2
CadnaA Software for Noise Abatement
Brief Instruction for the Demo Program

1 CadnaA - Software for Noise Abatement
2 System Requirements
3 Document conventions
4 Installation
5 Language
6 The Main Window of CadnaA
   6.1 Working with CadnaA
   6.2 Mouse Buttons
   6.3 Control Elements
7 Icon Bar
8 The Toolbox
9 Help
10 Quick start
   10.1 3D-Special-View
   10.2 Insert Road
   10.3 Immission Point Calculation
10.4 Insert Screen
10.5 Insert Building
10.6 Duplicate Objects
10.7 Import Objects
10.8 Edit Objects
10.9 Grid Calculation
10.10 dB-Level and Text Boxes
10.11 Generate Floors
10.12 Copy to the clipboard

11 Create Groups

12 Define Variants

13 Output of Results

14 Pass-By Level

15 Scanned Maps - Insert Images

16 Summary
1 CadnaA - Software for Noise Abatement

CadnaA is a genuine Windows program for calculation and evaluation of noise immission caused by:

- road and railbound traffic
- trade enterprises and industrial plants,
- sports and leisure facilities
- air craft
- or any other noisy equipment

Its operation and data exchange are smoothly integrated in the Windows software environment like word processing, spreadsheet and other applications.

This is what makes CadnaA different from other programs which, although featuring a Windows user interface, actually are DOS programs running behind this interface.

Handling your projects using CadnaA, you are always sure to get utmost ease of operation and a high technical standard and to stay in touch with up-to-date software technology.

CadnaA takes national guidelines into account. Each type of sound source, whether road, railway, or any general point, line or area source is considered according to the calculation regulations valid for the relevant type of source. (Please contact your national agent for up-to-date information).

The Basic standard program with 2.000 obstacles (for each 1000 buildings and 1000 barriers) theoretically unlimited number of sources and immission points. It contains all the calculation configurations except aircraft noise and options as mentioned below.

Also you may get the CadnaA basic program in different levels it is always required for all following options.
For the basic program CadnaA you can purchase following options:

**Option Feature**

- **BMP:** Scanned maps and other pictures can be integrated into the graphic presentation. Format like BMP, PCX, TIFF, JPEG, GIF etc. Several images can be integrated in one project file.

- **BPL:** Emission of different areas, which are permissible without exceeding limiting noise levels in the vicinity, are calculated and optimized.

- **SET Sound Emission and Transmission:** This is an expert system to find the sound power spectra for many noise sources like motors, gears, vans, ventilation systems, cooling towers on the basis of given technical parameters. With CadnaA-SET you can create modules with up to 10 input and 10 output channels for sound power spectra. You can define the creation of a sound power spectrum by your own algorithms. If such a module is defined, it can be referenced with all sources. More than 100 predefined modules based on a many years experience and on many standards give you a tremendous knowledge in the modelling of plant noise in one step. The modules can be coupled output-input, so that even complex plants are simulated correctly in your CadnaA project. Ask for our expert seminars for SET and for Noise Modelling of Industrial Plants.

- **SIP City-Mapping Module:** This module allows to calculate the noise taking into account about 16 million buildings in one run, to perform calculations with complete noise maps (e.g. subtract one map from the other), and to evaluate a situation on the basis of given noise levels and the number of persons living under the impact of these levels.

- **AzB Aircraft noise** - calculation of noise contours around airports
The demo program is also 32 bit-version and shows at the time being all features of CadnaA.

The grey coloured menu functions or symbols are not activated in the demo program.

Please remind that the calculation is falsified in the demo program.

You can’t take the results for noise assessment!

Also in the demo program you can’t save and export files and print directly - for that case use the COPY command for the clipboard and PASTE command to insert data into another Windows application to print out.

To get familiar to the main basic features of CadnaA, we recommend to follow the examples offered in this instruction. You will need about two hours for that in all. But you can always interrupt your lessons without losing your example project.

Because you can’t save files in the demo program, we made it for you. We saved all single steps in files with the CadnaA extension *.CNA. If required you can open the corresponding example file to continue.

The training starts with the chapter „Quick Start“ - we hope you will enjoy it.

Datakustik GmbH
Software, Technische Dokumentation
und Ausbildung für den Immissionsschutz
Gräfelfinger Str. 133 a
D-81375 München

email: info@datakustik.de
http://www.datakustik.de

Tel. +49 - (0)89 - 7007 629-0
Fax +49 - (0)89 - 7007 629-89
2 System Requirements

- IBM-compatible PC 486 with VGA-Bildschirm
- Windows 95, 98, WindowsNT, Windows 2000 (Windows is a trademark of Microsoft Corp., USA)
- minimum RAM 16 MB
- at least 5 MB of free disc space for the program CadnaA
- CD-Rom drive
- Microsoft-compatible mouse and printer

Minimum requirements

- IBM-compatible PC Pentium
- Windows 98, WindowsNT or Windows2000
- Scree with OpenGL graphic card and 3D-accelerator (recommend for the 3D-special view)
- 128 MB RAM
- CD-Rom drive
- Microsoft-compatible Wheel mouse (comfortabel for zooming) and printer
- Digitatizer

Recommend

The drive space depends on the size of the projects you want to treat. The experience shows, that the drive space can’t be big enough.

CadnaA is a 32-bit-version.
Brief Instruction for the Demo Program

System Requirements
3 Document conventions

In the following list you will find all conventions used in this document.

**setup**
Words or letters formatted with the font courier - you have to type them.

**RETURN**
Small capitol emphasize names of keys and key combinations like RETURN and CTRL+C.

**STRG+V**
A plus (+) between the name of keys symbolize a key combination. For example by CTRL+V you must press the CTRL-key continuously during you press the V-key.

**DOWN-KEY**
The relevant arrow keys are nameend concernig the direction to wich the arrow shows (LEFT-KEY, RIGHT-KEY, UP-KEY). The expression arrow-key is a collective term of all these four keys.

**Grid|Appearence|Options are name**
This written style means firstly you have to click on the menu option Grid secondly in the pop-up menu on the option Appearance and finally in the dialog box of the button Options.

**Press RIGHT mouse key**
This instruction means, you have to position the mouse pointer on the edge of the desired object (or on the centreline in the case of roads and railways) and press the RIGHT mouse key. In this cases a context menu opens containing a number of commands which relate to the specific object.
### Document conventions

<table>
<thead>
<tr>
<th>Instruction</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>choose or confirm</td>
<td>This instruction means you must click on a function or command with the LEFT mouse key.</td>
</tr>
<tr>
<td>DOUBLE CLICK</td>
<td>Ask you to click twice quickly with the LEFT mouse key.</td>
</tr>
<tr>
<td>✎</td>
<td>Ask you to do something</td>
</tr>
<tr>
<td>✏️ With the key INS insert two new rows.</td>
<td>A Step-by-Step instruction. You may skip these instructions if you have the basic knowledge.</td>
</tr>
<tr>
<td>📁 Industry.cna</td>
<td>Example files for training. You may open these files to follow the examples. They are saved on the CD-Rom in the directory DEMO_EXAMPLES.</td>
</tr>
<tr>
<td>📁 BuildingNoiseMap.cna</td>
<td>For the stated example a file is saved on your CD-rom with the completed examples</td>
</tr>
</tbody>
</table>
4 Installation

Use the following procedure to install the CadnaA demo program from the CD-Rom. Note that you cannot run the CadnaA components from the CD; you must install the program onto your hard disc.

