1. SYSTEM INSTALLATION

You can install the INM 5.1 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 OK.

1.1. Computer System Requirements

The computer system requirements for INM 5.1 are:

- 486DX 66-MHz processor or better (a fast Pentium is recommended)
- 32 Mb of RAM memory, or more
- Microsoft Windows 95, Windows NT 3.51, or Windows NT 4.0 operating system. (Note: INM 5.1 does not run on Windows 3.1, Windows for Workgroups, or NT 3.1)
- 640x480 16 colors VGA display or better
- Mouse input device
- 3.5-inch 1.44-Mb floppy drive
- 20 Mb of hard disk space for the INM system
- 1 to 30 Mb of hard disk space for each INM study
- CD-ROM drive for census and terrain data processing (optional but recommended)

Although you could probably get INM to run on a less capable computer than recommended above, both the graphical user interface and the noise-calculation performance would suffer.

Large studies involving thousands of flight operations and/or high resolution noise contours require more real memory than 32 Mb.

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 20 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.

A CD-ROM drive is required to process terrain elevation data and street map and population data. A CD-ROM drive is not needed if you do not want to use these data in your Study, or if you obtain these data from others who provide source data processing services.

1.2. Software Installation Procedure

The Windows 95, Windows NT 3.51, or Windows NT 4.0 operating system is required for INM 5.1. If one of these has not been installed on your computer, you must do so before installing INM. If you are a new user of Windows, please spend some time learning the operating system first.

1.2.1. Install in Windows 95 or NT 4.0

Put the INM #1 diskette in the floppy drive. From the Start menu, select the Run function and enter "A:SETUP" (or "B:SETUP" if the floppy is in the B drive). Follow the instructions in the setup program.

The setup program creates the INM 5.1 item in the Start // Programs menu, and this item contains two items: INM 5.1 (the main INM program) and PreProc (an INM source data processing program). You can use the Start // Settings // Taskbar to delete items from the Programs menu list.

1.2.2. Install in Windows NT 3.51

Put the INM #1 diskette in the floppy drive. In the File Manager or Program Manager, select the File // Run function and enter "A:SETUP" (or "B:SETUP" if the floppy is in the B drive). Follow the instructions in the setup program.

The setup program creates a Program Group containing INM 5.1 (the main INM program), PreProc (the INM source data processing program), and Uninstall (a de-installation program).

1.2.3. Un-Install INM

You can use the Start // Settings // Control Panel // Add/Remove Programs function to un-install INM on Windows 95 or NT 4.0, or use the Uninstall program on NT 3.51.

1.2.4. Installation Notes

System files installed: The INM setup program puts DLL files into your operating system subdirectory (for example, c:\win95\system) if the DLL's do not exist or are older versions. These DLLs are:

```
MFC30.DLL          V3.2.000
MSVCRT20.DLL       V2.11.000
CFX2032.DLL        V3.0.3.0
```

Applications that you install after installing INM may automatically load different versions of these DLLs into your operating system. INM will probably work with

newer versions of these files. Just in case there is a problem, you may want to save copies of these files, so that you can put them back if you have to.

Network users: You can put the INM system on a network disk drive, and your Studies on either network or local drives. However, there are some potential problems to watch out for:

- Two people cannot run INM from a network disk drive at the same time. This is because INM writes temporary files into the system subdirectories, and one person could overwrite another person's files. INM is a single-user system.

- 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.

No long file names: INM 5.1 does not support long file names. You should limit your INM directory names (INM system, Study, Case, and Output) to conform to standard DOS file-naming convention (an eight-character name, a period, and a three-character extension).

If INM runs very slowly: If INM seems to run very slowly on NT 4.0 (about 15 times too slow) you probably have the Pentium chip with the defective floating point processor, and Microsoft has set NT 4.0 to use floating point emulation. To reset to hardware floating point, run the PENTNT.EXE program in the operating system subdirectory (for example, c:\winnt40\system32) thus: "pentnt -o". Then, reboot your computer. You should replace the defective chip because INM uses transcendental functions (sine, arcsine, etc.), which may be incorrectly computed using hardware floating point.

Gray-on-gray problem: Windows 95 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: In the Windows 95 directory (for example, c:\win95), run the REGEDIT.EXE program. Click on the tree structure until you get to level HKEY_CURRENT_USER // Control Panel // Colors. Find "GrayText" in the right panel and change its values from "128 128 128" to "0 0 0".

1.3. Converting INM 5.0 Studies

INM 5.1 automatically converts your version 5.0 Studies into version 5.1 format. The conversion process takes place when you first load a 5.0 Study. A message box asks you if you want to continue with conversion, and you can stop the

process before it starts, if you wish. Also, you have the option of saving your old 5.0 Study under a different name.

Usually, a valid version 5.0 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. These messages are also written to the VERSION.MSG file in the Study directory.

1.3.1. Conversion Errors

If there are problems during conversion, error messages are written to the window and to the VERSION.MSG file. If there is an error, INM will not convert your Study to version 5.1. However, you are given the opportunity to have INM continue checking for more errors after the first one occurs. You can either quit at the first error, or continue checking your original data for related errors. If conversion fails, your original 5.0 data files will not be altered.

If there are errors, you must fix them in INM 5.0 and then try again. For this reason, do not delete your INM 5.0 system until after all your 5.0 Studies have been converted.

