_ID1     C   1
4 PROF_ID2     C   1
5 WEIGHT       N  6.0
    
```

Records(3):

```

747200 , D , C , 4 , 610000      { C = Close-in NADP }
747200 , D , D , 4 , 610000      { D = Distant NADP }
747200 , D , S , 4 , 610000      { S = standard profile }
    
```

File: C:\INM\CPP\TEST\SAVE\PROCEDUR.DBF

Last update: 14-Sep-1994

Fields(11):

```

1 ACFT_ID      C   6
2 OP_TYPE      C   1
3 PROF_ID1     C   1
4 PROF_ID2     C   1
5 STEP_NUM     N  2.0
6 STEP_TYPE    C   1
7 FLAP_ID      C   6
8 THR_TYPE     C   1
9 PARAM1       N  7.1
10 PARAM2      N  5.1
11 PARAM3      N  7.1
    
```

Records(27):

```

747200 , D , C , 4 , 1 , T , 10 , T , 0.0 , 0.0 , 0.0
747200 , D , C , 4 , 2 , C , 10 , T , 800.0 , 0.0 , 0.0
747200 , D , C , 4 , 3 , C , 10 , R , 3000.0 , 0.0 , 0.0
747200 , D , C , 4 , 4 , A , 10 , C , 1000.0 , 195.1 , 0.0
747200 , D , C , 4 , 5 , A , 5 , C , 750.0 , 235.1 , 0.0
747200 , D , C , 4 , 6 , A , ZERO , C , 750.0 , 255.1 , 0.0
747200 , D , C , 4 , 7 , C , ZERO , C , 5500.0 , 0.0 , 0.0
747200 , D , C , 4 , 8 , C , ZERO , C , 7500.0 , 0.0 , 0.0
747200 , D , C , 4 , 9 , C , ZERO , C , 10000.0 , 0.0 , 0.0

747200 , D , D , 4 , 1 , T , 10 , T , 0.0 , 0.0 , 0.0
747200 , D , D , 4 , 2 , C , 10 , T , 800.0 , 0.0 , 0.0
747200 , D , D , 4 , 3 , A , 10 , T , 1508.0 , 195.1 , 0.0
747200 , D , D , 4 , 4 , A , 5 , C , 750.0 , 235.1 , 0.0
747200 , D , D , 4 , 5 , C , ZERO , R , 3000.0 , 0.0 , 0.0
747200 , D , D , 4 , 6 , A , ZERO , C , 750.0 , 255.1 , 0.0
747200 , D , D , 4 , 7 , C , ZERO , C , 5500.0 , 0.0 , 0.0
747200 , D , D , 4 , 8 , C , ZERO , C , 7500.0 , 0.0 , 0.0
747200 , D , D , 4 , 9 , C , ZERO , C , 10000.0 , 0.0 , 0.0

747200 , D , S , 4 , 1 , T , 10 , T , 0.0 , 165.3 , 0.0
747200 , D , S , 4 , 2 , C , 10 , T , 1000.0 , 0.0 , 0.0
747200 , D , S , 4 , 3 , A , 10 , T , 1508.0 , 195.1 , 0.0
747200 , D , S , 4 , 4 , A , 5 , C , 750.0 , 235.1 , 0.0
747200 , D , S , 4 , 5 , C , ZERO , C , 3000.0 , 0.0 , 0.0
747200 , D , S , 4 , 6 , A , ZERO , C , 750.0 , 255.1 , 0.0
747200 , D , S , 4 , 7 , C , ZERO , C , 5500.0 , 0.0 , 0.0
747200 , D , S , 4 , 8 , C , ZERO , C , 7500.0 , 0.0 , 0.0
    
```



## **J PROCEDURAL PROFILES**

This section describes procedural profiles for civil aircraft and helicopters. Military aircraft utilize fixed point profiles.

### **J.1 Civil Airplane Procedures**

The following sections describe civil aircraft procedure steps and how they are combined into procedural profiles.

#### **Airplane procedure steps**

The following table shows the types of data values that are placed in the last three fields of a procedure step record. These fields are called PARAM1, PARAM2, and PARAM3. They take on a different meaning for each combination of operation type, procedure step type, and thrust type.

- A missing entry in a flap-identifier or thrust-type field means that blanks should be put in that field.
- For example, a departure operation (D) level step (V) should have a valid flaps identifier, a blank thrust type, altitude, speed, and distance-flown values.

OP_TYPE	STEP_TYPE	FLAP_ID	THR_TYPE	PARAM1	PARAM2	PARAM3
A,D,T,F,V	V	ID		ALT	SPD	DIST
A,T,F,V	D	ID		ALT	SPD	ANG
A,T,F	L	ID		DIST	0	0
A,F	B			DIST	SPD	PCT
D,F	T	ID	T,C,H,Q	0	0	0
D,F	T	ID	U	0	0	THR
T	T	ID	T,C,H,Q	0	SPD	0
T	T	ID	U	0	SPD	THR
D,T,F	C	ID	T,C,H,Q,R	ALT	0	0
D,T,F	C	ID	K,U	ALT	0	THR
D,T,F	A	ID	T,C,H,Q,R	CLM	SPD	0
D,T,F	A	ID	K,U	CLM	SPD	THR
A,D,F,V	M	ID		ALT	SPD	ANG
F	S	ID		0	0	0
A	U	ID		ALT	SPD	DIST
A	W			ALT	SPD	DIST
A	E	ID		ALT	SPD	ANG
A	F			ALT	SPD	ANG
D,T,F	P		T,C,H,Q,R	PCT	SPD	0
D,T,F	P		K,U	PCT	SPD	THR

**OP\_TYPE**

A = Approach  
D = Depart  
T = Touch&Go  
F = CircuitFlight  
V = OverFlight

**STEP\_TYPE**

V = Level  
D = Descend  
L = Land  
B = Decelerate  
T = Takeoff  
C = Climb  
A = Accelerate  
M = Cruise-Climb  
S = Level-Stretch  
U = Level-Decel  
W = Level-Idle  
E = Descend-Decel  
F = Descend-Idle  
P = Accel-Percent

**THR\_TYPE**

T = MaxTakeoff  
C = MaxClimb  
N = MaxContinuous  
H = ReduceTakeoff  
Q = ReduceClimb  
S = MaxTakeoffHiTemp  
B = MaxClimbHiTemp  
M = MaxContinuousHiTemp  
G = ReduceTakeoffHiTemp  
P = ReduceClimbHiTemp  
I = IdleApproach  
J = IdleApproachHiTemp  
R = MinimumThrust  
K = UserCutback  
U = UserValue

**PARAM**

THR = Thrust  
ALT = Altitude  
SPD = Speed  
DIST = Distance  
ANG = Angle  
PCT = Percent  
CLM = Climb Rate

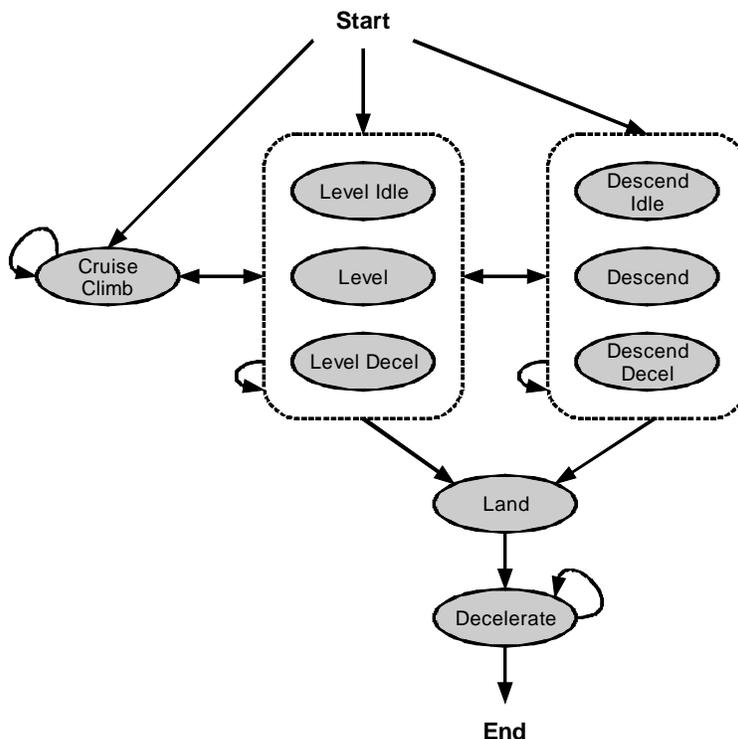
### J.1.1 Airplane procedure step transitions

Procedure steps are combined in prescribed sequences. Certain sequences are not allowed. For example, a climb step may not be followed by a descend step. Procedures must comply with the step transition diagrams provided here.

