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SINTEF REPORT

TITLE

NORTIM version 3.3. User Interface Documentation

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ABSTRACT

NORTIM, the program for calculation of aircraft noise propagation, has four main components: A calculation kernel, a project database, a master database, and a user interface. The latter is a tool where the user may combine operational input (from external sources) with data from the master database to make a project database. The final project database is used to produce a distribution of the noise sources suitable for the calculation kernel. The sources are distributed in four dimensions (x, y, z-coordinates and time).

This document is a short introduction and reference to the NORTIM, version 3.3 user interface. Version 3.3 is updated to comply with revised legislation related to the Norwegian pollution act.

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GROUP 1	Acoustics	Akustikk
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1 Introduction

NORTIM, the program for calculation of aircraft noise propagation, has four main components: A calculation kernel, a project database, a master database, and a user interface. The latter is a tool where the user may combine operational input (from external sources) with data from the master database to make a project database. The final project database is used to produce a distribution of the noise sources suitable for the calculation kernel. The sources are distributed in four dimensions (x, y, z-coordinates and time).

This document is a short introduction and reference to the NORTIM user interface. The user interface is integrated in a Microsoft® Word document. The different topics of the user interaction with NORTIM are organized as chapters in the Word document, utilizing Word's capability to handle text, tables, graphics and user dialogs. This allows an easy and rapid development of reports. All communication with the NORTIM databases is handled automatically by the user interface.

The user may double click active section headings in the Word document to choose tools relevant to the section. There are three main tools:

- *The table manager*, which is used to import, create and edit the information in the NORTIM project database, required for calculations by the NORTIM calculation kernel.
- *The GIS manager*, which is used to import and edit the basis for map generation.
- *The map manager*, which is used to create and edit maps to be included in the final Word document.

In addition, there are

- a *graphical track editor*, which is used to draw or edit the flight tracks
- a *difference map manager*, which is a special version of the map manager, used to create and change maps showing the *difference* between two scenarios
- a *chart manager*, which is used to illustrate flight profiles or noise data
- an *update* tool, which is used to update multiple tables, maps or charts at once
- a *version* tool, which is used to set the version number for the current project database
- the *NORTIM control center*, which is used to handle the NORTIM calculations

The *update* tool and the *version* tools are available from all active section headings. *Note that the update tool is not fully implemented yet.*

The functionality of the tools depends slightly on which section they are launched from. The general functionality of the three main tools and the special tools *track editor*, *difference map manager* and *NORTIM control center*, is presented in chapter 3. The next chapters, 4 – 10, are structured like a typical NORTIM report. For each section, the available tables and tools are presented, together with information specific to the section. Finally an appendix with technical information is included.

2 General notes

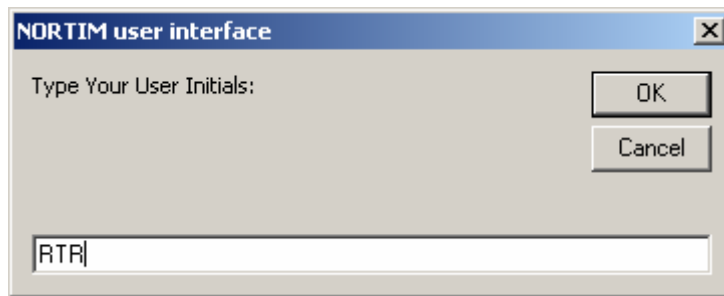
The following applies to all parts of the user interface:

- Position coordinates (North / East) are given in meters in the chosen global coordinate system
- Heights are given in meters, either above sea level or above local ground
- All numbers must have dot (.) as decimal indicator, not comma (,). If your system uses comma, you will have to change this under 'Regional options' in Windows' Control Panel
- Any changes to the contents of a table may have impact on subsequent tables. See the flow chart in appendix A.3 for more information on the relationship between tables.

3 Main Parts of the NORTIM User Interface

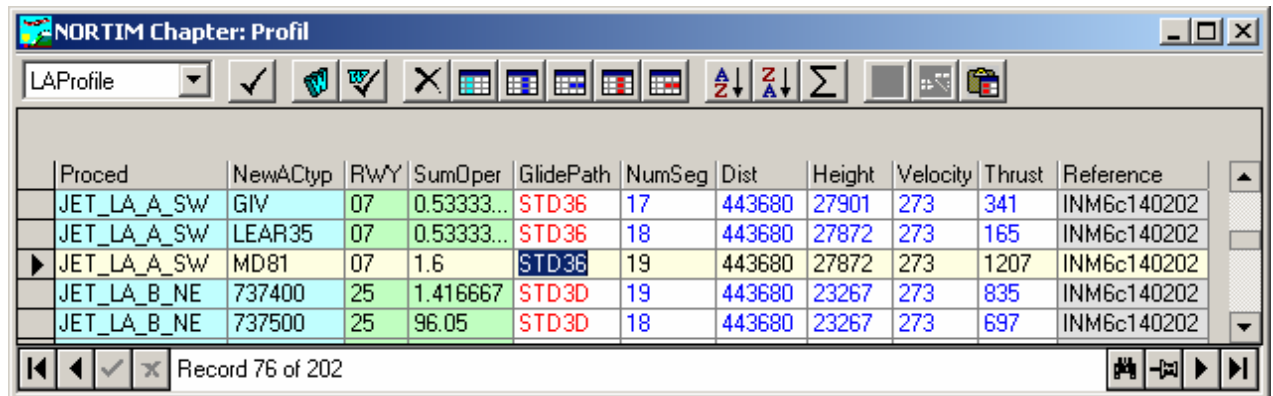
This section presents the main parts of the NORTIM user interface: The *table manager*, the *GIS manager*, and the *map manager*. With a few exceptions, all data handling is done with these three tools. The most notable exceptions, the *graphical track editor*, the *difference map manager* and the *NORTIM control center*, are also presented here.

When either of the tools is opened for the first time in a session, the dialog box shown below opens, prompting the user to enter his/her initials. The user initials, together with the current date, will be used as a reference tag if the user does any changes to fields in a table.
















3.1 The table manager

A typical table manager layout is shown in the figure below.

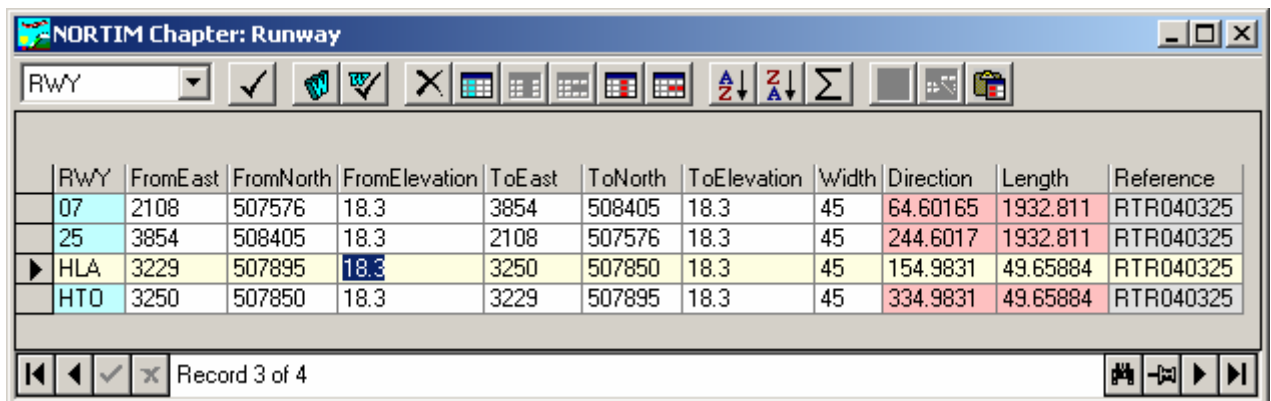


The lower toolbar may be used to navigate between records. Note that deleting records is only allowed in some tables, and the button for this operation is only available where applicable. The functions of the buttons in the upper toolbar are shown in the table below. Note that two of the buttons are not shown in the example figure above and two are disabled. Some buttons are not applicable for all tables.