Start Windows.

Before you install the program finish and close all other programs

Insert the CadnaA-CD in your drive (for e.g. drive D).

In the start menu of your operating system choose the according command to install the SETUP. EXE from the CD-Rom-Drive

The installation program will be started - just follow the instruction

Execute the standard installation
5 Language

**CadnaA** is multi-lingual. At the time being you may operate the program alternatively in German, English, Italian or French. Please ask for the currently languages. You can see the languages in the menu **Options|Language**. The language option depends also on the level you have purchased.

But at the moment manuals and online help are only in German or English available. Ask for the currently state.

When **CadnaA** is started, it automatically selects the language corresponding to the country setting in the Windows system. This setting is also the default setting for **CadnaA**. If a language not available in **CadnaA** is required, the program will be started in English.

On **Options|Language**, click the language in which you wish to run **CadnaA**. Then terminate the program and start **CadnaA** again. The selection of language is active now.
6 The Main Window of CadnaA

Double-clicking the program icon on the Windows Program Manager or a single click on the Cadna_A entry on the Start menu of Windows 95 or Windows NT starts CadnaA and opens the main window.

On the main window, all objects can be entered and edited using mouse, keyboard, and digitizer in parallel. Inserting an object at the same time creates a new data record on the pertinent object list (Tables menu).

Dialogs, edit dialogs, and also the toolbox can be re-arranged on the desktop by positioning the mouse pointer on the upper edge of the box while pressing the right mouse button. Now drag the box to the desired position with the mouse button held depressed.
**Icons**

_CadnaA_ features icons, so-called shortcuts, which, when being clicked, immediately trigger the function they represent.

For most icons, the pertinent function is indicated on the status bar in the lower-left corner of the _CadnaA_ main window as long as the mouse pointer is positioned on that icon with the left mouse button held depressed (see also HELP text under Show Icon Bar).

For users yet unfamiliar with handling menus, dialogs, scroll bars, or system menus, it is recommended to go through the respective chapters in the Windows manual.

**Status Bar**

The status bar runs horizontally along the bottom of the _CADNA A_ main window.

If, with the left mouse button held depressed, the mouse pointer is positioned on an icon of the icon bar or of the toolbox, information about the pertinent function will appear on the left side of the status bar.

As the mouse pointer is moved across the screen, the right side on the status bar will show the co-ordinates and, after a calculation, also the levels (L) calculated and if applicable also the ground height (G), for that point on which the mouse pointer is currently positioned.

The status bar can be turned on and off via the Options menu by clicking the menu item Show Status Bar.
6.1 Working with CadnaA

In CadnaA, selecting some menu items causes functions to be executed immediately while selecting other menu items opens a dialog. When you choose an item followed by ellipses (...), a dialog will appear. A hotkey is often indicated next to a menu item. Using this hotkey allows you to access the pertinent command without having to open the menu first.

By means of the identification letters (underlined letters), you can call CadnaA menu items from the keyboard as follows: Hold ALT KEY depressed, type identification letter of the menu in question, release ALT KEY, and then type only the identification letter of the desired command. If, for example, you wish to select the Save command, press ALT+F at the same time (File menu opens), release both keys, and then type s for Save (document is saved).

But it is not only menu items that can be accessed from the keyboard. There are also some frequently used icons of the toolbox which can be activated by using a hotkey. To this end, hold down the Control (CTRL) key and type the respective letter.
6.1 Brief Instruction for the Demo Program
Working with CadnaA
6.2 Mouse Buttons

- "Click" means to press and release a mouse button once.
- "Doubleclick" means to rapidly press and release the left mouse button twice.

To select an option, execute a command, select an object, or activate an object icon, place the mouse pointer on that option, icon, command, or, in the graphical representation, on the border or the centreline of an object or line object, respectively, and click the mouse button.

Unless you are instructed otherwise, mouse actions always refer to the left button (button #1). If you are left-handed, or the mouse was configured differently, use the appropriate button instead.

**CADNA A** features dialogs with lists where you can highlight and select several rows at the same time.

Click the desired row using the left mouse button. Clicking a different row deselects the one selected before.

Click the first row using the left mouse button, press and hold down **SHIFT** while clicking the last row to be selected. All rows lying in between are highlighted and selected as well.

Press and hold down the **CTRL** key while clicking the desired rows.

Double-clicking an existing object or a data record in a table opens the pertinent Edit Object dialog where you can enter the relevant parameters.
Click with Right Mouse Button  

Clicking with the right mouse button means to rapidly press release the right mouse button. Depending on which mode you are working in, using the right mouse button has two different effects.

- When using the mouse to insert an object in the CadnaA main window, clicking with the right mouse button
  - terminates the insertion mode for the object presently entered and
  - again with a subsequently one click with the Right mouse key on the object the edit dialog opens.

Edit mode

- In the edit mode when the right mouse button is used to click an existing object or a data record in a table, a context menu appears (for more information see online help keyword: context menu).
If you are owner of a wheel mouse (a mouse with two keys and a wheel in the middle of them) you may use the wheel to zoom into your graphical display very quickly in or out.
Brief Instruction for the Demo Program

Mouse Buttons
6.3 Control Elements

**Option Button**

Option buttons are control elements indicating whether a condition is true or false. If true = yes, a black dot appears in the option button. The mouse pointer is used for activation/deactivation. Within one set of options, only one option can be active at one time.

**Check Box**

Check boxes are control elements indicating whether a condition is true or false. When the check box is activated, an X or ü appears in the square, indicating that the condition is true (active). Otherwise, the condition is false (inactive).

**List Box/Combobox**

A list box contains a list of data of which only one value can apply. The value selected will be displayed on the list box, and the selected option is thus activated. On combobox, you can either select a value or enter a user-defined one.

To make the list drop down, click the arrow to the right of the box.

In some cases, like in the example above, you will find an option button next to the list box. Click this first to activate the list box.
6.3

Brief Instruction for the Demo Program
Control Elements
Icon Bar

The icon bar can be turned on and off by clicking Options|Show Icon Bar.

Scale list box to set the desired scale by selection from the list or by entering a user-defined value. To select a scale, click the arrow.

- Opens an existing file
- Saves file
- Prints result log
- Exports result log according to settings in the template file
- Copies contents, trimmed area or selected object from the CADNA A main window to the clipboard
- Triggers calculation according to specified configuration for specified immission points (for calculation of the immission point grid, click Grid|Calculate Grid)
- Representation and levels refer to daytime
- Representation and levels refer to night-time
- Display ground height
- Calls Digitizer menu
- Bitmap representation and resolution
- Fix objects
- Help cursor for topic-related help
- Calls Help
Brief Instruction for the Demo Program
Icon Bar
8 The Toolbox

Generating and inserting various sources and objects is a piece of cake thanks to the toolbox feature.