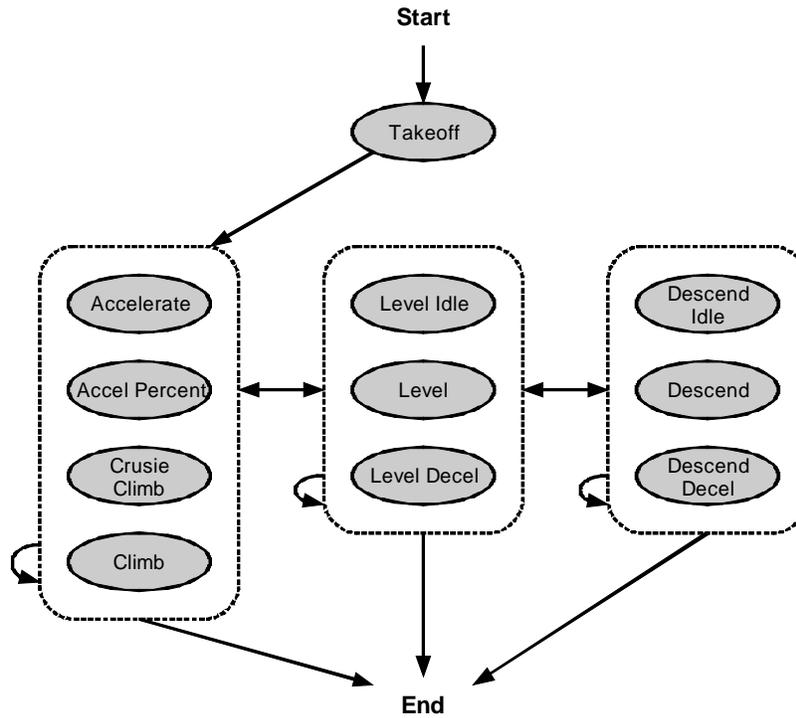
The step transition diagrams use a simple convention to represent procedures:

- Ellipses represent procedure steps.
- Arrows represent a valid transition from one step to another.
- Arrows point in the direction of the allowed transition – e.g. you can go from Land to Decelerate but not back.
- A double sided arrow means that the transition is valid in both directions.
- An arrow looping back to a step indicates that the step can be repeated.
- A box surrounding two or more steps is used to simplify the diagram.
- Arrows connected to the box apply to each step within.
- Each step within the box can transition to any other within the box.

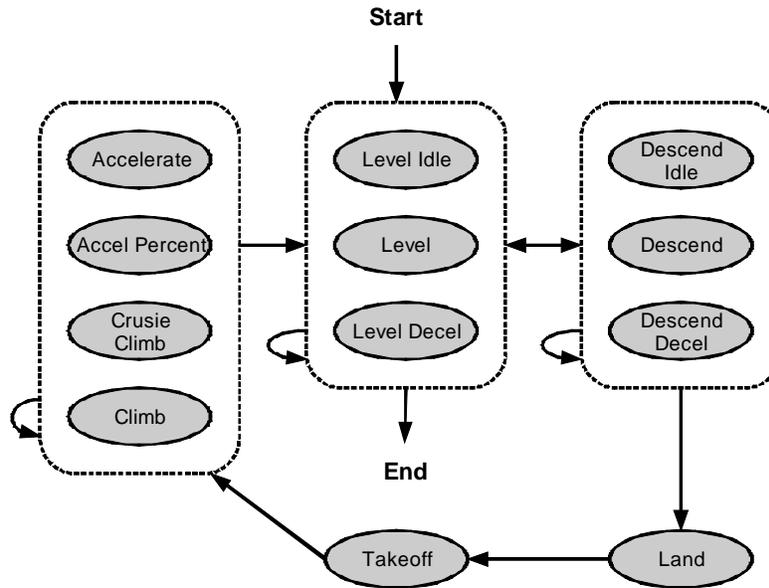
#### Airplane approach step transition diagram



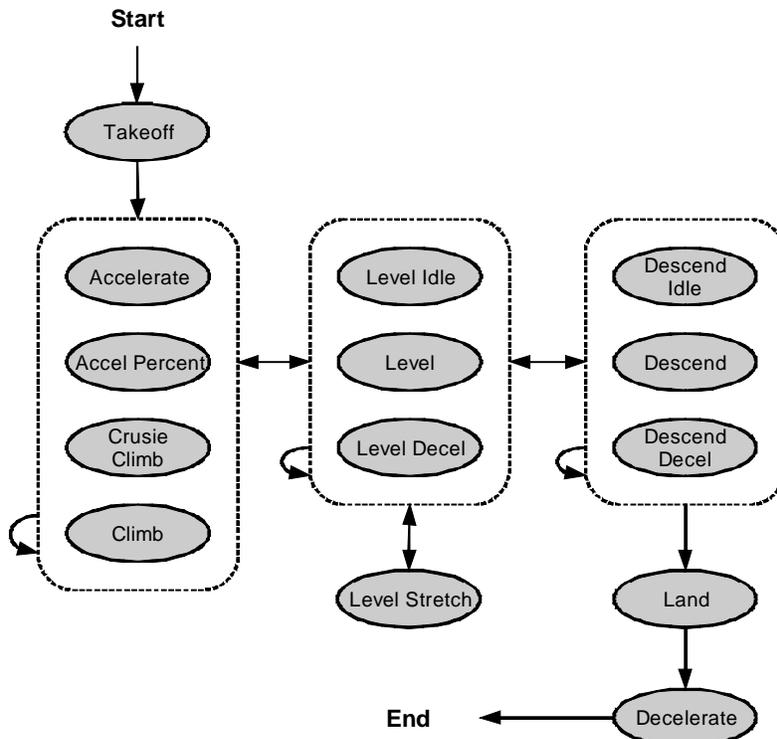
**Airplane departure step transition diagram**



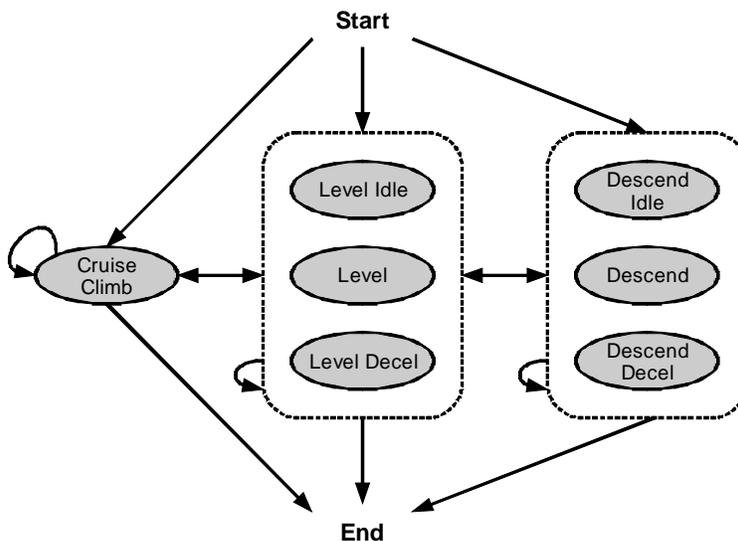
**Airplane touch and go step transition diagram**



**Airplane circuit step transition diagram**



**Airplane overflight step transition diagram**



## J.2 Helicopter procedures

INM supports four types of flight operations for helicopters. Each operation has three identifiers which appear in different contexts. In *DBF* files a single letter identifies the operation, while output lists use a three-letter name, and GUI windows use a phrase. The operation types are summarized below.

DBF	List	GUI	Begin	End
A	APP	Approach	In air	Helipad
D	DEP	Depart	Helipad	In air
T	TAX	Taxi	Helipad	Helipad
V	OVF	Overflight	In air	In air

### J.2.1 Helicopter procedure steps

The following table describes the procedure steps that are used to define helicopter profiles. The first seven types (NPD index 0-6) are the primary NPD operating modes. The next nine (NPD index 7-15) are secondary NPD operating modes, which can be derived from the primary modes or defined as separate curves in *NPD\_HELO.DBF*. The last step type (start altitude) facilitates profile creating and is not associated with NPD operating mode.