Button	Function
	Combo box for selecting a table. Only tables relevant to the current section will be listed here.
	Update project database. When updating is required, this button is red.
	Stick table to Word document. This is a toggle button, which is shown pressed when the current table is linked to a Word table.
	Update Word document. Press this to update the information in the Word table linked to the current table.
	Delete entire table contents. A warning will be given.
	Build table backbone. This generates the cyan and green colored columns from

Button	Function
	other (preceding) tables in the NORTIM project database.
	Import columns from master database. Based on the cyan (and in some cases also the red) columns, this will import information from the master database.
	Import cells from master database. Equivalent to  , but applies only to the current line. Overwrites any existing data.
	Calculate columns. If appropriate, this will calculate values for the red columns. In other cases, pressing this button will fill in default values.
	Calculate cells. Equivalent to  , but applies to only the current line. Usually overwrites any existing data.
	Sort table in ascending order with the current column as the primary key ¹ .
	Sort table in descending order with the current column as the primary key ¹ .
	Summarize operations, distributed on takeoff/landing/etc where applicable.
	Start the graphical track editor.
	Open dialog box to set calculation parameters
	Import data to the table from an external file.
	Fill column cells. This is used to enter content into multiple cells in a column, or to search and replace the content of cells in a column.

The color coding of the columns is used to indicate the source and status of the information. The cyan and green columns are based on information from other (prior) tables in the NORTIM project database. The green columns are shown for informational purposes only, and are not used in the current or subsequent tables. Neither the cyan nor the green columns may be changed by the user. Columns with red text may be filled with default values, and may be modified by the user. Columns with blue text may also be modified by the user, but are generally imported from the master database, based on the values in the red and cyan columns. If some information is not available in the master database, empty lines will appear in the table, to be filled in by the user. In some tables, there are also columns with black text on white background. These must be filled by the user, and can not be automatically generated. The last column (**Reference**) is automatically filled with a reference to the source. For records changed by the user, the user's initials and the current date will be used.




The screenshot shows a software window titled "NORTIM Chapter: Runway". It features a toolbar with various icons for table management, including a dropdown menu set to "RWY", a checkmark, a hand, a magnifying glass, a grid, a calculator, a sort icon, a sum icon, a dialog box icon, and a fill icon. Below the toolbar is a table with the following data:

	RWY	FromEast	FromNorth	FromElevation	ToEast	ToNorth	ToElevation	Width	Direction	Length	Reference
	07	2108	507576	18.3	3854	508405	18.3	45	64.60165	1932.811	RTR040325
	25	3854	508405	18.3	2108	507576	18.3	45	244.6017	1932.811	RTR040325
▶	HLA	3229	507895	18.3	3250	507850	18.3	45	154.9831	49.65884	RTR040325
	HTO	3250	507850	18.3	3229	507895	18.3	45	334.9831	49.65884	RTR040325

At the bottom of the window, there are navigation buttons and a status bar that reads "Record 3 of 4".





Another example of table manager layout is shown here. As noted above, the white columns *must* be filled by the user. Note that this table has another type of red columns. Based on the

¹ If repeated, any previous sorting keys are preserved (the previous primary key becomes secondary key, etc).

information in the white columns, these red columns are calculated when  is pressed. They may *not* be changed directly by the user.

3.1.1 Working with the Table Manager

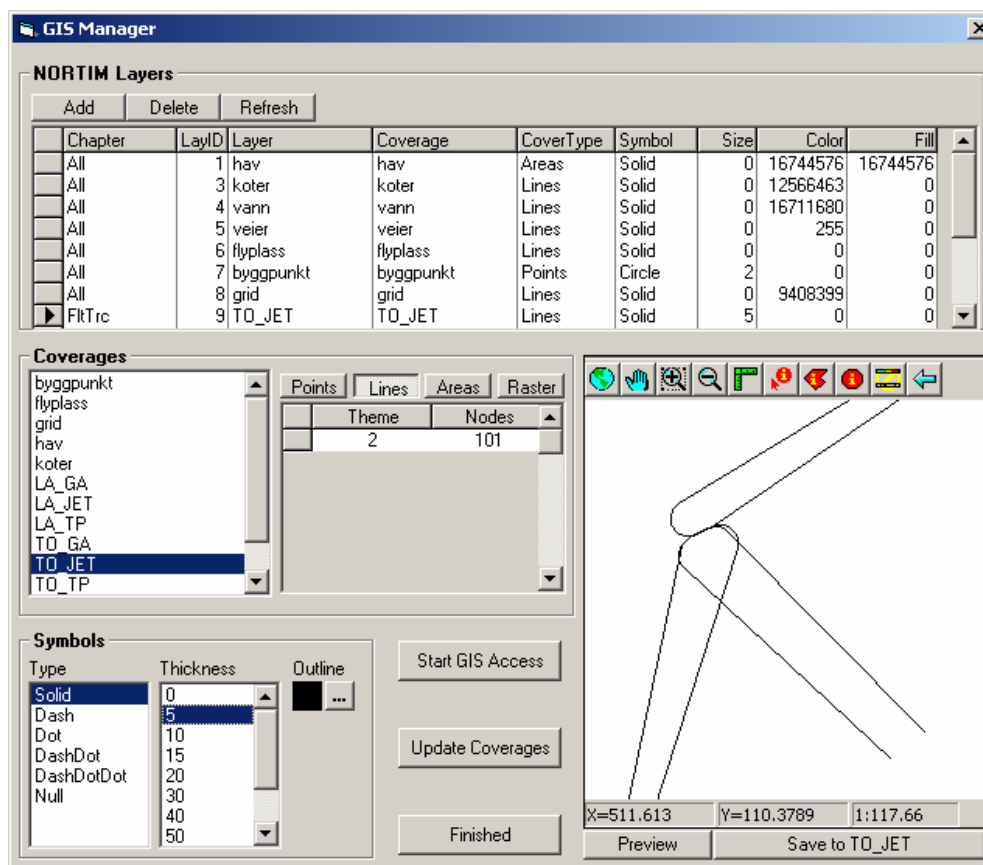
To summarize, the general procedure for working with a table manager is as follows:

1. Choose a table with the combo box.
2. Build table backbone (). This will fill any cyan and green columns.
3. Enter values in the white columns (where applicable).
4. Calculate columns (). This will fill any red text columns with default values, and red background columns with values based on the cyan and white columns.
5. Modify or enter the red values as appropriate.
6. Import columns from master database (). This will fill the blue columns with values from the master database, based on the cyan and red columns.
7. Modify or enter the blue values as appropriate.
8. Update project database ().

In some tables, there are no red or blue columns. In these cases, either the red or blue buttons are not required, and are therefore disabled (gray).

3.2 The GIS manager

The GIS manager is used to create map layers for use by the map manager. It is also an interface to the external GISAccess program, which is used to import and edit coverages and themes into the project database. The layout of the GIS manager is shown here.