The toolbox is part of the CadnaA main window and contains the icons representing the different object types. It can be re-arranged on the desktop as you like. To this end, click its upper border with the LEFT mouse button and hold the button depressed while moving the mouse to a different position on the window. When you have reached the desired position, release the mouse button.

An object type is activated by clicking the desired icon, or, if available, by pressing the pertinent hotkey, i.e. the CTRL KEY plus the respective letter key at the same time.
Toolbox Icons

Instead of activating a feature by clicking the pertinent icon, some icons can also be accessed via hotkeys. In this case, you have to press the CONTROL KEY, designated Ctrl or Strg depending on the keyboard used, plus the respective letter key at the same time. If such a hotkey exists, it is indicated below the icon it belongs to.

- **Edit Mode (CTRL+e)**
- **Zoom + (CTRL+)**
- **Zoom - (CTRL-)**
- **Zoom all (CTRL=)**

- **Point Source (CTRL+q)**
- **General Line Source (CTRL+l)**
- **Horizontal Area Source (CTRL+f)**
- **Vertical Area Source (CTRL+v)**

- **Road (CTRL+s)**
- **Crossing with Traffic Lights (CTRL+a)**
- **Parking Lot (CTRL+p)**
- **Railway (CTRL+b)**

- **Tennis Point of Service (CTRL+t)**
- **Optimisable Area Source (CTRL+o)**
- **Power Plant Source (CTRL+p)**
- **Ground Absorption (CTRL+g)**

- **Building (CTRL+h)**
- **Barrier (CTRL+w)**
- **Bridge (CTRL+b)**
- **Line of Fault (CTRL+l)**

- **Built-up Area (CTRL+b)**
- **Foliage (CTRL+f)**
- **Contour Line (CTRL+c)**
- **Cylinder embankment (CTRL+c)**
Brief Instruction for the Demo Program
The Toolbox

Note: The numbers in brackets indicate which method of positioning the object is used (see Online help keyword: Inserting objects).
Brief Instruction for the Demo Program
The Toolbox
9 Help

While you are working with Cadna/A, Help always is just one click away.

To call Help

☞ Press F1 (or click the Help icon on the icon bar), or

☞ Click the Help cursor on the icon bar: The mouse pointer turns into the Help pointer icon. Now click any menu item, or

☞ On any dialog box, click the command button “Help”.

Finding a Topic in the Online Help System

1. On the menu ?, select the Find command (or click the “Find” button of the online help). CadnaA opens the Find dialog box.

2. Enter the first letter of the topic to be found. During the entry, new index items are displayed in the list box.

3. Double-click that index item which corresponds to the desired topic (or select the index item and press the ENTER key). The online help displays further topics, if any, referring to this index item.
Brief Instruction for the Demo Program

Help

Users who are not yet familiar with Help, please refer to the Windows manual for further information, or in CadnaA, select the Use Help option on the HELP menu.

The Help texts may not yet be up to date! We trust in your kind understanding - CadnaA is subject to constant progress.
10 Quick start

To get familiar with the main basic function of CadnaA, we recommend to deal with the examples offered in this chapter. By doing so you will insert your first objects by mouse, change their data and dimensions in the graphical presentation, execute calculations and create noise maps among other things.

Of course you have more possibilities to insert objects in CadnaA than only by mouse, like

- digitizing from a plan with a usual digitizer with MS Windows interface
- input of the object coordinates via keyboard
- importing digital data using different formats e.g. for graphic files like DXF, different GIS formats like AtlasGis, ArcView, Sicad, Windput DGM and of course each CadnaA-file. You may also import data via ODBC-database interfaces like MS-Access, MS-Excel, FoxPro etc. If necessary asked for the actual interfaces.

Particularly for big projects these input possibilities minimize the expenditure considerably.

♫ You will find the example files on your CD-Rom in the directory „Demo_Examples“. For comfortable working copy them on your hard disc.

♫ Please note and remind that the calculation is falsified in the demo program. You cannot take the results for noise assessment!

♫ All gray shaded menu function, button or icons are deactivated. Contrary to the demo program partially in the program CadnaA some function are only working if the according option is purchased. For more information please read the first chapter.

♫ Now start CadnaA by double-clicking the program icon on your desktop or by clicking the corresponding starting menu button in programcadnaa. The CadnaA mainwindow opens.
Brief Instruction for the Demo Program
Quick start
10.1 3D-Special-View

At first - test your computer to see if all components are installed correct and complete to work properly with CadnaA.

Therefore open the file Racingcourse.cna by double-clicking its name in File/Open.

The file Racingcourse.cna contains some objects which are accessible in CadnaA like roads, bridges, contourlines and points, embankments, screens etc. We come back to it later. Now, see what performance your computer has.

With the RIGHT Mouse key click once on the middle axis of the road or alternatively on the auxiliary polygon which is drawn over road axis. Like shown in the following picture a context menu opens with
function refering to this object „Road‟.

In the edit mode if an object is marked with a Right mouse click a context menu opens with different function suitable to the marked object.

Choosing the function **3D (Special)** by clicking the same-named command once.

Now it could be that you have to wait for some seconds till the 3D-special window opens. How long it needs depends among other things on the dimension of the project file, on your RAM or on the quality of your graphic card. Your graphic card should have a 3D accelerator in any case. But exact you will find it out now.
You should not wait longer than about 3 seconds till your 3D-special window opens. Is it essentially longer purchase a new graphic card with a 3D accelerator. The newer cards will have it any way.

The file Racingcourse.cna with opened 3D-special window defaulty placed in the upper left corner.

If necessary maximize the 3D-special window by clicking on the equivalent icon in the upper right corner. Than the window expand to the size of your screen. Alternatively you may enlarge or reduce the window using the mouse.

Press the RETURN-key - now you are driving through this scenario with a speed of 100 km/h and a camera position of 1 m above the road.

Is this not the case - you should „arm“ your computer so that you can take advantage to the powerful performance of CadnaA.
Incidentally - you do not need to wait until your trip stops. You may force that by pressing the RETURN-key. From the stopped position you may now go further on using the arrow keys from your numerical keyboard. With these keys you can navigate through the scenario independent.

Numerical keyboard:
- Key 8 and 2 ahead or back
- Key 4 and 6 left or right turn
- Key 9 and 3 upward or downward
- Key 5 back to the starting position
- Key 7 vertical upward
- Key 1 vertical downward

For more information see online help keyword: 3D-(Special).

With this view you are able to check your project modelling of correctness and see all objects with acoustical relevance which are taken into account for a calculation.

Also in the 3D-Special view you may double-click on an object to open the edit dialog for this object and if necessary to change its data.

Try and change a parameter in the edit dialog in the 3D-Special view like the following example:

Drive through the 3D-Special view - start with the RETURN-key and stop pressing the Esc-key after passing the first bridge close to the both noise protection walls (screens). If necessary use the arrow keys to attain the right position.