NPD Index	DBF OpMode	Procedure Step Description	State	Parameters	HNM Code
0	A	Approach at constant speed	move	dis alt	APPR
1	D	Depart at constant speed	move	dis alt	TO
2	X	Level flyover at constant speed	move	dis	LFLO
3	G	Ground idle	static	dur	GIDLE
4	H	Flight idle	static	dur	FIDLE
5	I	Hover in ground effect	static	dur	HIGE
6	J	Hover out of ground effect	static	dur	HOGE
7	V	Vertical ascent in ground effect	static	dur alt	VASC
8	W	Vertical ascent out of ground effect	static	dur alt	VASC
9	Y	Vertical descent in ground effect	static	dur alt	VDSC
10	Z	Vertical descent out of ground effect	static	dur alt	VDSC
11	B	Approach with horizontal deceleration	move	dis spd	DCLH
12	C	Approach with descending deceleration	move	dis alt spd	DCLD
13	E	Depart with horizontal acceleration	move	dis spd	ACLH
14	F	Depart with climbing acceleration	move	dis alt spd	ACLC
15	T	Taxi at constant speed	move	spd	TAXI
--	S	Start altitude at constant speed	--	alt spd	

Parameter values are defined below:

- dis – distance (feet)
- dur – duration (seconds)
- alt – altitude above the airport (feet)
- spd – airspeed (knots)

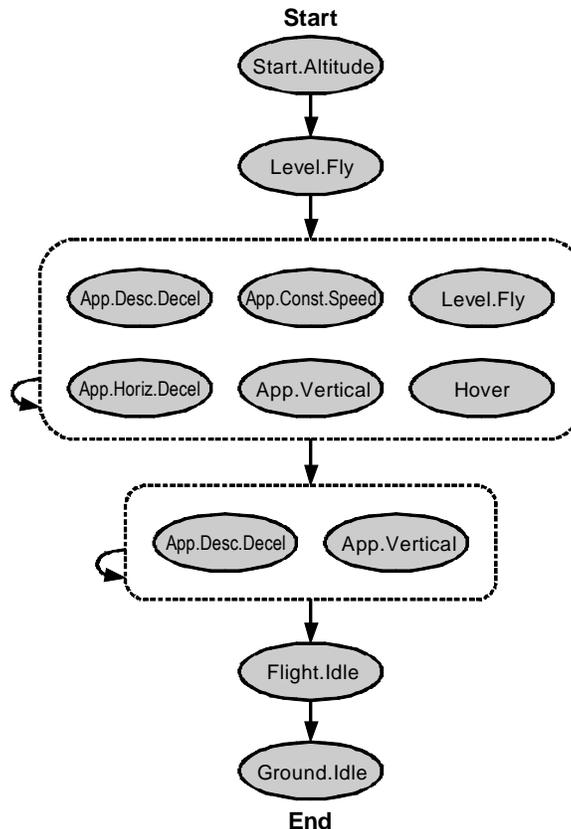
### J.2.2 Helicopter procedure step transitions

Procedure steps are combined in prescribed sequences. However, certain sequences are not allowed. For example, an approach profile cannot use an ascent step. Procedures must comply with the step transition diagrams provided here.

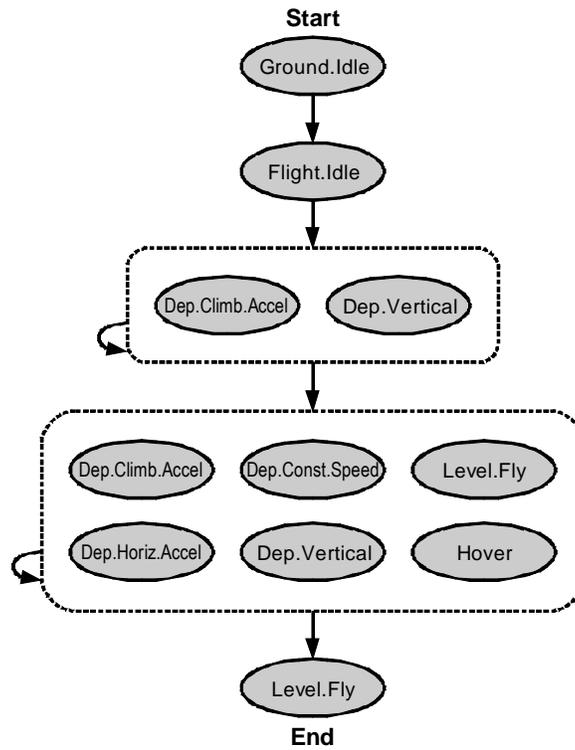
The step transition diagrams use a simple convention to represent procedures:

- Ellipses represent procedure steps.
- Arrows represent a valid transition from one step to another.
- Arrows point in the direction of the allowed transition – e.g. you can go from Flight.Idle to Ground.Idle on an approach, but not back.
- A double sided arrow means that the transition is valid in both directions.
- An arrow looping back to a step indicates that the step can be repeated.
- A box surrounding two or more steps is used to simplify the diagram.
- Arrows connected to the box apply to each step within.
- Each step within the box can transition to any other within the box. However, speeds and altitudes must be compatible. For example, on an approach a transition from an App.Horiz.Decel step to a Hover step is valid only when the App.Horiz.Decel step has a speed of 0 knots.

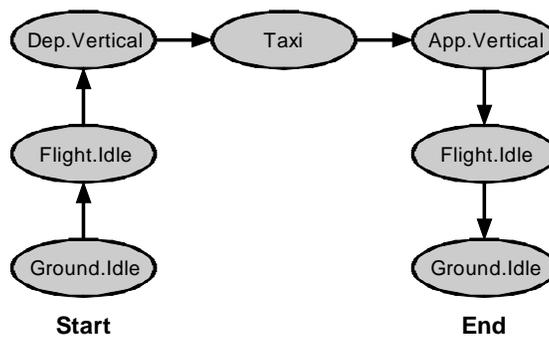
#### Helicopter approach step transition diagram



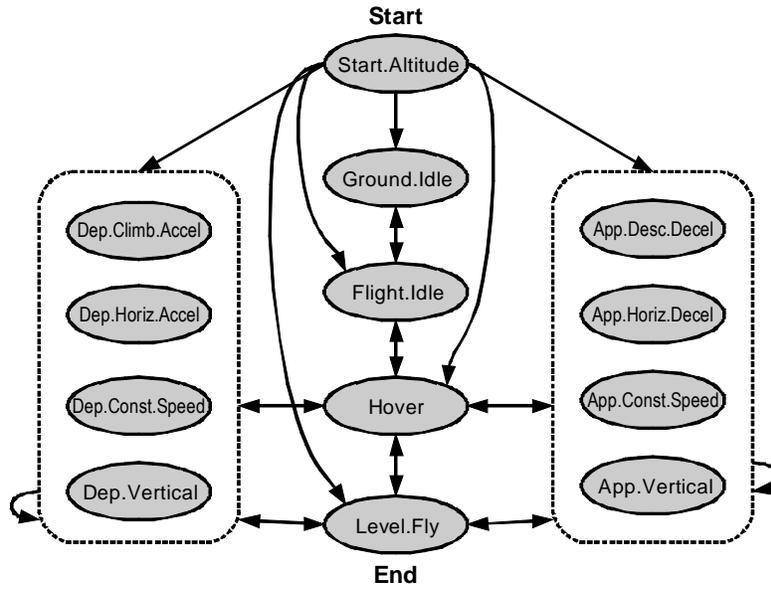
### Helicopter departure step transition diagram



### Helicopter taxi step transition diagram



Helicopter overflight step transition diagram



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## K THRUST TYPE CROSS REFERENCE

The table below shows which thrust types are available for use for each aircraft in INM. This table corresponds with the data contained in the THR\_JET.DBF file.