The upper panel, **NORTIM Layers** shows all layers available to the map manager. The first column, **Chapter**, specifies in which sections the layers are available. The values listed below are allowed. Note that where applicable, the section names are also specified in chapter 4 – 12 in this report.

- **All**. The layer is available in *all* chapters
- **DigMap**. The layer is only available in the section ‘Digital Maps’
- **DigTop**. The layer is only available in the section ‘Digital Topography’
- **Runway**. The layer is only available in the section ‘Runways’
- **FltTrc**. The layer is only available in the section ‘Flight Tracks’
- **GrdPnt**. The layer is only available in the section ‘Grid Parameters’
- **Resul0,..,Resul9**. The layer is only available in the sections ‘Results for Scenario 0..9’
- **LEQF**. The layer is only available in the section ‘Indoor noise levels – mapping and measures’
- **LDENNgt**. The layer is only available in the section ‘Mapping of outdoor noise levels’
- **LOther**. The layer is only available in the section ‘Plan of action’
- **LEQT**. The layer is only available in the section ‘Number of People Inside LEQ 50’

Thus, for a layer to be available in several sections, but not **All**, the layer must be duplicated, with different names (in the third column) and different values for **Chapter**. The second column is a layer id. In the map manager, the layers are drawn by **LayID**, in ascending order. To change the order, the layer ids may be changed to specify the desired order. **Refresh** must then be pressed to update the table.

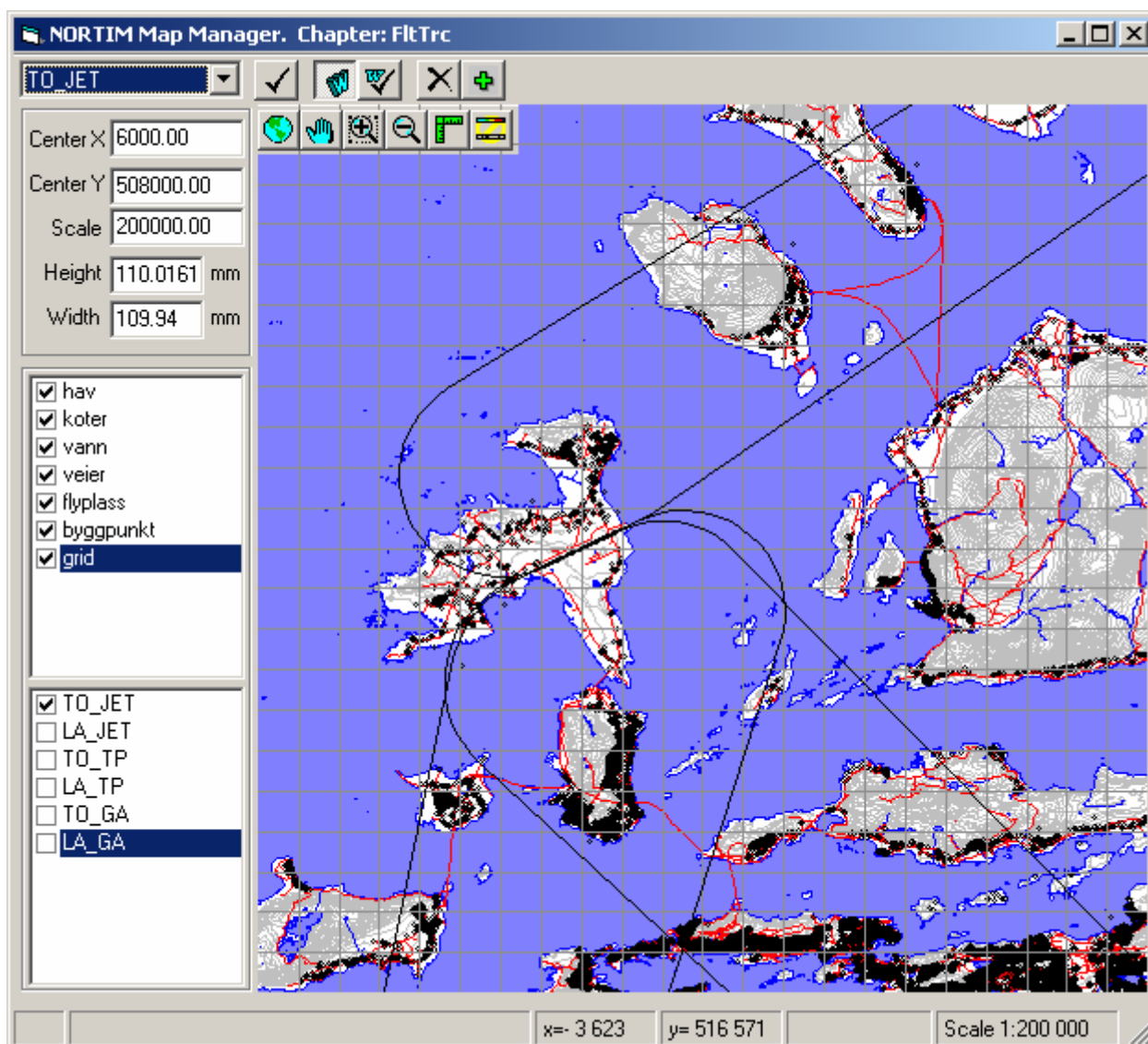
Note that there are several layers predefined, with **LayID** > 1000. These layers are only used by the difference map manager and should normally not be deleted or edited. In special cases the Size, Color and Fill columns may be altered by the user to change the visual appearance of the difference maps.


The **Symbols** panel shows the color and style that will be used when a coverage is drawn on a map. The button  is used to select a color. The color and style will be saved to the corresponding columns in the **NORTIM Layers** table when the user presses **Save to**. The values may also be manually entered into the table. By pressing the **Preview** button at the right side of the GIS manager, the selected color and style may be checked visually.

To create, delete, copy or otherwise manipulate coverages, the program GISAccess must be started by pressing the appropriate button. Then the correct project database must be chosen. A typical GISAccess layout is shown on the next page.


The **Coverages** panel is used to create, delete, copy or reduce the extent of coverages. A coverage may consist of several themes, which may be manipulated by the right hand side of the panel. A coverage is imported by using the buttons in the **Import tools** panel near the bottom of the GISAccess window. The buttons have the following functions:




- **Tracks**. Import tracks from the NORTIM project database
- **Grid**. Create a regular grid of a given density and extent
- **SOSI**. Import SOSI (digital map) files
- **BMP**. Import background map in bitmap format
- **GIS/CAD**. Import GIS or CAD files (.SHP, .DXF, Geo TIFF, etc)