As you may recognize the center of the left screen seems to hang in the air - there is no connection to the ground. Obviously this is an error and has to be corrected.
For that double-click on the left screen - the screen edit dialog should open.

The screen edit dialog - the screen is activated as a floating screen with a z-extent of 3 m.

Inadvertently the screen was defined as a floating screen. Correct this by clicking on the same-named checkbox to deactivate this option (no hook).
Afterwards confirm by clicking on the **OK** button. The edit dialog closed.

Now, the noise protection wall stands correct on the ground.

Close the 3D-Special window by clicking on the closing-icon.

Hereby you have made your first excursion with **CadnaA**. We hope you enjoyed it.

Do not be discouraged if your trip was not as exciting as it should have been because your hardware was not fast enough - you may change that.

For more information read chapter 2.

It would be best you go on now with the next exercise.
10.2 Insert Road

Now you enter your first object on your own - a road.

For that point to the car icon in the toolbox and click.

After clicking you are in the Insert Road mode. The mouse pointer is dragging the Car icon.

Position the mouse pointer on that point where your road is supposed to begin and use the LEFT mouse button to click. A line suspended from the mouse pointer like a rubber band then allows you to define a road as you wish. For each change of direction, insert a new point by pressing the LEFT mouse button again. After the last point has been defined, the insertion is completed by pressing the RIGHT mouse button.

The inserted points of the road define only the road course - the acoustically subdivision is happen separate during calculation.
An inserted marked in the Edit mode

An inserted graphical object will be inserted also in the object table as a data record automatically (menu **Tables|Sources**).
If an object is inserted a hook appears on the corresponding table description. When the road has been inserted correctly,

- click the **Edit Mode** icon. This mode allows you to edit any inserted object.
- In the edit mode, double-click the polygon line or the centreline of the inserted road. The edit dialog box appears.
- In the **Edit** mode if you make a double click on an object in **CadnaA** the corresponding edit dialog box opens. It contains all data of an object.

Alternatively you may also click on the object with the **RIGHT** mouse key once directly after entering the object to open the edit dialog.
10.2 Brief Instruction for the Demo Program
Insert Road

After closing it you are still in the insertion mode. So you do not need to change in the edit mode if you only want to edit object parameters.

In the edit dialog in some text boxes you may enter data by choosing them in the list boxes by others you enter them from the keyboard by typing the desired value.

Road edit dialog according to the German standard RLS90

The appearance of the edit dialogs and the enter possibilities will be adjustet to the choosen country respectively standards. You may specify this in Calculation|Configuration|Tab Country. The description of the choosen standard appears in the dialog header. If necessary complete the textboxes accordingly.

Click the Card Index icon to the right of the SCS/Dist. (m) text box. Another dialog box opens, allowing you to select the width of the road by clicking the relevant standard cross section.

Choose the value b2 by clicking on it. Now it is marked.
Is the desired value not visible use the scroll bar or the arrow keys on your keyboard. While using the arrow keys (UP, DOWN) of your keyboard to select an SCS value, holding the DOWN key or UP key depressed will cause the display to show the eligible road cross sections continuously like in a movie.

Confirm your choice with **OK**.

The dialog box closes and the chosen value is entered in the object edit dialog box. Alternatively you may also enter an arbitrary value in the SCS/Dist. (m) text box of the edit road dialog box.

To get training just enter all data like showed in the edit dialog box. You should also try the **Options** button. You may enter the emission values L m,E either directly or by activating the „Counts“ values of the MDTD (mean daily traffic density). Via **Options**, you reach input boxes allowing you to enter more details concerning traffic densities.

Please watch how the emission values are continuously adapted as individual parameters are modified. This edit road dialog box is a “highly condensed” version of the national guideline for the calculation of traffic noise.

Having entered all data, click **OK** to close this dialog box.
**10.2**

**Brief Instruction for the Demo Program**

**Insert Road**

**Road after entering a distance**

**CadnaA** contains additional objects, you can use together with the object road like

- Bridge and
- Screen for a noise protection wall on roads or railways or
- the Floating Screen as noise protection wall on a bridge and
- the Mound (embankment).

For more information see the online help.

Also pay attention to the mentioned objects in the file **Racingcourse.cna** in the 3D-special view.
Model of a bridge in CadnaA in Options 3D-View without hidden edges
10.2 Brief Instruction for the Demo Program

Insert Road
10.3 Immission Point Calculation

After you have inserted a road insert still an immission (receiver) point at a distance of about 20 m.

Different to the immission points in a grid for the individual immission points you may save all interim results of a calculation in a file.

To define a certain distance you may use a polygon and give it the desired length.

Therefore draw a vertical line (a line with only two points) from the middle axis of the road using the Auxiliary polygon.

Change to the Edit mode and click on the Auxiliary polygon with the RIGHT mouse key.

From the opening context menu choose Set Length and enter the value 20. Close the dialog by confirming with OK.

At the end of the line insert now the immission point. Therefore at first click on the corresponding icon in the toolbox and then on the end of the Auxiliary polygon.
Subsequently click with the RIGHT mouse key on the border of the immission point - the edit dialog opens.

Enter a **Name** and a **Standard Level**. Therefore activate the same-named option.

If you have entered a **Standard Level** then after a calculation you will see at once whether the level is exceeded or not. In case the level is exceeded in the graphical view the immission point changes its colour red. The excess value will be indicated in the corresponding field.

You have also additional the possibility to select from a list standard levels for user pre-defined different types of land use, like residential area, industry area, spa or health resort etc. Furthermore you may determine if the standard level regards only e.g. road or railway traffic, industry or if it concerns all type of noises together. (menu **Options|Land use**)

You reach the coordinates of the immissions point after clicking on the **Geometry** button.

![Point Geometry dialog](image)
For all objects you may determine if the height refer to

- **relativ to the ground topography**
- **absolut**
- **roof**
  the object is situated e.g. 2 m above an other object in which layout it is located (e.g. a ventilation on a building).

Now trigger the calculation via the **Calculator** icon on the icon bar

Afterwards open the immission point edit dialog by double-clicking the immission point border. In the dialog you will see the results and eventually an exceeded value.

If spektra existing the sound pressure level will be spectrally calculated, evaluated and indicated.

The immission point sound level caused by a source denotes **Partial level**.

The **Partial level button** in the immission point dialog shows all sound levels from all sources caused on the concerned immission point. The Partial level list in the menu **Tables|Partial Level** shows also all sound levels from all sources but for each immission point.
10.3 Brief Instruction for the Demo Program
Immission Point Calculation

The list of partial levels results e.g. as an efficacy ranking of noise protection measures.
10.4 Insert Screen

After inserting a road and an immission point you should now do something against the noise from the road. Build a noise protection wall. Therefore

With the RIGHT mouse key click once on the middle axis of the road. Remember, for that you have to be in the Edit mode now. The context menu opens. Click on the Parallel Object command. The same-named dialog opens.