Aircraft ID	Available thrust types										THR_TYPE KEY	
	T	C	N	H	Q	S	B	M	G	I	J	
1900D	T	C										T = MaxTakeoff
707320	T	C										C = MaxClimb
707QN	T	C										N = MaxContinuous
717200	T	C				S	B					H = ReduceTakeoff
720B	T	C										Q = ReduceClimb
727100	T	C										S = MaxTakeoffHiTemp
727D15	T	C				S						B = MaxClimbHiTemp
727D17	T	C										M = MaxContinuousHiTemp
727EM1	T	C										G = ReduceTakeoffHiTemp
727EM2	T	C				S						P = ReduceClimbHiTemp
727Q15	T	C				S						I = IdleApproach
727Q7	T	C										J = IdleApproachHiTemp
727Q9	T	C										R = MinimumThrust
727QF	T	C	N			S	B	M				K = UserCutback
737	T	C										U = UserValue
737300	T	C				S	B					
7373B2	T	C				S	B					
737400	T	C				S	B					
737500	T	C				S	B					
737700	T	C				S	B					
737800	T	C				S	B					
737D17	T	C										
737N17	T	C										
737N9	T	C										
737QN	T	C										
74710Q	T	C										
747200	T	C										
74720A	T	C										
74720B	T	C										
747400	T	C				S	B					
747SP	T	C										
757300	T	C				S	B					
757PW	T	C				S	B					
757RR	T	C				S	B					
767300	T	C										
767400	T	C				S	B					
767CF6	T	C										
767JT9	T	C										
777200	T	C				S	B					
777300	T	C				S	B					
A300-622R	T	C				S	B					
A300B4-203	T	C										
A310-304	T	C				S	B					
A319-131	T	C				S	B					
A320-211	T	C				S	B					
A320-232	T	C				S	B					
A321-232	T	C				S	B					
A330-301	T	C				S	B					
A330-343	T	C				S	B					
A340-211	T	C				S	B					

Aircraft ID	Available thrust types										THR_TYPE KEY	
	T	C	N	H	Q	S	B	M	G	I	J	T = MaxTakeoff
A7D	T	C										C = MaxClimb
BAC111	T	C										N = MaxContinuous
BAE146	T	C										H = ReduceTakeoff
BAE300	T	C										Q = ReduceClimb
CIT3	T	C										S = MaxTakeoffHiTemp
CL600	T	C										B = MaxClimbHiTemp
CL601	T	C										M = MaxContinuousHiTemp
CNA500	T	C										G = ReduceTakeoffHiTemp
CNA55B	T	C										P = ReduceClimbHiTemp
CNA750	T	C										I = IdleApproach
COMJET	T	C										J = IdleApproachHiTemp
CONCRD	T	C										R = MinimumThrust
DC1010	T	C										K = UserCutback
DC1030	T	C										U = UserValue
DC1040	T	C										
DC850	T	C										
DC860	T	C										
DC870	T	C										
DC8QN	T	C										
DC910	T	C										
DC930	T	C										
DC93LW	T	C										
DC950	T	C										
DC95HW	T	C										
DC9Q7	T	C										
DC9Q9	T	C										
DHC8	T	C										
DHC830	T	C										
EMB120	T	C										
EMB145	T	C										
EMB14L	T	C										
F10062	T	C										
F10065	T	C										
F28MK2	T	C										
F28MK4	T	C										
F4C	T	C										
FAL20	T	C										
GII	T	C	H	Q	S				G			
GIIB	T	C	H	Q	S				G			
GIV	T	C			S	B						
GV	T	C			S	B						
IA1125	T	C										
KC135	T	C										
KC135B	T	C										
KC135R	T	C										
L1011	T	C										
L10115	T	C										
LEAR25	T	C										
LEAR35	T	C										
MD11GE	T	C										
MD11PW	T	C										
MD81	T	C				S	B					
MD82	T	C				S	B					
MD83	T	C				S	B					
MD9025	T	C				S	B					
MD9028	T	C				S	B					
MU3001	T	C										

## L INM MAP PROJECTION METHOD

The mapping of latitude-longitude coordinates to and from x,y coordinates in INM is accomplished by projecting a small portion of the earth's surface onto a cone. The transformation equations are outlined below.

Let  $A = 6378137.000$  m = radius of the equator circle (WGS-84 spheroid).  
 $B = 6356752.314$  m = distance from earth center to a pole (WGS-84 spheroid).

$\phi_0 \lambda_0$  = latitude and longitude of the origin of the x,y coordinate system (radians).

$\phi \lambda$  = latitude and longitude of a point on the earth (radians,  $180/\pi$  degrees/radian).

x y = coordinate values of the same point (meters, 1852 m/nmi).

North latitude is positive and south latitude is negative. East longitude is positive and west longitude is negative. Positive x is toward the east, and positive y is toward the north.

The two principal radii of curvature at latitude  $\phi_0$  are:

$$R_p = A^2 / \text{sqrt}( A^2 \cos^2 \phi_0 + B^2 \sin^2 \phi_0 )$$

$$R_m = R_p^3 B^2 / A^4$$

where,

$R_p$  = radius of curvature (m) in a plane perpendicular to a meridian plane

$R_m$  = radius of curvature (m) in a meridian plane.

A cone is constructed with its vertex on the line of poles, tangent to the earth spheroid along a latitude circle at  $\phi_0$ . The cone is cut from edge to vertex and unfolded so that it lies flat. An x,y coordinate system is constructed on the unfolded cone. The x-axis is tangent to the latitude circle at  $\phi_0$ , and the y-axis is tangent to the longitude ellipse at  $\lambda_0$ .

For conic projections, latitude circles (parallels) map into circles centered on the vertex of the unfolded cone, and longitude ellipses (meridians) map into straight lines that converge at the vertex of the unfolded cone.

For points on the y-axis, the y-coordinate is accurately approximated by the meridian arc-distance:

$$x = 0$$

$$y = R_m ( \phi - \phi_0 ) .$$

For points off the y-axis, the  $y = \text{constant}$  coordinates lie on a conic circle centered at the vertex of the unfolded cone. For this case, the x-coordinate is approximated by the arc-distance along a conic circle; and the y-coordinate is approximated by the y-value at  $x=0$  plus a parabolic correction:

$$\begin{aligned}x &= (R_p \cos\phi_o - y_o \sin\phi_o) (\lambda - \lambda_o) \\y &= y_o + E_o x^2\end{aligned}$$

where,

$$\begin{aligned}y_o &= R_m (\phi - \phi_o) \\E_o &= \frac{1}{2} \tan\phi_o / R_p\end{aligned}$$

An exact inverse transformation is provided by the following equations:

$$\begin{aligned}\phi &= \phi_o + y_o / R_m \\ \lambda &= \lambda_o + x / (R_p \cos\phi_o - y_o \sin\phi_o)\end{aligned}$$

where,

$$y_o = y - E_o x^2$$

The above conic projection method provides a simple and very quick transformation between latitude-longitude and x,y coordinates. (The radii of curvature  $R_p$   $R_m$ , the sine and cosine terms  $\cos\phi_o$   $\sin\phi_o$ , and the off-axis correction coefficient  $E_o$  are constants that are calculated only once.) A computationally quick transformation is required because lat/long values are calculated and displayed for every movement of the mouse pointer when in lat/long mode in an INM graphics window.

The INM conic projection method is not exactly conformal (angles on the earth do not exactly map into the same angles in the x,y coordinate system). However, the method is very accurate within an area of approximately one hundred miles around the origin of coordinates.

For example, if the origin is at 45°N 90°E, a 1-km square on the earth's surface located at 46°N 91°E (about 73 nmi from the origin), when mapped into INM x,y coordinates, is 23 cm longer in the east-west direction and 25 cm shorter in the north-south direction. By comparison, the same 1-km square mapped by the standard Mercator projection method is 1786 cm larger in both directions.

## **M MILITARY AIRPLANE POWER UNITS**

NPD curves for INM Military Airplanes are defined with respect to the power units shown in the table below.

<b>DBF Code</b>	<b>Power Units Type</b>	<b>Description</b>
C	CTIT	Turbine Inlet Temperature (Deg C)
E	EPR	Engine Pressure Ratio
H	ESHP	Equivalent Shaft Power
I	IN HG	Manifold Pressure (Inches Mercury)
B	LBS	Pounds Thrust
S	LBS/HR	Pounds per Hour of Fuel Flow
N	%NC	Percent Corrected Rotor Speed
F	NF	Fan Speed
V	%NF	Percent Fan Speed
O	%N1	Percent Low Pressure Compressor Speed
A	PLA	Power Lever Angle
M	RPM	Propeller or Compressor RPM
R	%RPM	Percent Propeller or Compressor RPM

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## N AUDIBILITY AND AMBIENT SCREENING

This Appendix describes the methods and metrics associated with ambient screening and audibility features within INM. Note that ambient / audibility options are available in INM only when the required ambient data files are set in *Setup // File Locations // Ambient Noise File*.

### N.1 Metric-specific ambient files

The following table shows the different types of ambient files that are used for each of the special metrics. For legacy purposes, Time Above metrics (TALA, TAPNL, and TALC) utilizes either a 2 digit ambient grid file, or a new 3 digit version. Each format is described in Section N.4.