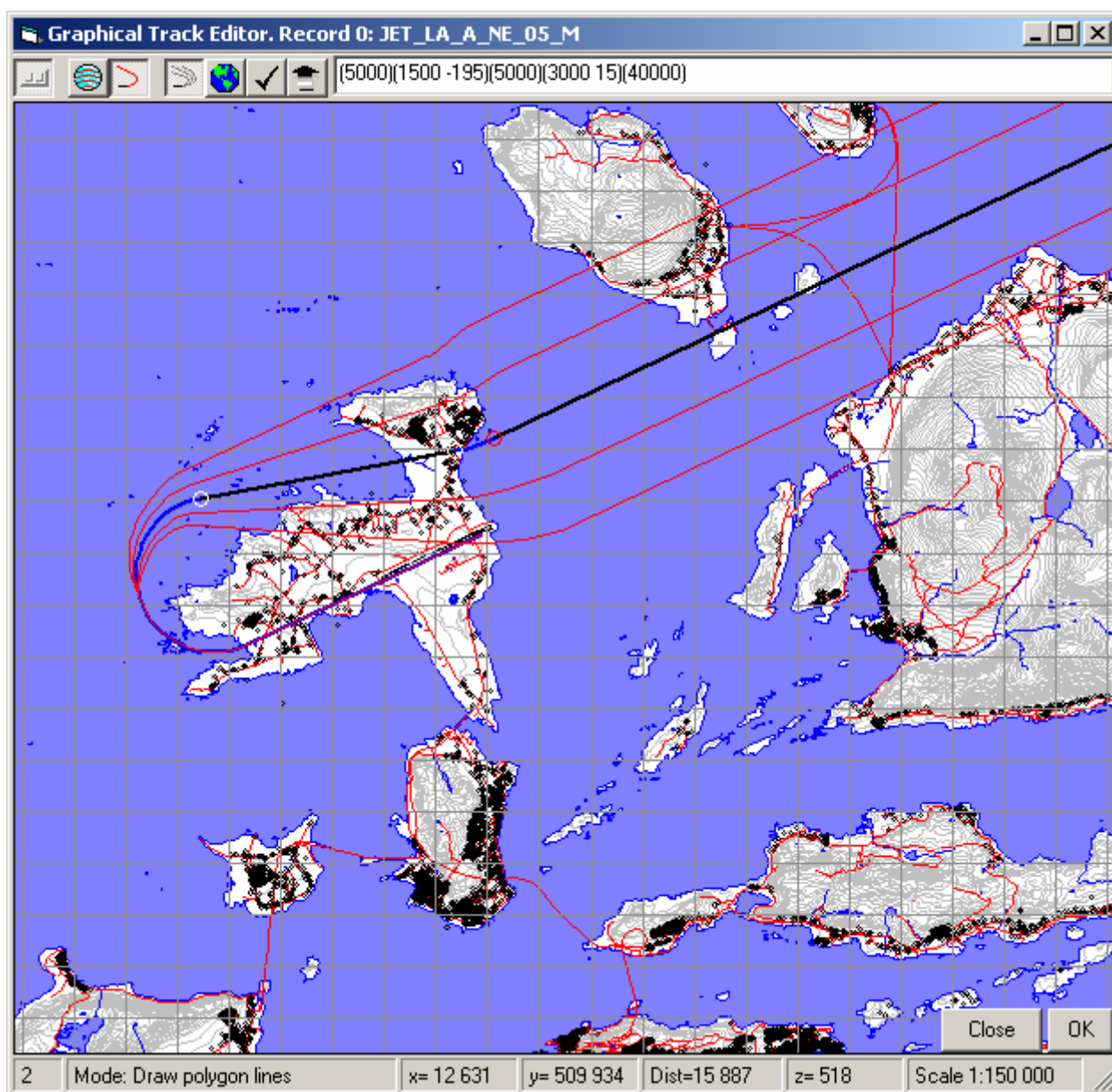
The  button should be pressed to update the map in the project database before inserting into the Word document. The inserted map will have the scale and dimensions given by **Scale**, **Height** and **Width**. Note that when a map is inserted, a copy is also stored as an enhanced metafile in a subdirectory 'figures' in the path of the project database. The filename consists of the section name and the map name, *i.e.* '<section name>_<map name>.EMF'.

3.4 The graphical track editor

The track editor is a graphical tool for constructing flight tracks. It can be activated from the flight track tables (**Track** and **DispTrack**) by the  button. An example of a track editor layout is shown on the next page. The functionality of the toolbar buttons is described in the table below.

Button	Function
	Map toolbar. This is a toggle button, which shows or hides the map toolbar. This button is only available in map design mode.
	Map design mode. In this mode, individual layers from the All category (see section 3.2) may be toggled on or off. The scale and offset of the map may also be adjusted.
	Track draw mode. In this mode, the track for the current procedure may be

Button	Function
	drawn, as described below.
	Display dispersion tracks. This is a toggle button, which may be used to check that the dispersion tracks are drawn correctly.
	Load topography file. When a topography file is loaded, the terrain elevation at the pointer is displayed in the status bar.
	Refresh map background. This will restore the background map to the original state, removing any temporarily stored tracks.
	Store temporary background. This will temporarily save the current track as part of the background map. This makes it easy to compare tracks.



Below the map is a status bar. The **x** and **y** fields show the east and north position of the pointer. If a topography file is loaded, the **z** field shows the terrain height at the pointer. The **Dist** field shows the total track length from the runway threshold to the segment end, marked with a small red circle. If no mouse buttons is pressed, this point is always the segment end closest to the pointer.

3.4.1 Creating tracks using the Graphical Track Editor

Drawing track segments is relatively easy, obeying these rules:

1. A new, straight segment is created by double clicking. The new segment will be appended to the end of the track segment list, independent of the position of the red circle.
2. The red circle shows the end of the current segment. The user must be very careful to choose the right segment.
3. Any segment may be turned into a straight segment by right clicking. While holding the right button, the length may be adjusted.
4. Any segment may be turned into an arc by left clicking. While holding the left button, the end point (and thus the radius and angle) may be adjusted.

At any time, segments may be edited or added manually in the upper right text box (see section 7.4 for more information on the notation used to describe the tracks). The graphical representation is updated correspondingly. Note however, that any change to a segment in the track editor will also update the segments in the text box. As noted above, the user must take care to choose the right segment. When the track is finished, the user must press the **OK**-button to save the track to the project database. The **Close**-button will close the track editor *and does NOT save the track!*