In the Edit mode one click with the RIGHT mouse key on an object opens a context menu with different function suitable to the marked object.
With a click select **Screen** from the list. To open the list click on the arrow on the right hand site of the **Object** box.

**Left** or **Right** of the object refer to the viewing direction from the starting to the end point. The distance screen - road axis and the height can be entered.

Enter the data like above and confirm with **OK**. The dialog closed and you can see the result on the screen.

A road section with a parallel screen.
With the Zoom-icons + or - from the toolbox you can easily modify the scale of the representation on the screen.

Select option by clicking the respective icon and use the left mouse button to click the position of which is supposed to remain unchanged while the scale is modified. The scale changes by a factor of 2 with each click. When you use the right mouse button, the scale changes in the opposite direction.

You may also blow up an arbitrary detail of your representation on the screen by clicking the Zoom + icon and pulling a rectangle over the area in question. This is done as customary by pressing the left mouse button with the mouse pointer positioned on the first corner of the area and sliding the mouse to the opposite corner with the mouse button depressed. Use the right mouse button to undo these steps.

After clicking the tool zoom wrap-around the whole wrap-around will be shown in your CadnaA window. By pressing the SHIFT-key simultaneously the scale will be adapted so that you see all objects in the CadnaA window but not obligatorily the complete wrap-around. By that you may navigate very fast through your object.

Just try it.

Afterwards switch to the Edit mode and double-click the screen. The object edit dialog opens.
You may enter either the reflection loss in decibels or the absorption coefficient separately for each side. Again, left and right refer to the viewing direction from starting point to end point. Pre-set values for different surfaces are available via the Card Index icon.

You may also enter the name of an existing frequency spectrum in the project database.

For more information see online help keyword: Libraries.

The co-ordinates are always reached via the Geometry button. Double click one set of co-ordinates - all edit features are now available. Even if you want to change the height of each co-ordinate point you can do though. For that you just activate the option absolute Height at every Point. Are the absolute heights of some co-ordinates unknown just clear the edit field by deleting the values (it must be empty). After closing the dialog boxes CadnaA now interpolates the value between the heights known. Modify any value and, after closing the dialog boxes by clicking OK, watch how the result is displayed on the screen.
Object geometry dialog

In CadnaA all tables are synchronized with the graphic - e.g. if you are editing a co-ordinate point in the dialog box Geometry the corresponding point in the graphic is flashing simultaneously. By that you always know where you are.

If necessary close the Geometry dialog and move the edit dialog so, that you can see the polygon points of the screen after opening the dialog. Watch these while you scroll through the coordinate table by using the arrow keys. Each point flasches as soon as the data record is marked.
Brief Instruction for the Demo Program

Insert Screen

The flashing polygon point and the marked data record

You may, of course, edit the barrier graphically also:

Select the barrier, then move or delete any polygon point with the mouse button held down, or insert a new polygon point (press the CTRL key and click the desired new point) until you get the desired course.

Deleting a polygon point:  

Press CTRL+SHIFT key (a minus icon is dragged on the mouse pointer) and click on the desired point.
Press CTRL key (a plus icon is dragged on the mouse pointer) and click on the desired point.

For more information see online help keyword: ???

To insert a barrier in an arbitrary location, first click the Screen icon, then click the desired points of the screen polygon line.

Update the calculation with a click on the Calculator icon in the icon bar. If you followed the example your standard level should not be exceeded anymore and the colour of your immission point should be black again.

Please remember: the calculation in the DEMO-program is falsified.

Defaultly CadnaA calculates always the immission levels of day- and night-time simultaneously and displays the results for the day-time in the graphical presentation. If you switch to the night-levels by clicking on the corresponding icon in the icon bar or vice-versa the colour of the noise map respectively the colour of the immission point changes normally because e.g. you may have defined a different pre-set standard level for the night-time.

Try it - switch to the night-time presentation by clicking on the corresponding icon.

As you may see, the immission point discoloured to red again and shows that the pre-set standard level is exceeded for the night-time.

In menu Calculation|Protocol turn on the protocol by activating the corresponding checkbox. In that case all interim results will be recorded if you execute the calculation again.
Afterwards look at the protocol by clicking on Calculation\ProtocolPrint|Preview.

For more information see online help keyword: Protocol.

Try also again the 3D-special view like described in the first chapter. Use the road to execute the function.

- Right mouse click on the middle axis of the road and
- choose 3D-special view from the context menu.
10.5  Insert Building

Buildings are inserted in the same manner like the objects mentioned before.

Click on the Building icon in the toolbox.

Click the corner points to have the building contour drawn. Contrary to „Road“ and „Screen“, buildings are closed polygon lines: When you finish the insertion by pressing the right mouse button or the RETURN key, the line is closed automatically by connecting the end point to the starting point. As you are still in the “Insert Building mode”, you may now insert further buildings.

Buildings may be shaped arbitrarily. To insert rectangular buildings, also hold the SHIFT key depressed while sliding the mouse. After each click, you may then continue the polygon at right angles only.

To generate a rectangular building, you should always start with one of the longer sides, and hold down the SHIFT key during inserting.

As customary, insert the first, second and third point with the SHIFT key held down by pointing to the respective positions and clicking. Now position the mouse pointer, not on the fourth corner to be inserted, but on the first one already inserted while still holding the SHIFT key down. The fourth point is thus inserted at the right position, and you may close the polygon line to form a rectangle by pressing the RIGHT mouse button.
10.5

Brief Instruction for the Demo Program
Insert Building

Four polygon points which have to be inserted for a closed rectangle polygon. A right mouse click matches the last point with the first one automatically.

Just try it.

Even if you insert nothing but right angles by constantly holding the SHIFT key depressed, you will be able to generate any complex/complicated building ground plan with as many projections, oriels, and courtyards as you like.

Having inserted the building, switch to the edit mode and double-click the edge of the building. The Building edit dialog box opens.
Brief Instruction for the Demo Program
Insert Building

The building edit dialog

Behind the button Geometrie you will find the co-ordinates of your building. Here you may also enter the building height.

Click the Geometrie button and enter the building Height e.g. 11.50 m. After you have entered all parameters of your first building, close the dialog box clicking OK. The building should still be selected.

In CadnaA you can „build“ houses and define them as sources additionally only by drawing the plan ground, entering a building height and in closing you just assign emission levels for the facades, caused by indoor levels with the possibility to assign deadening spectren. This is particularly for trade enterprises and industrial plants a very helpful tool.
For more information see online help keyword: Generate Building

Moreover you have another object - the Cylinder. With this object you can model tanks, cauldrons and other cylindrical buildings. You just enter their radius and height. They have also a shielding and reflecting effect.
For more information see online help keyword: Cylinder
Brief Instruction for the Demo Program
Insert Building
10.6 Duplicate Objects

Next you generate from one building a whole housing estate.

- Open the file L04.cna.
- Mark the building by clicking it in the Edit mode.
- Point with the mouse pointer on the border of the building and press the RIGHT mouse button. Again, the context menu appears. Now select Duplicate.