DDOSE requires the 3 digit ambient grid file, and will not work with the older 2 digit file format. TAUD requires a binary ambient file, that is a combination of the 3 digit ambient grid file and an ambient spectral map file, which correlates unique spectra to each ambient sound level specified in the ambient grid file. This binary file merges spectral data with cumulative levels and is produced by error-checking software at FAA. Users requiring use of the TAUD metric must submit their ambient data to FAA in accordance with the procedures given in the following section. FAA will perform a consistency check and return a binary file for use with the project. Once produced, the file may be used indefinitely and transferred as any other publicly available data source.

Metric	Ambient Files		
	2 digit ambient grid file (.txt)	3 digit ambient grid file (.txt)	Binary ambient file (.bin)
<b>TALA</b>	<b>Yes</b>	<b>Yes</b>	No
<b>DDOSE</b>	No	<b>Yes</b>	No
<b>TAUD</b>	No	No	<b>Yes</b>

Users should note that the TAUD metric cannot be run with the ambient grid file (.txt), and DDOSE and the Time Above metrics cannot be run with the binary ambient file (.bin). Furthermore, Audibility is not an available option under *Run // Run Options // Run Type* unless the study-specific binary ambient file is referenced in *Setup // File Locations // Ambient Noise File*. To avoid problems with ambient files for a particular INM Study, careful recordkeeping is needed to insure that the correct ambient file is referenced for each metric.

## N.2 Running an ambient screening analysis

To assist in the determination of the need for ambient data collection, INM provides an ambient screening capability that assumes no ambient noise (i.e., no ambient levels higher than the Equivalent Auditory System Noise (EASN) threshold) for the evaluation of TAUD. The user may utilize this capability to determine if any operations for a given scenario are audible for the user-specified study area. If the ambient screening procedure indicates aircraft sound levels are not audible for the entire user-specified study area, and no other ambient-dependent metrics (e.g., TALA and DDOSE) are required in the analysis, ambient sound level measurements are not needed.

Ambient Screening is performed by running an INM scenario and selecting Ambient Screening from the drop down list in *Run // Run Options*, under *Run Type*. Ambient Screening can only be used to run single case scenarios. Screening should be performed with all run options, including terrain, that would be applicable to the full study. After the selection of Ambient Screening, save the record and exit the *Run Options* window. To perform the ambient screening go to *Run // Run Start*, and run the noise computations for the scenario as you would for a normal INM computation.

To view the results of the screening analysis, go to *Output // Output Setup*. Under *Metric*, select *SCREEN* to identify all scenarios for which the user has selected “Ambient Screening” under *Run Options* above. Exit the window and go to *Output // Output Graphics*. A map will appear that shows up to 2 types of priority zones based on the audibility criteria. Green zones do not have audible aircraft sounds (based on use of the EASN only), whereas red zones do have audible aircraft sounds. As this map is only intended for screening purposes, the minimum size of a priority zone is fixed as a 0.5 nmi square. This map may be exported to a GIS system and used to establish priority for ambient data collection (i.e., ambient data collection is not necessary in green zones, but may be necessary in red zones).

## N.3 Using TAUD and DDOSE

TAUD is calculated using a procedure similar to Ambient Screening defined above. In *Run // Run Options*, under *Run Type*, select *Audibility* from the drop down list.

The DDOSE metric may be selected through the Noise Metric drop-down list in the *Run-Options* window for each INM Scenario, using *Noise Metric // DDOSE*. It is not available for selection under the *Grid* section of the *Run Options* window and therefore grid point values can only be calculated for one of the two new metrics during each SCENARIO run.

In order to run both TAUD and DDOSE for a particular INM Study, it is necessary to create two separate scenarios (e.g., BASE\_2005\_TAUD and

BASE\_2005\_DDOSE) and run each separately with the appropriate metric-specific ambient file referenced in *Setup // File Locations // Ambient Noise File*.

Upon selecting TAUD or DDOSE, the user may run INM to produce results using these metrics. TAUD and DDOSE values can be produced for Contour Grids, Standard and/or Detailed Grids, Population points, and Location Points. The values will appear in the Metric column of the Standard Grid report. The two metrics will be treated as any other metric in the Detailed Grid report. In summary, TAUD and DDOSE behave just like ordinary user-defined. The specifics on using TAUD and DDOSE are given below.

### **Time Audible (TAUD)**

Audibility compares aircraft noise against background noise to determine if noise may be detected by a human observer with normal hearing who is actively listening for aircraft noise. The process is based on detectability theory along with research that has assessed human detectability under different environments. Audibility requires highly detailed inputs and results may be very sensitive to the quality of input data. Guidance on developing these inputs (i.e. an ambient map file) is still being developed and subject to further scientific review. Accounting for background noise requires an ambient file.

Users wishing to calculate TAUD should first contact the FAA Office of Environment and Energy for guidance on the applicability of a TAUD analysis to specific aviation proposals. Given 1) the anticipated process for collecting ambient data, 2) the sensitivity of TAUD to ambient data, and 3) the need for consistency between input files, the FAA will provide binary ambient files on a project basis for use in Federal projects.

In order to acquire a special binary ambient file, the user will first need to generate a modified version of the ambient file accompanied by a second file that contains one-third octave spectral information mapped to a cumulative A-weighted sound level. The first file is the 3 digit ambient grid file, a text grid file that assigns a number, often representing the A-weighted ambient sound level, to study area grid points. The second file is the ambient spectral map file, which correlates unique spectra to the ambient sound levels specified in the ambient grid file. The data in these two ambient files are described in Appendix N.4. After reviewing the two ambient files, the FAA will generate the corresponding, study-specific binary ambient file (*ambient.bin*) and send it to the user. Only by using this FAA generated binary ambient file may TAUD be utilized in INM. Once the *ambient.bin* file has been loaded, and the TAUD option becomes available for use in INM, the user may select *Relative Threshold* within *Grid Setup* in order to calculate audibility based on spectral ambient data.

An ambient file was first introduced in INM 6.0 to support a metric for time above an ambient level (TALA) and it is described in Section 15.1 of the User's Guide. While this file may still be used to support TALA calculations, the ambient file format has been modified for TAUD computations.

### **Percent time audible (%TAUD)**

The user may calculate the percentage of time that aircraft are audible. This function is enabled by selecting the *Do Percent of Time* check box in the *Grid Setup* window. A time period of 24 hours is used as a default for %TAUD, and appears in an input box next to the *Do Percent of Time* check box. However, this value may be changed to a user-specified time period over which to calculate the percentage by changing the value. For example, if the user selects 12 hours, %TAUD will be referenced to 12 hours, with 100 %TAUD being the equivalent of 12 hours.

It is important to note that when calculating TAUD, that the INM audibility calculations do not directly account for overlapping aircraft operations. If all or a portion of the audibility of two unique aircraft overlap in time the model will overpredict audibility. Overprediction is likely in busy operational environments where multiple aircraft are audible simultaneously. For this reason TAUD is capped for both Contour and Standard Grid output at 100% using a default of 24 hours (or 1440 minutes). TAUD remains uncapped for Detailed Grid output, so it may be utilized as a diagnostic tool (e.g., At grid point X, Aircraft A contributes 1200 minutes TAUD and Aircraft B contributes 670 minutes TAUD, yielding 1870 minutes or 130% TAUD, whereas a capped metric would only yield 1440 minutes or 100% TAUD).

For user-specified time periods other than 24 hours, TAUD will be capped (for Contour and Standard Grid output) at 100% in accordance with that time period. For example, if the user selects 12 hours, TAUD will be referenced to and capped at 12 hours (or 720 minutes). A single input box is provided for inputting a user-specified duration for TAUD and Time Above. This duration input box is accessed by selecting the *Do Percent of Time* check box in the *Grid Setup* window, and modifying the duration of time over which to calculate TAUD and Time Above. For time based metrics (TAUD in minutes), the *Do Percent of Time* check box is then unselected after the duration has been modified. Although, unselecting the *Do Percent of Time* check box causes the duration of time input box to disappear, the user-specified time is retained by INM.

### **Track segment length considerations**

Time-based metrics are potentially sensitive to the length of aircraft track segments because INM uses conditions at the closest point in a track segment and applies them to the entire segment. Users should consider creating track segments fine enough (i.e. short enough) so that the time an aircraft flies on a segment approximates the desired accuracy of the time-based metric.

For example, an aircraft flying 100 knots along a track with segments on the order of 2,000 feet, results in 12-second segment lengths. The maximum error for any one segment would similarly be 12 seconds. Users should consider that run time will increase approximately linearly with the number of segments, so segment size should not be made smaller than that length required to give the desired accuracy. The flight segments in the flight.txt file should be examined to ensure that further sub-segmenting has not occurred.