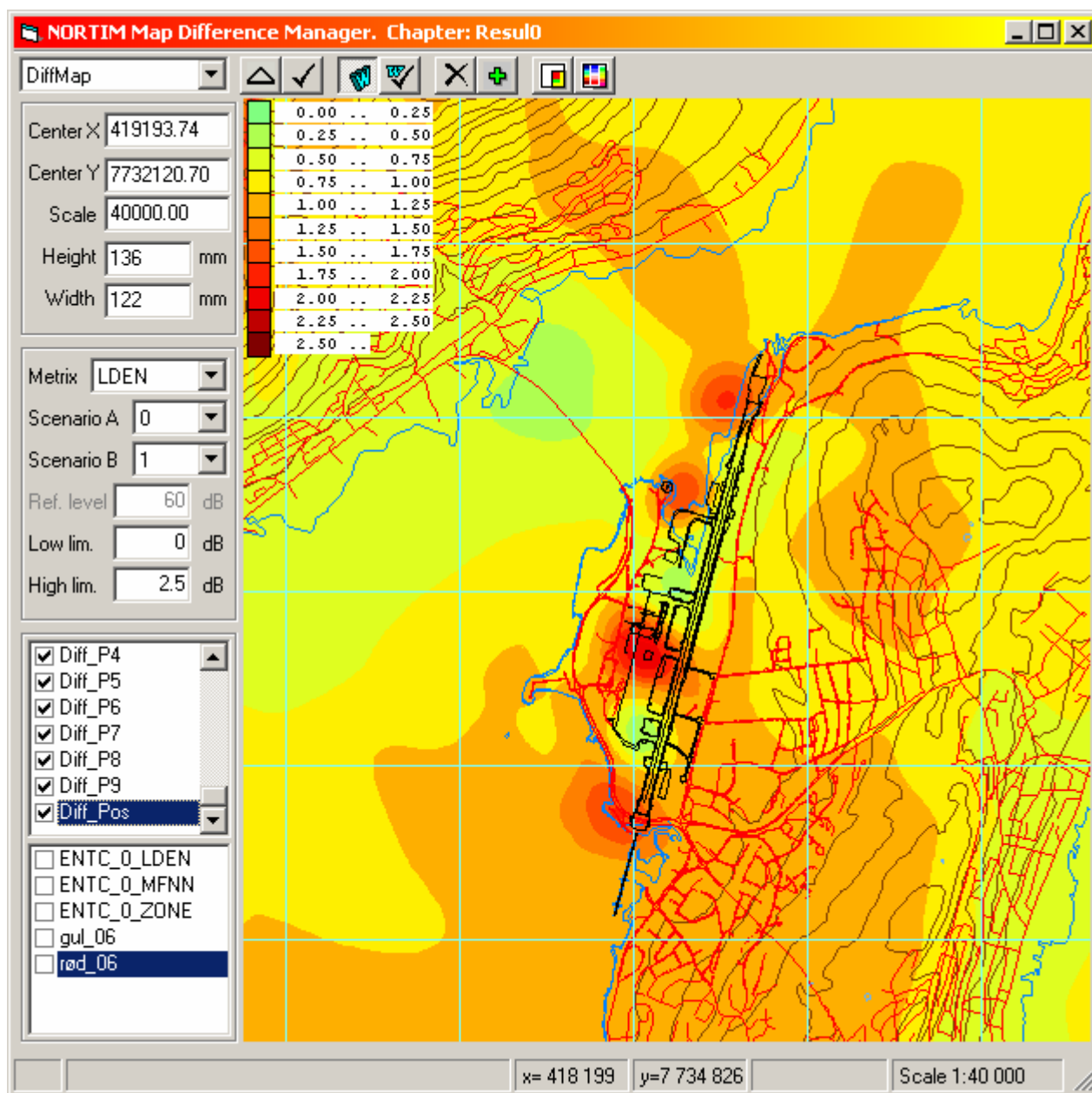
3.5 The difference map manager


The difference map manager is a special version of the map manager, used to create maps with contours showing the difference between two scenarios. The layout of the difference map manager is shown on the next page. The main difference from the ordinary map manager is a panel where the noise unit (**Metrix**) and scenarios to be compared are selected. The comparison is done by subtracting **Scenario A** from **Scenario B**. If **Scenario B** is “None”, a reference level (**Ref. level**) can be entered instead. In this case, the reference level is subtracted from **Scenario A**.

In either case, the contours generated are defined by the limits given in **Low lim.** and **High lim.** Note that the low limit must be less than or equal to zero, while the high limit must be greater than or equal to zero. The resulting contours are given in the table below (with L = Low limit and H = High limit).

Contour name	L < 0 < H	L = 0 < H	L < 0 = H	L = 0 = H
Diff_Neg	-50.0 .. 1.0L	-50.0 .. 0.0	-50.0 .. 1.0L	-50.0 .. 0.0
Diff_N9	1.0L .. 0.9L		1.0L .. 0.9L	
Diff_N8	0.9L .. 0.8L		0.9L .. 0.8L	
Diff_N7	0.8L .. 0.7L		0.8L .. 0.7L	
Diff_N6	0.7L .. 0.6L		0.7L .. 0.6L	
Diff_N5	0.6L .. 0.5L		0.6L .. 0.5L	
Diff_N4	0.5L .. 0.4L		0.5L .. 0.4L	
Diff_N3	0.4L .. 0.3L		0.4L .. 0.3L	
Diff_N2	0.3L .. 0.2L		0.3L .. 0.2L	
Diff_N1	0.2L .. 0.1L		0.2L .. 0.1L	
Diff_Zero	0.1L .. 0.1H	0.0 .. 0.1H	0.1L .. 0.0	
Diff_P1	0.1H .. 0.2H	0.1H .. 0.2H		
Diff_P2	0.2H .. 0.3H	0.2H .. 0.3H		
Diff_P3	0.3H .. 0.4H	0.3H .. 0.4H		
Diff_P4	0.4H .. 0.5H	0.4H .. 0.5H		
Diff_P5	0.5H .. 0.6H	0.5H .. 0.6H		
Diff_P6	0.6H .. 0.7H	0.6H .. 0.7H		

Contour name	L < 0 < H	L = 0 < H	L < 0 = H	L = 0 = H
Diff_P7	0.7H .. 0.8H	0.7H .. 0.8H		
Diff_P8	0.8H .. 0.9H	0.8H .. 0.9H		
Diff_P9	0.9H .. 1.0H	0.9H .. 1.0H		
Diff_Pos	1.0H .. 200.0	1.0H .. 200.0	0.0 .. 200.0	0.0 .. 200.0



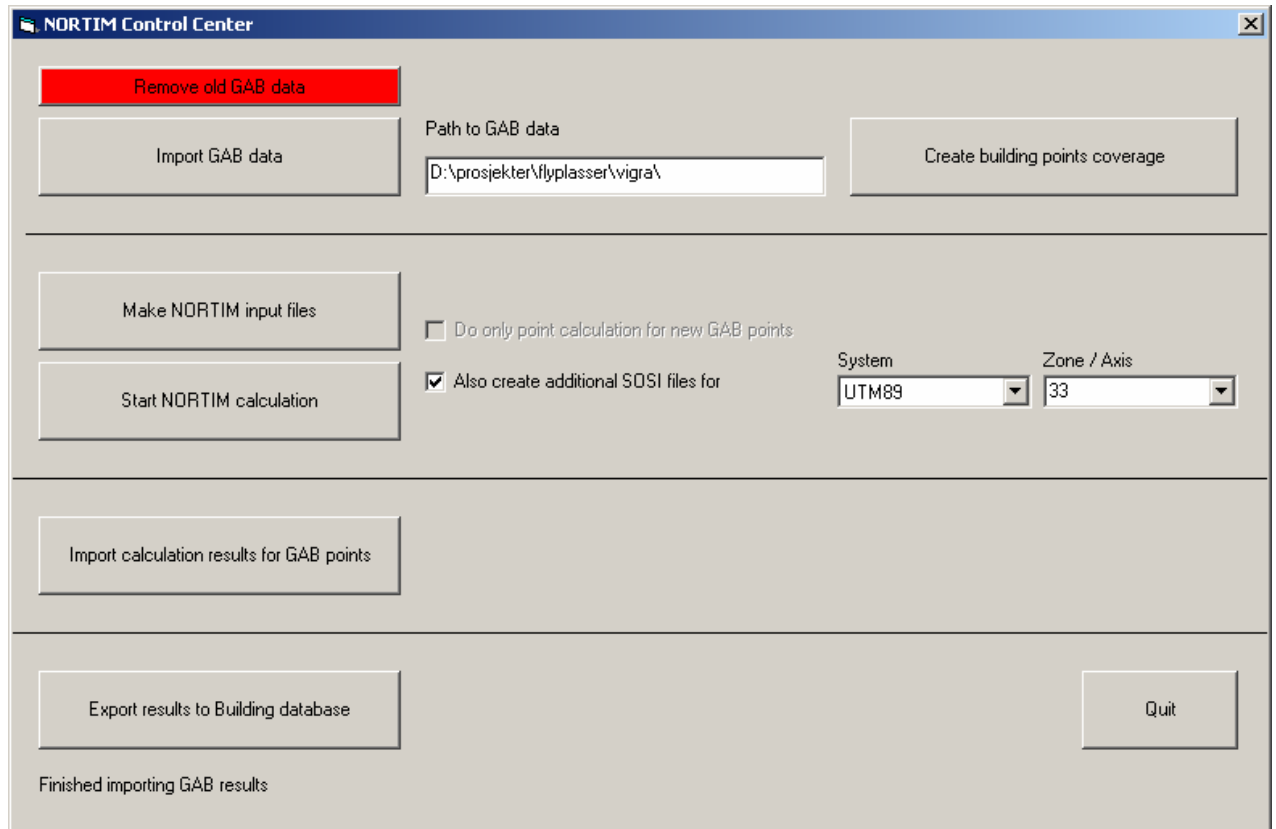
The difference contours, based on the given information, are generated by clicking the  button. After generating the contours, they are automatically imported into the database, and the map is updated. As shown in the figure above, the contours are available among the other background layers, and can be marked for inclusion or exclusion when the map is drawn. Foreground layers from the current chapter may also be included if desired.