<table>
<thead>
<tr>
<th>The Building context menu</th>
</tr>
</thead>
<tbody>
<tr>
<td>A dialog box opens where you may define the number of objects in the vertical and horizontal direction and the spacings between them.</td>
</tr>
</tbody>
</table>
Enter the parameter from the above dialog box and confirm with OK.

The selected object has been multiplied according to the numbers you entered. The parameters you entered for the first building - e.g. building height 11.50 m - also apply to the other buildings. You are now able to quickly realise your urban development ideas.

Just select any buildings and move or delete them (using the DEL key) as you please.
Instead to duplicate objects you can copy them separately. For this you will find more information in the online help keyword: Copy Objects.

Delete a selected object by pressing the DEL key or selecting the Delete option on the context menu.

In CadnaA you have the command Undo. With this feature you may undo what has been deleted and that 32 times.
10.6 Brief Instruction for the Demo Program
Duplicate Objects
10.7 Import Objects

Maybe you have noticed that the immission point is missing in the file L04.cna. After duplicate the buildings we have saved this project in file L05.cna. We use this one now for the following example. Please open the file and proceed analogously if necessary.

Among other formats you can also import complete CadnaA files or only parts of it or just one specific object type.

Now you will import only the immission point from the file L03.cna into the file L05.cna. Therefore

1. Open the file L05.cna and the menu File | Import.

2. Choose the format type CadnaA and afterwards the filename L03.cna and concludingly click on the Optionen button.

![Import Options](image)

- Activate the option as shown in the above figure and confirm with OK. The immission point will be imported then.

If you like, try the other formats as well. Use the example files for that. The option dialog for the import altered depending on the file format you choose.
10.7 Brief Instruction for the Demo Program
Import Objects
10.8 Edit Objects

To stretch or squeeze an object, or to scale it, the Edit mode must be activated. Depending on the object in question the edit mode will be activated as Polygon Point Mode (for line sources, area sources, barriers, buildings) or as Stretching Mode (level boxes and text boxes).

If the polygon mode is activated, switch to the stretching mode using the TAB key and select the object by clicking its edge. Then position the mouse pointer on one of the small black markers on the lines or corners around the selected object, depress and hold the mouse button.

The mouse pointer turns into a two-headed arrow. The entire object is stretched or squeezed by moving the mouse in the desired direction. The object size can be chosen arbitrarily.

Dragging a corner marker will scale the object (i. e. both dimensions are multiplied by the same factor).

If you wish to modify the size of an object in discrete steps and/or symmetrically, depress and hold the SHIFT key (symmetrical change) while dragging the marker, or the CTRL key (change in discrete steps) or both of these keys (symmetrical change in discrete steps).

In the polygon point mode, the object may be resized by moving any of the polygon points.

Just try it:

Mark a building by clicking and watch the edges. Press the TAB-key. Keep pressing the mouse button and „pull” a marker. Press again the TAB-key and „pull” once more a marker.
By the way - in the menu **Options|Appearance** you may change colors, line widths and type and filling of the objects. Also the appearance of deactivated objects may be decided.
10.9 Grid Calculation

To get a representation of a colored noise map with line or areas of equal sound level you have to calculate a grid of immission points.

Under the menu item Options|Wrap-around, you may enter the x- and y-co-ordinates for the area to be represented graphically.

![Wrap-around dialog](image)

When the grid calculation is triggered, **CadnaA** calculates the immission levels for each immission point in the relevant wrap-around unless a calculation area was defined. Thus, a calculation area is always smaller than the wrap-around.

Please watch the x- and y-co-ordinates in the dialog box Wrap-around and click on the button **Calc**. After trigger this command, the wrap-around will be change so, that all objects are within this area.

If you have started a calculation and some objects are outside of the wrap-around **CadnaA** warns you and gives the possibility to alter it.

To avoid calculation for a wrap-around of 1 km² with the 2.600 immission points of the default setting (the demo version returns a randomised result anyway), we restrict the grid calculation to the area where you have inserted your objects.
Open the file L06.cna.

Click on the Calculation Area icon. Then, in the usual “Cadna way”, click the first corner of your calculation area and pull a borderline around the area to be calculated by clicking each corner. The last corner need not be clicked, but you close this polygon by pressing the Right mouse button.

CadnaA carries out a calculation for each immission point within this area, and displays the results either by lines or by areas of equal sound level. The calculation area encloses the immission points. Sound sources are taken into account even if they lie outside the calculation area.

You may also define several calculation areas and have them calculated simultaneously. You even can exclude areas inside calculation areas from the calculation. This is maybe useful if on the factory site itself the immission sound level does not interest but in the vicinity, in the neighborhood. That saved calculation time.
Choose **Grid|Properties**.

Here you may define the size and the height of the immission point grid.

![Immission Point Grid](image)

The finer the grid, the more immission points are defined, and the more time is needed for the calculation.

A bisection of the immission point spacing quadrupled the calculation time.

Check how fast your computer is by first having it calculate the 20-m grid of the default setting. Then you may calculate with a denser grid.

Close the dialog box by clicking **OK**, and trigger the calculation by clicking the menu **Grid|Calc grid**.
In menu **Option/Miscellaneous** you may define if you want to see the progress of calculation by clicking the corresponding option.

The calculation may be aborted any time by pressing the **Stop** button.

If you interrupted the calculation in **CadnaA** you may continue at that break point by pressing the **SHIFT**-key while you start the calculation again.

On completion of the calculation, the graphical representation appears, showing either lines or areas of equal sound level, depending on the settings you chose. As you move the mouse pointer across the calculated area, the respective levels are displayed on the status bar at the right bottom.
You may select the settings for the layout of the noise map in menu `Grid\Appearance`.

<table>
<thead>
<tr>
<th>Grid Appearance</th>
<th>Colors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Show</td>
<td></td>
</tr>
<tr>
<td>Lines of Equal Sound Level</td>
<td>Yellow</td>
</tr>
<tr>
<td>Areas of Equal Sound Level</td>
<td>Green</td>
</tr>
<tr>
<td>silent/overlapping</td>
<td>Blue</td>
</tr>
<tr>
<td>No Grid</td>
<td></td>
</tr>
<tr>
<td>Level Range</td>
<td></td>
</tr>
<tr>
<td>Lower Limit (dB)</td>
<td>30.00</td>
</tr>
<tr>
<td>Upper Limit (dB)</td>
<td>100.00</td>
</tr>
<tr>
<td>Class Width (dB)</td>
<td>1.00</td>
</tr>
<tr>
<td>Show Grid Points</td>
<td></td>
</tr>
<tr>
<td>Progressive Colours</td>
<td></td>
</tr>
<tr>
<td>Line Width</td>
<td></td>
</tr>
<tr>
<td>Width of all lines of equal sound level</td>
<td>5 dB</td>
</tr>
<tr>
<td>Line Width on Screen always one Pixel</td>
<td></td>
</tr>
</tbody>
</table>

Just try out some settings: Switch from Lines of equal sound level to Areas of equal sound level by selecting the relevant option. Change the Class Width (dB) from 1 to 5, for Areas of equal sound level, select Progressive Colours, etc.