### **Delta Dose (DDOSE)**

Change in Exposure may be modeled in INM by selecting the DDOSE noise metric. DDOSE is defined as the arithmetic difference between aircraft noise exposure and ambient sound level, and the user has multiple means for calculating the metric. Specifically, there are several options for selecting the ambient sound level, which is utilized in the calculation of Change in Exposure. Note that, in all cases, computed Change in Exposure values below the specified ambient sound level at a given receiver location will be reported as 0.0 (dB).

### **Fixed Threshold Change in Exposure**

Selecting *Fixed Threshold* within *Grid Setup* allows the user to calculate the Change in Exposure relative to a fixed, user-defined value. Unless normalized to another time period (see below), the metric utilizes a 12-hour equivalent sound level. If the Fixed Threshold box is selected, a box appears next to the option labeled Fixed threshold (dB) in which the user may enter the actual threshold value. The fixed threshold value is limited to the range 0.0 to 150.0 dB.

### **Relative Threshold Change in Exposure**

Selecting Relative Threshold within Grid Setup allows the user to calculate Change in Exposure based on user-specified, A-weighted ambient data. The calculation requires the 3 digit ambient grid file highlighted above. Additional information regarding ambient files can be found in Appendix N.4. Change in Exposure may be calculated in reference to the values in the ambient grid file as is, or with an absolute delta applied to the ambient data. This delta value may be entered into the box labeled Ambient + Delta (dB). Similar to the fixed threshold function, the relative threshold is limited to the range 0.0 to 150.0 dB.

### **Change in Exposure Normalized to other Time Periods**

Using either the Fixed Threshold or Relative Threshold options outlined above, the user may calculate the Change in Exposure normalized to a time other than 12 hours; this function is enabled by selecting the *Do Percent of Time* check box in the *Grid Setup* window and entering the duration of time over which to calculate the percentage.

## N.4 Ambient data input files

The supplemental metrics TAUD, TALA and DDOSE require input data files that contain estimates of ambient sound levels. There are two types of data that may be collected. The first type of data contains representative A-weighted sound levels assigned to a regularly spaced grid and is referred to as the ambient grid file. Ambient grid files are utilized by the TALA and DDOSE metrics. The other contains representative one-third octave band data that are also assigned to a regularly spaced grid through an indexing convention described below. This is referred to as the ambient spectral map file and it is required for the TAUD metric. This project-specific pair of ambient grid and ambient spectral map files must then be submitted to the FAA for review, and if approved, the FAA will provide the user with a corresponding binary ambient file. This binary ambient file will activate the TAUD run option as described in the release notes. The location and actual filename of the ambient grid files must be specified using the *Setup // File Locations* dialog. The binary ambient file must be named `ambient.bin` and specified in the *Setup // File Locations* dialog window. Example ambient grid (`ambient.txt`) and ambient spectral map files are shown below

### N.4.1 Ambient Grid File (3 digit)

The purpose of the ambient grid file is to assign a number, representing the A-weighted ambient sound level, to study area grid points. This file is a space-delimited, ASCII text file with format and use illustrated with an example file at the end of this section. The first five rows contain header information that specifies the dimensions of the grid, which is referenced to a geodetic coordinate system. The first two rows, `ncols (Y)` and `nrows (X)`, specify the number of columns and rows of the regular grid. The third and fourth rows specify the Lower Left (ll) or southwest corner of the grid in terms of latitude/longitude in decimal degrees. Row 3 contains the field id “`xllcorner`” followed by a real number specifying the longitude (x-coordinate of grid) in decimal degrees. Row 4 contains the field id “`yllcorner`” followed by a real number specifying the latitude (y-coordinate of grid) in decimal degrees. The fifth row contains the field id “`cellsize`” followed by a real number specifying the spacing between both latitude and longitude points in decimal degrees. The final grid in this example will contain a 15 column by 12 row array of points, evenly spaced 0.1 decimal degrees apart referenced to a lower-left (southwest) corner of -114.03464052 longitude and 35.61089089 latitude.

The sixth row contains the text “`NODATA_value`” followed by an integer. This value is used to indicate that no ambient grid data are available for one or more locations within the grid. When computing TAUD for locations specified as having no data, by default the INM assigns the ISO threshold of human hearing spectral data to those locations. For TALA and DDOSE, NODATA values are used explicitly as ambient levels, subject to the 0.0 to 150.0 dB threshold limitations. A warning file called `NODATA_warning.txt` file is written to the

case directory if any locations have utilized NODATA values for ambient thresholds.

Lines 7 through X+7 each contain Y three-digit integers. The integers represent A-weighted sound levels and are stored as ten times the value they represent (i.e., '347' represents 34.7 dB).

Sample Ambient Grid Text File – (Ambient.txt)

```
ncols 15
nrows 12
xllcorner -114.03464052
yllcorner 35.61089089
cellsize 0.1
NODATA_value -99
347 347 347 347 347 347 347 347 347 347 347 347 347 347 347
347 347 347 347 347 347 347 347 215 347 347 347 347 347 347
347 347 347 347 347 347 347 347 215 215 215 347 347 347 347
347 347 347 347 347 345 345 345 215 347 347 347 347 215 215
347 345 345 345 345 345 345 345 347 347 347 347 347 215 215
347 345 345 345 345 345 345 347 347 347 347 347 347 215 215
347 347 347 345 347 347 347 347 347 347 347 347 347 347 347
347 347 347 347 347 347 347 347 347 347 347 347 347 347 347
347 347 347 347 347 347 347 347 347 347 228 347 347 347 347
347 347 214 347 347 205 205 205 347 347 347 228 228 228 228
347 347 214 214 347 205 205 205 347 347 347 228 228 228 228
347 347 347 347 205 205 205 347 347 347 228 228 228 228
```

## N.4.2 Ambient Spectral Map

The ambient spectral map file is a comma-delimited, ASCII text file, which assigns spectral data to the grid points contained in the ambient grid file outlined above. The first row contains an integer specifying the number of data rows, which follow. Each row contains the following information: (1) first field: index of spectrum, for informational purposes only and not used at this time; (2) second field: spectrum name/site name, for informational purposes only; (3) third field: A-weighted energy sum of spectrum. This value should have a corresponding match in the ambient grid file above; (4) fields four through twenty-seven: sound pressure levels for one-third octave bands 17 (50 Hz) through 40 (10,000 Hz). Note that field 3 above is the value, which is indexed with the ambient grid file for specifying grid-based ambient spectra. For example, a field 3 value of 34.7 will map the one-third octave band spectrum associated with this record to all values of 347 in the ambient grid file. It is useful for documentation purposes for this value to be equivalent to the A-weighted sum of the spectrum, however this is not required and the convention may not hold for the unique case where different spectra have identical A-weighted values. Regardless of convention, the values of column 3 must be unique across all rows. Prior to use of the TAUD metric, the FAA will perform a verification check on the data to insure uniqueness of mappings and consistency of spectra to reported A-weighted values.

### Ambient.bin file for TAUD

The calculation of the TAUD metric requires both the A-weighted levels and the ambient spectral map information described above. TAUD is based on spectral information; however the ambient mapping design uses the A-weighted level as

an index to assign 24 one-third octave band levels to grid locations. Both files must be consistent for use in INM.

Given 1) the anticipated process for collecting ambient data, 2) the sensitivity of TAUD to ambient data, and 3) the need for consistency between input files, the FAA will provide binary ambient files for use in Federal projects on a project by project basis. Users wishing to calculate TAUD should contact the FAA Office of Environment and Energy before proceeding.

If any errors are uncovered during the generation of the `ambient.bin` file, such as an A-weighted sound level in the ambient grid file which does not have an associated spectrum in the spectral map file or an A-weighted value specified for a given spectrum in the ambient spectral map file does not match the A-weighted sum of the spectral data (within 0.1 dB(A)), then the user will be contacted about revising the submitted ambient grid and spectral map files. Typically, these errors are data anomalies, which would cause INM to abort processing.