The  button shows a legend in the map. Repeated clicks move the legend through the four corners, and finally remove the legend. The  button cycles through three different color maps.

Note that the difference map manager only stores the selected layers and map scale, size, etc. The selected scenarios and limits are not stored and must be reentered when reopening the difference map manager.

3.6 NORTIM control center

The control center is used to prepare inputs for the calculation kernel, start the NORTIM calculation, and import the results. It is activated from the ‘NORTIM calculation control’ section. The layout of the NORTIM control center is shown below.



The window is divided into four sections.

The first section is related to the import of building points from a GAB data source. The path to the source files must be given. The names and format of the files must conform to a given standard, see appendix A.2 for more information. After the import, the user may generate a building points map coverage which can be included in a map layer. *Note: The coverage, named ‘byggpunkt’, will overwrite any existing coverage with the same name.* The example figures shown in section 3.3 and 3.4 include a building points layer.

The second section is related to the generation of input files for the calculation kernel, and the calculation itself. If contour sets are created, the user may specify that an additional set of contour should be generated, in a coordinate system different from the one used in the project and given in the **MapList** table. If GAB data has been re-imported it is also possible to do point calculations for new buildings only (if any). Note that both these possibilities must be chosen *before* the NORTIM input files are generated. The input files are put in a subdirectory ‘inputs’ in the path of the project database. The calculation result files are put in a similar subdirectory named ‘results’.

The third and fourth sections are related to the import and export of building points calculation results. The number of buildings and an approximation of the number of people concerned are

summarized in files for each scenario. The results for each building may also be exported to a building database. *Note that this function has not been tested with the later version of the building database.*

4 Surroundings


This chapter presents the digital map that is used as a background for tracks and noise contours. The topography and any modifications to the topography are also defined.

4.1 Digital Maps [DigMap]

Table: **MapList**. List the local origin coordinates and coordinate system.

Other tools: GIS manager and map manager.

In this section, the background map (to be used in the track- and noise contour figures) is created. This is done by use of the GIS manager and the map manager, by the following steps:

1. Open the GIS manager and start GISAccess
2. Create appropriately named coverage(s)
3. Import SOSI data, bitmap figures or GIS/CAD files to the coverage(s)
4. Quit GISAccess and refresh the coverages in the GIS manager
5. Create appropriately named layer(s)
6. Specify that the layers are available in **All** chapters
7. Double click a layer name to which a coverage is to be saved
8. Give the coverage a color and style
9. Save the coverage to the chosen layer
10. Open the map manager
11. Add () and name the map 'BaseMap'
12. Use the created layers to build a suitable background map

Note that the **MapList** table must be filled with the chosen local origin in the same coordinate system that has been used in the background map. The code numbers for the coordinate system and axis must be entered according to this table:

Coordinate System	CoordSys	CoordAxis
UTM50	3	32,33,34, etc
UTM89	7	32,33,34, etc
NGO	4	1,2,3,4, etc


4.2 Digital Topography [DigTop]

Tables: **TopoList**. Allows specification of the topography file(s) to be used by NORTIM.

TopoEdit. Allows corrections to be made to the topography.

Screens. Allows specification of artificial screens.

Other tools: GIS manager, map manager and topography manager (TopoAccess).

In the table **TopoList**, the *full path* to the topography file(s) must be given. If the path and filename is correct, the file date/time is shown when the  button is pressed. The coordinate system of the topography files must be the same as used for the background map and specified in the **MapList** table in section 4.1.

Topography corrections in the **TopoEdit** table are given as a number of rectangles. A rectangle is given by specifying the width of the rectangle, together with the end points of a line along the center of the rectangle. The height above sea level is given as an interval, which corresponds to

the end points of the centerline. For all points inside the plane defined in this way, the surface characteristics are set equal. The surface characteristic is given by the user as a number between zero (acoustically hard, like water or runway) and one (acoustically soft). In some cases, it is convenient to let all terrain points inside a rectangular *box* (as an alternative to a plane) have the same surface characteristic. This may be done by using a height interval with *negative* numbers.

In the table **screens**, artificial screen segments are specified by their start and end coordinates, height *above local ground*, and a code which specifies the type of screen. These codes are valid:

Code	Description
3	A single, standalone screen
1	The start segment of a number of screen segments
0	A screen segment with neighbor segments at either side
2	The end segment of a number of screen segments
-1	The start segment of a <i>closed</i> ring of screen segments
-2	The end segment of a <i>closed</i> ring of screen segments. <i>NB: Note that this segment must be a duplicate of the start segment (which has code = -1)</i>

Note: For screen segments that are connected (codes -1, -2, 0, 1 or 2), the order must be correct, and the start coordinates of the next segment must equal the end coordinates of the prior segment.



For each row in these tables (**TopoList**, **TopoEdit**, **Screens**) it is possible to specify which scenarios it applies to or not (by entering '1' or '0' in the appropriate columns).

5 Traffic

This chapter presents the electronic journal data.

5.1 Traffic Journal

Table: **Journal1**. Allows the electronic journal to be imported and eventually adjusted.

The **Journal1** table is the basis for the NORTIM calculations. It is usually imported from an Excel spreadsheet. The import process is started by pressing the **Import from external file** button () , which opens up a dialog box. The user must select a database and a table to import from, and define which fields in the import table are associated with the columns in the **Journal1** table. The imported data may be changed, and new lines may be added. After the import and any change of the data, the  button must be pressed to calculate the red columns.

The **TO_LA** column is used to identify operation type. Allowed values are

- **TO**: Takeoff / departure
- **LA**: Landing / arrival
- **TG**: Touch and Go

Note that NORTIM will automatically add taxi operations for each takeoff and landing (not Touch and Go). The user should *not* enter taxi operations manually. Taxi operations associated with departures and arrivals are denoted **TOX** and **LAX**, respectively.

5.2 Traffic Plan

Table: **Plan**. Allows flights not included in the journal to be added to the total traffic.

This table is typically used to enter traffic information not included in the electronic journal. This may be future traffic, touch-and-go operations, military operations, etc.

5.3 Traffic Summary

The traffic summaries will include the traffic from both of the tables **Journal1** and **Plan**.



6 Aircraft Types

This chapter presents the used aircraft types, and how these are grouped into different categories.

6.1 Aircraft Types

Tables: **subAC**. Shows the aircraft types in use, and how aircraft types that are not found in the master database are substituted.