Errors can exist in a version 5.0 Study for a variety of reasons:

1) You may have made changes in the 5.0 Study and then left it, never trying to run it again. If you have a problem converting, make sure that INM 5.0 can run your original data and produce correct results.

2) You may have tried to trick INM into doing something by using unrealistic data (like thrust = 1 pound). INM 5.1 has many new error-trapping functions, and it is now harder to input out-of-bounds data. Version 5.0 data must pass INM 5.1 validity tests, or conversion cannot take place. Look at the error messages in the VERSION.MSG file, use INM 5.0 to fix input data, and then try again.

3) Because of incomplete error-trapping code in INM 5.0, the model may have allowed an error to exist, even though reasonable-looking noise contours were produced. For example, approach Profile Points must start with negative X values; but this requirement was not trapped by INM 5.0 (it is now). If you think that this kind of error may be preventing conversion to 5.1, try graphing your profiles in INM 5.0 to see what they look like. Hard-to-find data input errors are easily seen in the plotted profiles.

1.3.2. Re-Run INM

All version 5.0 output files are deleted as part of the conversion process in preparation for re-running the model. After successfully converting a version 5.0

Study, you must re-run all Case and Output results because of modifications and corrections in the flight path calculator and in the noise computation module.

1.4. Quick Tests

You can quickly test INM by loading one of the 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

Start INM like you would any other Windows program. If all is working well, INM will load itself, and then it will automatically load the TEST50 Study.

1) Click on "Acft" on the menu bar, and then select "Aircraft" in the pull-down menu. INM will take a few seconds to load Aircraft data. Then, 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").

   If you want to keep the TEST50 example Study the way it was when it came with INM, do not click or type in the data-input boxes on the right-hand side of the DBF windows.

2) Now, you can try other menu items to see what happens. The one called Acft // Procedure Steps ("Acft" on the menu bar, and "Procedure Steps" in the drop-down menu) will take a while to load because there are thousands of records to check and organize as it loads.

3) Go to the Track // 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.

   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).

   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.

4) Go to the Output // Output Graphics function. After the window loads, select the View // Layers On/Off function and click inside the little box next to "Population Points", and click again on "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 "C:\", and then type "NEWSTUDY" in the Study Name edit box. Press "OK", INM verifies your choice, click on "Yes", and INM creates a new directory called "C:\ NEWSTUDY". All of the Study files and subdirectories will go in this Study 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 450 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. navaids 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 (navaids and fixes) and Runway Ends. Press "OK" to close the Study Setup dialog.

5) Select the Setup // 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 DBF window with 767JT9 data.

6) Select the Setup // Cases function. After INM displays the Case DBF window, select the Edit // Add Record function. Click in the "Case" edit box and type "CASE01". Leave the airport parameters as they are. Select Edit // Commit Record. INM creates a subdirectory called "C:\ NEWSTUDY \ CASE01", where case-related data are stored.

7) Select the Track // Input Graphics function. Zoom in on the runway system. Select the Edit // Add Track 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 "AA" for the track identifier and press "OK". INM redraws the departure track and colors it blue.

8) Select the Window // Close All function to close the various open windows that have accumulated.

9) Select the Ops // Flight Ops function. Click on Case "CASE01" and press "OK". After the Flight Operations window appears, select "09R" in the Runway drop-down list box. Select Edit // Add Record. Select Profile "S6". Click inside the "Day" edit box and type "300". Select Edit // Commit Record.

10) Select the Run // Grid Setup function. Click on Case "CASE01" and press "OK". Select Edit // Add Record and then Edit // Commit Record. The default "CNR" grid specifies a rectangle for computing noise contours.

11) Select the Run // Run Options function. Select Run Type "MultiMetric", Noise Family "A-weighted", and leave the rest of the run option parameters as they are. Select Edit // Commit Record.

12) Select the Run // Run Start function. Click on "CASE01", 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 during the noise calculation. When the Run Status window disappears, the run is done. Look at the Run Options window to see how long the noise calculation took.

13) Select the Output // Output Setup function. Select Edit // Add Record, click in the Output Id box, and type "CASE01.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 "OneCase" and Case1 "CASE01" parameters as they are. Select Edit // Commit Record.

14) Add a second Output record "CASE01.LMX" using the "LAMAX" Metric, and set the contour parameters to (60 dB, 100 dB, and 10 dB). Again, use "OneCase" and "CASE01" parameters. Select Edit // Commit Record.

15) Add a third Output record "CASE01.TA" using the "TALA" Metric, and set the contour parameters to (5 minutes, 45 minutes, and 10 minutes). Again, use "OneCase" and "CASE01" parameters. Select Edit // Commit Record. You should have three committed records showing in the left-hand list box when you are finished with the Output Setup function.

16) Select the Output // Output Graphics function. Click on all three Output identifiers to highlight them, and press "OK". INM then performs post-processing on one set of MultiMetric noise files to produce three sets of noise contours. A DOS window appears while NMPLOT calculates the contours. When finished post-processing, INM displays three Output Graphics windows — one with DNL contours, one with LAMAX contours, and one with TALA contours. Double-click on the title bar of one of them to maximize the window. Zoom in to see the contours better. Then, look at the other two Output Graphics windows.