Sample Ambient Spectral Map Text File – (`ambi_map.txt`)

```
6
1,3A-1,34.7,45,39.7,35.7,32.7,30.9,30.8,30.8,29.9,29.6,29.6,29.2,28.6,27.8,27.2,26.4,24.6,21.9,19,14.5,9.9,8,7.2,14.8,23.6
2,3A-2,34.5,45,39.5,35.2,32.1,30.3,30.3,30.4,29.5,29.5,29.5,29.2,28.7,28,27.2,26.1,24,21,17.5,12.8,8.7,8,9.4,14.8,23.6
3,3B-2,22.8,44.9,39.2,34.3,30.5,27.7,25.5,23.6,22.2,21,20,18.5,17.5,16,15.2,14.7,13.6,12.3,10.6,8.5,6.7,7.2,14.8,23.6
4,3B-2,21.4,44.9,39.1,34.1,29.9,27,24.8,22.7,21.4,20.1,19,17.6,16.5,15.2,14.4,13.9,12.9,11.6,10,8.1,4.6,4.4,7.2,14.8,23.6
5,3D-1,21.5,44.9,39.1,33.9,29.2,25.8,22.6,19.6,17.7,16,14.8,14.3,14.2,14.6,15,15.4,14.9,14.1,12.6,10.1,7.4,4.4,7.2,14.8,23.6
6,3D-2,20.5,44.9,39.1,33.9,29.3,25.9,22.6,19.6,17.6,16,14.7,14.2,14,14.3,14.6,14.9,14.4,13.3,11.6,9.1,4.6,4.4,7.2,14.8,23.6
```

## O SUPPLEMENTAL HELICOPTER NPD DATA

All helicopters prior to INM version 7.0 had a single approach NPD. During the development process of INM 7.0, members of the Helicopter Association International (HAI) advisory group recommended NPD curves for different approach angles be added. Noise data for 3, 6, 9, and 12 degree approaches were collected during flight tests for the EC-130 and R-22 helicopters. This report discusses how to create user defined INM helicopters that make use of these data.

INM 7.0 currently allows for the use of a single approach power setting; this does not directly allow for the accounting of different approach angles. If the INM user needs to use approach angles of 3, 9, or 12 degrees for the EC-130 or R-22<sup>1</sup>, the existing INM helicopter types EC130 and/or R22 can be copied to user defined types, the approach NPD can be replaced with the appropriate NPD, and a new associated profile copied into the study. These supplemental NPDs are presented in Tables 1 through 6. Note that this process must be repeated for each required approach angle by each helicopter; i.e., each helicopter type in the INM only can use one approach angle; if you have one helicopter type that uses three distinct approaches, you must model this with three separate INM helicopters.

This section discusses the actual implementation on adding helicopter types with the different approach angle. Users should consider whether this process meets their requirements before proceeding. The implementation below presents the process to add a single new helicopter approach; this process needs to be repeated if more than one new EC-130 or R-22 approach angles are required. In the rest of this section, an EC130 at an approach angle of 9 degrees is used to illustrate the process.

### Copying the Helicopter Type and Noise Identifier

1. Make sure the base helicopter type (e.g., EC130) has been added to the study.
2. Open the *Helicopter//Helicopter Data* window.
3. Select the Helicopter ID (e.g., EC130).
4. Copy the helicopter using the *Edit//Copy Records*<sup>2</sup> command.
5. Paste the helicopter back in using the *Edit//Paste Records* command.
6. The INM will open up a new window asking for an identifier for the new record; in this case the name EC130\_9D may be selected to indicate a base helicopter of the EC130 and a 9 degree approach.
7. Repeat the above process to add a new noise NPD (called EC130\_9D) in the *Helicopter//Noise ID* window.

<sup>1</sup> The standard approach data in the INM for the helicopters are representative of a 6 degree approach descent from 1000 to 500 feet AFE, followed by a 9 degree descent from 500 to 15 feet AFE.

<sup>2</sup> You can also perform this copy function by using the copy button on the top of the window or the CTRL-C hot keys.

8. Go back to the *Helicopter//Helicopter Data* window and change the Noise selection box to the new Noise ID (e.g., EC130\_9D). Note that there is no need to change the Directivity box selection since these are unrelated.

### **Replacing the existing approach NPD data**

1. Open the *Helicopter//NPD Data* window.
2. Select the original Helicopter ID (e.g., EC130, not the EC130\_9D).
3. Copy all of the data by selecting the first record on the left side of the window (EPNL Approach Center), holding down the shift key, using the slider bar to move to the last record (SEL LevelFly Right), and clicking on this record. All the recorders should now be highlighted. While these records are highlighted, click the //Edit/Copy Records command.
4. At the top of the Helicopter NPD Data window, select the user-defined Helicopter ID (e.g., EC130\_9D).
5. Paste all the records using the *Edit//Paste Records* command.
6. Click on the first record on the left side (EPNL Approach Center).
7. Copy and Paste the data from Tables 1 through 6 into the appropriate fields on the right side of the Helicopter NPD window. Repeat this for each of the noise metrics and right-center-left data. This is a manual process, so this should be done carefully. Note that this is only done for the approach data, not the Depart or LevelFly data, which do not change.

### **Adding and Modifying the Associated Profile and Profile Points**

1. In the same manner as done above, copy the three records (APP, DEP, and TAX) in the //Helicopter/Profile Identifier window from the INM Helicopter to the user-defined helicopter (e.g., EC130 to the EC130\_9D).
2. Select the APP-Standard profile for the user-defined helicopter (e.g., EC130\_9D).
3. Manually change the Profile Group from Standard to User.
4. Repeat the name change from Standard to User for the Departure and Taxi profiles also.
5. Shut down the //Helicopter Profile Identifiers window.
6. Open the //Helicopters//Procedural Profiles window.
7. Select step number 4. This is an approach at constant speed. The original data represented a 6 descent from 1000 ft AFE to 500 ft AFE. We now change the track distance in this step to represent a 9 degree approach. The equation to use is:  
$$\text{Track Distance} = \text{Altitude Change} / \tan(\text{Descent Angle})$$
8. In this case the track distance, rounded to the nearest 100 feet is 3200 feet. Change the Track Distance (ft) in step 4 to 3200.
9. The next segment is a 9.6 degree decelerating approach. The associated track distance of 2850 feet can be kept, or modified via the above equation to exactly 9 degrees, to yield a Track Distance of 3062 feet.

NPD data

**Table 1 NPD Data for the EC-130 on 3 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
EC130	SEL	Approach	Left	93.7	89.9	87.1	83.8	78.2	71.4	66.2	60.1	53.2	46.5	65	3