ACcat. Shows the aircraft types. The aircraft types may be grouped into a smaller number of aircraft categories. The engine installation code is also set.

For both of these tables, most of the information is handled automatically, by pressing the  and  buttons. However, there may be aircraft types for which no substitution or category has been pre-assigned. In these cases, the user must enter the values in the blue columns manually. Note: If the **subAC** table is stuck to the Word document, only aircraft types for which the ICAO designator *differs* from the designation pre-assigned in the NORTIM master database, will be shown in the Word document.

6.2 Noise Emission

Tables: **nc**. Shows the aircraft types, with noise id and number of thrust settings.

npd. Shows the noise ids, with noise levels as function of thrust level and distance.

Other tools: chart manager.

In general, these tables are also automatically generated. Only when aircraft types not found in the master database are used, the user will have to add information.

The chart manager may be used to illustrate the noise levels as a chart in the document.

6.3 Aircraft Summary

Shows summary tables based on information in **Journal**, **Plan**, **SubAC** and **ACcat**.





7 Destinations, Tracks and Profiles

This chapter presents the used destination and departure designators, and how these are grouped. The chapter also presents the procedures and tracks used in the simulations.

7.1 Departures and Destinations

Tables: **subDepDest**. Shows the departure- and destination designators in use. Invalid designators may be substituted with valid ones.

DepDestGroup. Shows the departure- and destination designators. The designators may be grouped, and the stage length may be specified.

The **subDepDest** table will generally be automatically created (by the  and  buttons). Only new (i.e. not in database) or invalid (wrong) designators will have to be changed. Note: If the **subDepDest** table is stuck to the Word document, only designators *not recognized* as valid designators, will be shown in the Word document. The **DepDestGroup** table may be used to simplify the input, by grouping departure and destination designators that are localized in the same direction as seen from the study case airport. The **DepDestGroup** table may be filled automatically (by the  and  buttons). However, the suggested values in the red columns (**DepDestGroup** and **StageLength**) are crude estimates, and should be checked and eventually modified by the user.

7.2 Procedures

Tables: **NumProced**. Shows dep./dest. groups together with the aircraft categories. The user may specify the number and distribution of procedures for each combination of dep./dest. group, aircraft category, and operation type. A list of ‘tags’, for use in the automatically generated procedure names may also be entered.

Procedures. Shows all the procedures. For each procedure a runway name must be given. The procedures are automatically given unique names.

NumTaxiProced, **TaxiProcedures**. Analogous to **NumProced** and **Procedures**, but applies to taxing at the airport. Note that zero is a valid number of procedures.

The distribution between the procedures (in the **NumProced** and **NumTaxiProced** tables) is given as a list of numbers. The list will be truncated or padded with the last value if the length differs from the number of procedures. The numbers represent the relative contribution to the total. *E. g.* with four procedures, the list ‘1 2 3’ will be padded to ‘1 2 3 3’, and will distribute 1/9, 2/9, 3/9 and 3/9 to the four procedures, respectively. Note also that the order is important, as the numbers in the list refer to sequentially named procedures. In the case of taxi procedures, the user should use the same runway names as were used for the corresponding ordinary operations.

7.3 Runways [Runway]

Table: **rwY**. Allows the coordinates and elevation of the runway thresholds to be specified, together with the width of the runway surface. The direction and length of the runways will be calculated.




Other tools: GIS manager and map manager.

The runway names are defined by the user in the **Procedures** and **TaxiProcedures** tables in the previous section. The flight procedures are assumed to start and stop at the runway thresholds specified in this table. It is therefore very important to use the correct values. Note that in some

cases, the digital map may be too old and do not correspond to the present runway length. The table manager example on page 7 shows the **RWY** table.

The length and width of the runways will be used to define acoustically hard terrain modifications. Note that these automatic terrain modifications are not shown in the **TopoEdit** table (section 4.2).

7.4 Flight Tracks [FltTrc]

Tables: **Track**. Shows all the procedures. The user may edit the tracks in the table, or use the track editor (see section 3.4) to draw the flight track to be associated with each procedure. The number and type of dispersion tracks may be changed from the default values (which is 6 dispersion tracks of type 'ECAC'). Note that if such a change is done,  or  must be pressed to regenerate the **trackID(s)**. After selecting a procedure, the track editor is started by pressing .

DispTrack. Shows all the dispersion tracks. The tracks may be edited by the track editor, or manually in the table.

Other tools: GIS manager and map manager.

The **TrackIDs** of center- and dispersion tracks are given by the procedure name and a special code which identifies the track. The code contains the following information:

<number of tracks><offset from center/main track><left/right>

Examples: 07CL : 7 tracks total, this is the third (*i.e.* outer) dispersion track on the left
 09AR : 9 tracks total, this is the first (*i.e.* innermost) dispersion track on the right
 11_M : 11 tracks total, this is the center (main) track.

The center- and dispersion tracks of tables **Track** and **DispTrack** are written in a special notation. A single number in parenthesis represents a straight line segment with the length in meter given by the number. Two numbers in parenthesis represents an arc segment. The first number is the arc radius in meter. The second number is the arc angle in degrees. A positive number corresponds to a counter-clockwise (left) turn. Note that the segments are given starting at the runway threshold. Thus, the segments of an arrival track are given in the opposite order of what is actually flown. The direction of the angles will also be opposite. For taxi procedures related to arrivals, however, the segments are given in the natural order, and the segments start at the runway threshold which has been flown over. Note that for arrival taxiing, *the first segment drawn will be removed from the calculations*. The intention is to allow the user to use this segment to position the start of the arrival taxiing at the desired position at the runway.

The GIS manager and map manager may be used to present the tracks on a map. The example map manager in section 3.3 is taken from this section.

7.5 Flight Profiles

Tables: **NumTOP**. Shows combinations of procedure name, aircraft type, and stage length. The user may specify the number and distribution of takeoff profiles for each combination. A tag list may be entered as a reference in the **TOPProfile** table.

TOPProfile. Allows takeoff profiles to be specified for each combination of procedure name, aircraft type, stage length and profile number.

LAPProfile. Allows landing profiles to be specified for each combination of procedure name and aircraft type.

TGProfile. Allows specification of touch-and-go profiles for each aircraft type.

TXProfile. Allows specification of taxiing profiles for each aircraft type.

Other tools: chart manager.

The specification of number and distribution of takeoff profiles in the **NumTOP** table is completely analogous to the number and distribution of procedures, see section 7.2. In the **TOPProfile** and **LAPProfile** tables, the distance, height, velocity and thrust are given as four lists of matching points. Note that **Dist** and **Height** are both given in meters. The **Velocity** is given in knots, while the **Thrust** is given in the *same units* as used in the **NPD** table (see section 6.2). The **NumSeg** column shows the number of segments in the profile.

In the **TOPProfile** table, the user may enter a substitute value of the stage length in the red column, if necessary. In the **LAPProfile** table, a number of standard glide path profiles may be referred to by name in the red column. The table manager example on page 6 shows the **LAPProfile** table.

If the profiles in the **TGProfile** table are edited, they must be entered in a special format; First, the values corresponding to the climb part of the operation are entered, followed by a slash (/). Then a single value corresponding to level flight is entered, and another slash. Finally, the values corresponding to the landing part are entered, with *no terminating slash*.

The chart manager may be used to illustrate the profiles as a chart in the document.

7.6 Routes and Patterns Summary

Shows summary tables based on information in the procedure tables.