In CadnaA you can integrate the color-level-scale like a legend in the graphical representation on the screen and for your prints.

The option **Width of all** allows you to provide the lines of equal sound level with different line widths. You could have, e.g. all lines of x5 dB (like 85 dB), or simply all lines, printed thicker. Change the colours of the level classes by clicking the Colour button and modifying the colours in the window which then opens, or by modifying the level classes themselves (they can be edited).

Any change made on the Grid Appearance dialog box will not
become effective until the dialog box has been closed again.
10.10 dB-Level and Text Boxes

At any time you may display also the sound level at a certain point by inserting a Level-Box. That could be useful if you have defined lines of equal sound levels for your presentation. But of course before you can indicate sound levels you must have calculated an immission point grid. If you have not yet open the file L06.cna again if necessary and do so like described in the above chapter.

In menu Grid\Appearance activate the option lines of equal sound levels. Confirm with OK.

Now, in the toolbox click on the Level-Box icon and then on the desired point in your graphic - CadnaA indicates the sound level value on this point in a box.

Before you go on inserting more Level-Boxes switch in the Edit mode, click on the Level-Box border and adopt the size respectively the outlook of it by pulling on the black marker with the mouse. Try also pulling while pressing the SHIFT key. Make a double-click on the border of the Level-Box - the edit dialog opens - and change the font or the size of it or try just some options.

CadnaA transfers the parameter of the last inserted object to the next inserted one of the same type. So modify objects after inserting the first one and then insert all others - that saved a lot of time.
The same applies to the text box but you have to enter the text on your own. Try for yourself.

However, you have to “draw” the text box first. Therefore you have to click on that place where you want to have the upper left corner of the text box, press the mouse button while you pull the mouse to the other lower right corner and let the mouse button go.

Change to the edit mode and double-click the edge of the Text Box. The edit Text Box dialog opens. Now you may enter your text. If done, confirm by clicking OK.

All other inserted Text Boxes get the same outlook and size if you just make one click - do not draw - on the desired position.

In CadnaA you may choose additional options for Level, Text and Symbol Boxes as followed:
Brief Instruction for the Demo Program

dB-Level and Text Boxes

- Angle (°) - Inserting a value in degrees causes the box/frame to be rotated accordingly about its centre with respect to the x-axis. You may enter positive and negative values.
- You may select the font and size for the labeling of objects.
- Box with or without frame - if the Frame option is activated, the rectangle will be framed and, at the same time, its area hides any objects that may be lying underneath. If this option is deactivated, the rectangle has no frame and is transparent. Any objects underneath show through.
- Scale Dimensions - the dimensions of the box, the fonts or the symbol will be scaled with the rest of the graphical representation on the screen.
- Up to 33,000 characters may be entered in a Text Box.

Demo Program

Version 3.1
10.10 Brief Instruction for the Demo Program dB-Level and Text Boxes
10.11 Generate Floors

If you want to look at the immission points more particular you may calulateate them additionally to the immission grid.

Open the file L06.cna.

Now you may determine the immission level on several floors at a building. Therefore you have to place immission points at the building facade - we assume a building height of 11.5 m.

Click on the function Options|Object Snap and enter a Snap Radius of 8 pixel.

With that you ensure that immission points or sources at building facades will not inadvertently placed inside the buildings.

Point sources, vertical area sources and immission points which are positioned closer to a facade of a building than the specified snap radius, will be assigned to this facade and will be placed in front of it at a distance defined in the edit box Distance Points Facade.

For more information see online help keyword: Object Snap.
To close the dialog confirm with **OK** and activate the icon **immission point** from the toolbox. Position a immission point on a building facade by clicking.

Change in the **Edit** mode and double-click the border of the immission point - the edit dialog opens.

Open the **Geometry** dialog by clicking on the same-named button and enter a height of 2.20 m relativ.

To close the dialog confirm with **OK** again and enter a name for the immission point in the **Name** box, e.g. **Imp1** and a Standard Level of 50 dB for day-time and 40 dB for the night-time. Close the dialog also by clicking **OK**.

Now generate the floors.

Therefore click with the RIGHT instead with the LEFT mous button on the existing immission point Imp1. The context menu opens again. Choose the option **Generate Floors**.

Enter the values shown in the dialog box Generate Floors.
When the dialog box is left by clicking **OK**, CadnaA automatically generates three further floors, starting from the first immission point, with a spacing of 2.80 m each. It also appends the respective floor number to the existing immission point term, and enters the relevant height.

You may check this by selecting the Immission points table on the **Tables** menu.

Close the table and select the 3D-View on the Options menu. It allows you having immission points represented graphically according to floors. When selecting this option, the horizontal projection is the default setting.
On the list box of the 3-D View dialog box, select **Isometric**, and blow up the relevant detail using the magnifier tool. Also try out other types of representation.

You may also copy this representation to the clipboard and paste it in another Windows application.

The views **Isometric**, **Cavalier** and **Cabinet** are projections at preset angles - just check them out.

Under the general **Parallel Projection** you may specify arbitrary angles under which to look at the model. In this view you are able to turn your project by means of the arrow keys on the numeric keyboard. With the keys 9 and 3 you can modify angle Theta, the keys 4 and 6 will modify angle Phi.

In 3D-view you can also reach the edit dialog by double-clicking on the relevant object. To do this you have to be in the edit mode (click on arrow icon).

Also, try the 3D-special view again from the context menu of the road. (If necessary see chapter 10.1)
Should the immission points to be to big either in the normal presentation or in one of the 3D views you may change that. Therefore select Options > Appearance > Immission Point and change the Symbol Size from (mm) to (m). The symbol size will be adapted to the scale then.

For more information see online help keyword Options Appearance.

If you have generate the floors execute a new calculation. Therefore

If necessary close all dialogs and click to the Calculator icon in the icon bar.

Again, the immission levels calculated for each floor are listed on the menu Tables > Immission points.

The menu Tables > Partial Level shows a total list of all partial levels at the immission points which are caused from all sources. (In this example it is only a road).

<table>
<thead>
<tr>
<th>Source Name</th>
<th>Partial Level Day</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name</td>
<td>ME</td>
</tr>
<tr>
<td>m100</td>
<td>50.5</td>
</tr>
</tbody>
</table>

Table of Partial Level from the menu Table

But of course you may also create userdefined result tables. Therefore see chapter 13.
10.11

Brief Instruction for the Demo Program

Generate Floors
10.12 Copy to the clipboard

All lists available on the Tables menu may be copied to the Windows clipboard by clicking the **Copy** button, and used in a different Windows application (such as WORD, EXCEL etc.) e.g. for the preparation of reports. (Direct printout from Cadna/A is not implemented in the demo version).

* In **CadnaA** you may also duplicate just a single data record from the table.