EC130	SEL	Approach	Center	93.2	89.9	87.6	85.0	80.8	75.8	71.8	67.3	61.9	56.1	65	3
EC130	SEL	Approach	Right	92.5	89.1	86.6	83.9	79.3	73.9	69.8	65.1	59.5	53.5	65	3
EC130	LAMAX	Approach	Left	89.3	82.4	77.7	72.5	63.9	54.3	47.5	39.9	31.1	22.4	65	3
EC130	LAMAX	Approach	Center	89.9	83.5	79.2	74.6	67.4	59.4	53.4	46.8	39.7	32.4	65	3
EC130	LAMAX	Approach	Right	87.7	81.3	77.0	72.6	65.5	57.6	51.9	45.5	38.1	30.1	65	3
EC130	EPNL	Approach	Left	96.6	92.3	89.1	85.5	78.8	70.7	64.6	57.1	47.0	33.9	65	3
EC130	EPNL	Approach	Center	96.3	92.7	90.1	87.2	82.2	76.1	71.5	66.2	59.0	49.6	65	3
EC130	EPNL	Approach	Right	95.2	91.4	88.7	85.6	80.3	73.9	69.1	63.3	55.5	45.6	65	3
EC130	PNLTMAX	Approach	Left	102.6	95.6	90.6	85.0	75.2	64.4	56.8	47.8	36.2	19.0	65	3
EC130	PNLTMAX	Approach	Center	103.1	96.4	91.9	87.0	79.0	70.0	63.6	56.8	48.3	37.7	65	3
EC130	PNLTMAX	Approach	Right	100.5	93.9	89.4	84.8	76.9	68.1	61.7	54.4	45.1	33.7	65	3

**Table 2 NPD Data for the EC-130 on 9 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
EC130	SEL	Approach	Left	94.2	90.5	87.7	84.7	79.5	73.2	68.3	62.5	55.6	48.6	65	9
EC130	SEL	Approach	Center	94.3	91.0	88.6	86.1	82.0	77.2	73.5	69.1	63.8	57.9	65	9
EC130	SEL	Approach	Right	91.1	87.5	85.0	82.3	77.6	72.2	68.1	63.3	57.9	52.2	65	9
EC130	LAMAX	Approach	Left	90.1	83.4	78.7	73.7	65.5	56.3	49.7	42.2	33.5	24.6	65	9
EC130	LAMAX	Approach	Center	89.2	82.9	78.7	74.3	67.3	59.8	54.4	48.3	41.3	33.8	65	9
EC130	LAMAX	Approach	Right	86.8	80.2	75.8	71.1	63.6	55.5	49.7	43.3	36.1	28.7	65	9
EC130	EPNL	Approach	Left	97.0	92.9	89.9	86.5	80.3	72.9	67.2	60.2	50.7	36.2	65	9
EC130	EPNL	Approach	Center	97.3	93.6	91.1	88.3	83.5	77.7	73.3	68.2	61.5	52.7	65	9
EC130	EPNL	Approach	Right	94.1	90.0	87.3	84.2	79.0	72.5	67.5	61.6	53.6	43.0	65	9
EC130	PNLTMAX	Approach	Left	103.3	96.3	91.4	86.1	76.9	66.7	59.4	50.7	39.6	24.4	65	9
EC130	PNLTMAX	Approach	Center	102.4	95.8	91.4	86.8	79.2	70.7	64.6	57.9	49.9	40.0	65	9
EC130	PNLTMAX	Approach	Right	99.9	93.1	88.4	83.4	75.4	66.4	59.8	52.4	43.2	31.6	65	9

**Table 3 NPD Data for the EC-130 on 12 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
EC130	SEL	Approach	Left	97.1	93.2	90.4	87.3	81.8	75.0	69.6	63.0	55.3	47.4	80	12
EC130	SEL	Approach	Center	92.7	89.2	86.8	84.2	79.7	74.6	70.6	65.9	60.2	54.1	80	12
EC130	SEL	Approach	Right	93.7	90.0	87.4	84.5	79.6	73.6	68.8	63.0	56.4	50.4	80	12
EC130	LAMAX	Approach	Left	93.2	86.5	81.8	76.8	68.6	59.3	52.3	44.3	35.0	25.2	80	12
EC130	LAMAX	Approach	Center	88.2	81.8	77.6	73.1	66.1	58.3	52.7	46.3	39.0	31.2	80	12
EC130	LAMAX	Approach	Right	90.0	83.5	79.0	74.4	66.7	58.1	51.6	43.9	35.1	26.4	80	12
EC130	EPNL	Approach	Left	99.4	95.2	92.1	88.4	81.8	73.9	67.9	60.4	50.6	36.0	80	12
EC130	EPNL	Approach	Center	95.1	91.3	88.6	85.7	80.7	74.6	70.0	64.5	56.8	46.9	80	12
EC130	EPNL	Approach	Right	96.3	92.3	89.5	86.4	80.9	73.9	68.0	60.6	51.1	38.4	80	12
EC130	PNLTMAX	Approach	Left	105.7	98.8	93.9	88.5	79.1	68.6	61.2	52.6	41.7	26.7	80	12
EC130	PNLTMAX	Approach	Center	100.9	94.3	89.9	85.1	77.4	68.8	62.5	55.5	46.3	35.1	80	12
EC130	PNLTMAX	Approach	Right	102.9	96.1	91.6	86.7	78.6	69.1	61.8	52.9	41.6	28.3	80	12

**Table 4 NPD Data for the R-22 on 3 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
R22	SEL	Approach	Left	86.8	83.4	81.0	78.4	73.9	68.3	64.3	59.6	54.1	48.7	53	3
R22	SEL	Approach	Center	89.3	86.0	83.6	81.1	76.6	71.3	67.2	62.3	56.7	50.8	53	3
R22	SEL	Approach	Right	89.8	86.6	84.2	81.3	76.8	71.1	66.7	61.4	55.2	49.1	53	3
R22	LAMAX	Approach	Left	81.8	75.4	71.0	66.4	58.9	50.4	44.3	38.1	31.0	23.6	53	3
R22	LAMAX	Approach	Center	84.1	77.7	73.5	68.9	61.7	53.5	47.8	41.5	34.4	26.7	53	3
R22	LAMAX	Approach	Right	84.7	78.4	74.1	69.6	62.4	54.3	48.2	41.4	33.5	25.0	53	3
R22	EPNL	Approach	Left	89.7	85.7	82.9	79.8	74.2	67.7	62.4	55.5	46.5	31.6	53	3
R22	EPNL	Approach	Center	91.5	87.7	85.0	82.1	77.1	70.9	65.9	59.7	51.5	39.4	53	3
R22	EPNL	Approach	Right	91.5	87.9	85.2	82.1	76.8	70.2	64.9	57.9	49.4	36.1	53	3
R22	PNLTMAX	Approach	Left	94.0	87.2	82.6	77.6	69.5	59.9	52.7	44.4	34.2	20.1	53	3
R22	PNLTMAX	Approach	Center	95.8	89.2	84.6	79.8	72.1	63.5	57.1	49.4	40.0	27.5	53	3
R22	PNLTMAX	Approach	Right	96.0	89.4	84.8	80.0	72.4	63.7	57.2	49.6	39.8	27.3	53	3

**Table 5 NPD Data for the R-22 on 9 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
R22	SEL	Approach	Left	88.7	85.5	83.2	80.6	76.2	70.7	66.6	61.7	56.0	50.2	53	9
R22	SEL	Approach	Center	89.1	85.9	83.5	80.9	76.4	70.9	66.6	61.5	55.5	49.1	53	9
R22	SEL	Approach	Right	90.4	87.1	84.8	82.3	77.7	72.2	67.8	62.6	56.5	50.1	53	9
R22	LAMAX	Approach	Left	86.5	80.1	75.8	71.2	63.8	55.4	49.4	42.8	35.2	27.2	53	9
R22	LAMAX	Approach	Center	87.5	81.0	76.7	72.1	64.8	56.6	50.6	43.8	35.8	27.2	53	9
R22	LAMAX	Approach	Right	87.2	80.8	76.4	71.8	64.5	56.4	50.5	43.7	35.8	27.3	53	9
R22	EPNL	Approach	Left	90.9	87.2	84.6	81.6	76.6	70.3	65.2	58.8	50.5	38.2	53	9
R22	EPNL	Approach	Center	91.1	87.4	84.8	81.9	76.7	70.5	65.5	59.2	50.0	37.2	53	9
R22	EPNL	Approach	Right	92.3	88.6	86.0	83.1	77.9	71.4	66.3	59.8	51.2	39.4	53	9
R22	PNLTMAX	Approach	Left	97.9	91.3	86.7	81.8	73.9	65.2	58.6	51.1	41.4	29.0	53	9
R22	PNLTMAX	Approach	Center	99.3	92.6	88.0	83.1	75.2	66.3	59.9	52.3	42.0	28.9	53	9
R22	PNLTMAX	Approach	Right	98.7	92.1	87.6	82.7	75.0	66.0	59.4	52.0	42.4	30.5	53	9

**Table 6 NPD Data for the R-22 on 12 Degree Approach**

HELO_ID	NOISE_TYPE	OP_MODE	SIDE_TYPE	Distance (ft)										REF_SPEED (kts)	FLT_ANGLE (degrees)
				200	400	630	1000	2000	4000	6300	10000	16000	25000		
R22	SEL	Approach	Left	86.9	83.4	80.8	78.0	73.1	67.3	63.0	58.0	52.6	47.6	53	12
R22	SEL	Approach	Center	89.2	85.6	83.1	80.1	75.7	70.4	66.2	61.1	55.3	49.7	53	12
R22	SEL	Approach	Right	89.0	85.5	83.0	80.2	75.4	69.4	64.9	59.5	53.8	48.0	53	12
R22	LAMAX	Approach	Left	82.4	75.8	71.4	66.7	59.0	50.9	45.1	38.7	31.4	23.7	53	12
R22	LAMAX	Approach	Center	84.5	78.1	73.8	69.4	62.2	54.2	48.3	41.5	33.5	25.0	53	12
R22	LAMAX	Approach	Right	83.8	77.2	72.8	68.1	60.2	51.3	45.2	38.3	30.6	23.0	53	12
R22	EPNL	Approach	Left	89.7	85.6	82.7	79.4	73.9	66.9	61.4	54.5	44.7	32.2	53	12
R22	EPNL	Approach	Center	91.0	87.3	84.5	81.4	76.5	70.4	65.4	58.6	49.2	34.6	53	12
R22	EPNL	Approach	Right	90.7	87.0	84.1	81.0	75.4	68.6	62.9	55.7	45.3	33.5	53	12
R22	PNLTMAX	Approach	Left	94.2	87.6	83.1	78.2	70.5	61.6	54.8	46.9	36.9	23.6	53	12
R22	PNLTMAX	Approach	Center	96.4	89.8	85.3	80.6	73.0	64.4	58.2	50.2	39.4	24.0	53	12
R22	PNLTMAX	Approach	Right	94.8	88.0	83.3	78.2	70.3	61.2	54.2	45.6	34.6	17.9	53	12

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