8 Traffic Scaling

This chapter presents the traffic grouped together into categories, and allows the traffic to be scaled in several ways in different scenarios.

8.1 Scaling by Aircraft Types

Tables: **scaleFLT**. Allows scaling of traffic in up to ten different scenarios. The scaling is based on type of operation.

scaleACcat. Allows scaling of traffic in the same scenarios as the preceding table. The scaling is based on aircraft category.

scaleAC. Allows scaling of traffic in the same scenarios as the preceding table. The scaling is based on aircraft type.

There are ten different scenarios available. The scenario number is common to all tables in the project (where applicable). For each scenario, the scaling is done by entering a factor, by which the number of operations is multiplied. Thus, the factor 1.0 indicates no scaling.

8.2 Scaling by Procedures and Tracks


Tables: **BalanceDepDest**. Allows scaling of traffic in the same scenarios as in the preceding section. The scaling is based on departure- or destination group.

BalanceProcedure. Allows scaling of traffic in the same scenarios as in the preceding section. The scaling is based on procedure name.

8.3 Scaling by Time

Tables: **TscaleFLT**. Allows scaling of traffic in the same scenarios as in the preceding section. The scaling is based on type of operation, and time of operation.

mix. Generates the final flight mix.

The filling of the **FlightsBLOB** column in the **mix** table (by the  button) can take a long time for large projects. The user should ensure that the information in all prior tables is correct and up to date before clicking this button.

9 Calculation Parameters

This chapter describes the final NORTIM input parameters, and runs the NORTIM calculation.

9.1 Calculation Units

Table: **unitsStartHours**. Shows the available noise level units. The user may specify start hours for the day, evening and night intervals.

unitsThresholds. Shows the available noise level units. The user may specify limits for each unit. The calculation grid expands geographically until the calculated results for *all* units are below the respective limits given in this table.

9.2 Grid Parameters [GrdPnt]

Table: **GridPoints**. Allows specification of one or more scatter points to be calculated in addition to or instead of noise contours.

Other tools: GIS manager and map manager.

The inclusion/exclusion of grid point calculation is specified in the **NORTIMcontrol** table below.

9.3 NORTIM Calculation Control

Table: **NORTIMcontrol**. Allows specification of a number of calculation parameters.

Other tools: NORTIM control center (see chapter 3.6).

All scenarios must be numbered (in the range 0 – 9). For each scenario, the following parameters must be defined:

AverageDays	Number of days in the traffic data. This defines the averaging time.
Resolution	Number of feet between calculation points in the basic grid used for creation of contours (64 – 1024).
MFNthreshold	Minimum average weekly frequency for which an operation is to be included in the MFN level units.
AssessmentLevel Parameters	LEQ level which impose evaluation of noise levels inside buildings. One or more keywords to set any of the flags below as "true". At least the bold part of the keywords must be included. Note that keywords are <u>not</u> case sensitive:

TOPography (Include topography)

CONtourSets (Create contour files)

GRID (Calculate the points in table GridPoints)

BUILDings (Calculate building points)

WINTer (Assume winter conditions)

T2284 (Calcute according to T-22/84)

T1277 (Calcute according to T-1277)

T1442 (Calcute according to T-1442 [Default])


Doc29 (Calcute according to ECAC Doc. 29R)

BINaryOut (Create binary output files)

HighObs (Assume observer position 4 m above ground)

TerrZone33 (Assume topography is UTM Zone 33)

The latter keyword is useful in situations where the topography is available only in UTM zone 33, while the background maps are in some other coordinate system. The input data will be converted to UTM zone 33, and the results will be converted back to the map coordinate system.

The  button opens a dialog box that may be used to set most of the parameters above for the current scenario or all scenarios.

10 Results related to T-1442

This chapter presents the results of the NORTIM calculations for several scenarios

10.1 Results for Scenario 0..9 [Resul0..Resul9]

Tables: **(none)**

Other tools: GIS manager and map manager.

Where applicable, the ‘Results for Scenario ...’ section headings are automatically substituted with the contents of the **Description** field in the `NORTIMCONTROL` table.

The NORTIM calculation results, in SOSI format, may be imported by GISAccess and the GIS manager and presented by the map manager.

11 Results related to Noise Pollution Act

11.1 Indoor noise levels – mapping and measures [LEQF]

Tables: **PinfoF_0,...,9**. Contains the number of buildings and estimated number of people inside LEQ contours related to the Noise Pollution Act.

Other tools: GIS manager, map manager and difference map manager.

Note that the tables are not available until after **Import calculation results for GAB points** has been done (see section 3.6).

11.2 Strategic noise mapping

11.2.1 Mapping of outdoor noise levels [LDENNgT]

Tables: **PinfoLden_0,...,9**. Contains the number of buildings and estimated number of people inside LDEN contours 50, 55, 60, 65, 70 and 75 dBA.

PinfoLngt_0,...,9. Contains the number of buildings and estimated number of people inside LEQ Night contours 50, 55, 60, 65 and 70 dBA.

Other tools: GIS manager, map manager and difference map manager.

Note that the tables are not available until after **Import calculation results for GAB points** has been done (see section 3.6).

11.2.2 Plan of action [LOther]

Tables: **(none)**

Other tools: GIS manager, map manager and difference map manager.

The NORTIM calculation results, in SOSI format, may be imported by GISAccess and the GIS manager and presented by the map manager.

12 Other results

12.1 Number of People Inside LEQ 50 [LEQT]

Tables: `pinfor_0,...,9`. Contains the number of buildings and estimated number of people inside LEQ contours 50, 55, 60, 65 and 70 dBA.

Other tools: GIS manager, map manager and difference map manager.

Note that the tables are not available until after **Import calculation results for GAB points** has been done (see section 3.6).

Appendix A. Technical Specifications

A.1 Installation Requirements

NORTIM runs on Windows 2000 / Windows XP with Office XP installed². Minimum RAM requirements are but 512 MB. NORTIM runs on any processor speed, but at least 1 GHz is recommended.

A.2 GAB Files

NORTIM expects to find these files in the folder specified under **Path to GAB data**:

BYGNING.TXT
 EIENDOM.TXT
 ADRESSE.TXT
 EIER.TXT

The data in these files should be TAB-separated, and no heading lines are allowed. The contents and type of the fields must match the fields in the correspondingly named tables in the project database (*i.e.* bygning, eiendom, adresse, eier).

A.3 Data Flow

The figure on the next page shows the data flow through the tables in the project database. The tables which are drawn without a frame are not seen by the user through the user interface.

The user interface outputs four input files per scenario to the calculation kernel, and one file to the plot program (which generates the SOSI files). These are listed below, including the tables they depend on. Note that *all* input files use information from the **MapList** and **NORTIMcontrol** tables.

Filename	Required tables	Description
param_<scenario>.txt	UnitsStartHours, UnitsThresholds	Defines the unit thresholds/starthours, and miscellaneous other parameters
calc_<scenario>.txt	RWY, TopoList, TopoEdit, Screens, Grid	Defines what should be calculated, and where (including topography)
noise_<scenario>.txt	NPD, Mix	Contains the unique noise sets which are used by the flights in the scenario
flight_<scenario>.txt	RWY, Mix	Contains the times, number of operations, track and profile for all flights in the scenario
plot_<scenario>.txt	RWY	Defines the contours that will be generated, and the coordinate system that will be used.

² For use with earlier versions of Office, the project database will have to be converted to the appropriate format.