But copying to the clipboard by just one click and pasting in another Windows application is also possible for

- the entire wrap-around of the graphic (make sure no object is selected),
- a trimmed area of the graphic - use the trimmed area icon on the tool-box to draw a box, switch to the edit mode and select the box - or
- an individual object: Just select the desired object.
**Summary**

Now you know how Cadna/A works. You may apply it to all other objects:

1. Click on the desired icon on the toolbox.

2. Place the object accordingly on the screen using the LEFT mouse button.

3. The RIGHT mouse button finished the input.

4. You may now also click once with the Right mouse key or alternatively switch in the Edit mode and double-click the object. In both cases the edit dialog opens but in the first case you keep in the insertion mode and after closing the edit dialog you may insert further objects of the same type without clicking the object icon again.

Our little introduction for CadnaA is nearly finished. If you may just play a little bit with the other sources and object types from the toolbox, like point source, line source, area source, parking places and contour lines.

- On the status line appears the name of the icon if you keep pressing the LEFT mouse button during you point on the icon.

- In CadnaA you may calculate either with A-weighted-levels or in frequency bands. Even a mixture is possible - if only for few sources the emission is known frequently, the contribution to the immission level will be defined in frequency bands.

Also try out the options on the context menu for the various object types inserted.

1. For this purpose, in the Edit Mode use the RIGHT mouse button instead of the LEFT one to select the existing object.

2. Choose then by clicking with the Left mouse button the desired option.

Further informations for the single features you will find in online help by their item.
11 Create Groups

In the menu Tables|Groups you may find a extremely versatile and powerful tool. A named group is a desired choice of objects. Their membership is defined by characters contained in their ID-box in the edit dialog box.

With this feature you may carry out varying actions of these groups, e.g.:

- deleting groups of objects
- converting to an other object, like line sources in roads or railways or the other way round
- co-ordinate transformations
- activate or deactivate objects for calculation
- representations of results a.s.o.

The earlier mentioned Partial Levels e.g. - you may define them also for groups of sound sources called Partial Sum Levels.

- Open the file L07.cna again and deactivate the grid appearance (Grid|Appearance|No Grid) if necessary.

- Insert some extra sources - e.g. another Road and two Point Sources.

- Change in the Edit Mode and open the corresponding edit dialog box by double-click on the object.

- Enter at least a Name for the object and a Sound Power Level

- Enter q for the Point Source in the box ID.

In CadnaA you may easily enter and change text boxes by editing them in the object tables. With the command Change Column you may change several columns for different objects with a single command simultaneously.

The source Road has already characters in the ID-box D₁. You will find a complete example in file L08.cna.
Create Groups

If you are finished with editing,

- start calculation again with the icon Calculator on the icon bar.
- choose on menu Tables|Group.

The Group list opens containing only the heading of the group list, showing the column with the name of immission points. It isn’t a group defined yet.

Now insert a group.

- Just click on the Ins-key to insert new rows, for each group one row.
- Double-click the new row. The Group edit dialog box opens.

Enter in the box **Name** industry and in **Expression** q*.

The group is now defined. All objects containing as first character q in the box **ID** are members of this group. The star (*) is a joker for perhaps further characters.

In the Group dialog box click on the button **Part.Level**. You get a list with each member source of the group „Industry“ with their partial levels caused on each immission point for day- and night-time.
Create Groups

Create another group for roads. If you followed this example the characters \( D_{-1} \) or \( D^* \) should be entered in the box Expression.

With this list you may determine the priority for noise protection measures. For more information see online help keyword Groups.

If you click the button Copy you may insert this list for your report in your word processing system by clicking CTRL+V or analogously.

Test also again the 3D-special view - remember:

- In Edit mode - RIGHT mouse click e.g. on the road axis and choose the function from the context menu.

Close this list and also the Group edit dialog box by clicking OK.

Now you get the list of **Partial Sum levels**. Those are the levels altogether caused by the group „Industry“ on each immission point.
Does the groups already offer an extremely flexible logic to switch between different project versions, the inclusion of this group structure in the integrated variants management (Tables|Variant) results in an increasingly efficiency (see also chapter 12 Variants).
12 Define Variants

With the menu **Tables|Variant** you have an other versatile tool of data management. With the variant management you are able to calculate and manage different states of a project in a file. By choosing the relevant variant from the drop down menu in the icon bar this variant will become visible with all its components, respectively objects and parameters, you have assigned to it.

- Open the file L09.cna.
- If necessary deactivate the grid presentation (**Grid|Appearance|No Grid**). You may switch on the grid later again.

In your project file if you use variants you also have to create groups first but afterwards assign them to the corresponding variant. If you then choose the desired variant from the icon bar automatically all groups will be active or deactivate which you have assigned to it.
Define Variants

By choosing the relevant variant from the drop down menu in the icon bar this variant will become visible with all its components.

With the Calculator in the icon bar you always calculate the current variant. With the menu Calculation|Calc you have the possibility to choose which variant you want to calculate.
In the file L09.cna have been established two variants. In the second vari-ant is additional to the first one a noise protection wall integrated.

Change between variant V01 and V02 by clicking on the variant name in the list on the icon bar. If you switch to the second variant V02 the noise protection wall will be activated and a calculation would show the result with the noise protection wall.

Now, how were the groups assigned to the variants?

In menu Tables|Variant for the variant V02 activate the checkbox Use Variant by clicking.

You may change the abbreviation V02 and also you may enter a longer term for the variant name. You can activate up to 16 variants in one file.

After activating the variant V02 open the group list (Tables|Groups). In our example are already groups existing and assigned to the variants.
Brief Instruction for the Demo Program

Define Variants

The group list with groups assigned to variants

In the group list you can see all defined groups and you assign them to the variants by entering a plus (+) - group is part of the variant - or minus (-) - group is not part of the variant - in the column of the corresponding variant via the keyboard.

After calculation with the command Calculation|Calc|All Variants you may see the results in the result table (menu Tables|Result Table) - prerequisite you have chosen a corresponding table layout.

For more information see the next chapter or online help keyword: Result Table.
13 Output of Results

For the output of the results you have different possibilities in CadnaA.

- The printout of input parameters and results in form of tables directly from CadnaA (menu File|Print Report, default or userdefined)
- The presentation of results with a Result Table - these tables can the user design on its own (menu Tables|Result Table)
- The export in Ascii (*.txt) or in Rich-Text-Format (*.RTF) menu File|Export (default or userdefined) for word processing systems or spreadsheets (like MS Word or Excel). Therefore you are independent - you can get out all data again.
- You can copy nearly each table to the clipboard and insert them again in a third-party Windows program or print them directly by clicking on the Print button in the table dialog.
- The graphical output via the clipboard (see chapter 10.12 "Copy to the clipboard") or via menu File|Print Graphic, default or userdefined.

Remember: In the Demo program is among others the print and the export deactivated!

The Result Table shows the calculation results equivalent to the layout table. Those layout tables can the user define or alter of its own. So the user specified the heading column and the values which will be displayed or not. The Result Tables are some sort of spreadsheet.

Open the file L10.cna and afterward the Result Table with Tables|Result Table.
Brief Instruction for the Demo Program

Output of Results

This result table shows the results equivalent to the layout file ResultTableV2.cnt.

You may adapt the table as desired by clicking on the same-named button. In the opening dialog if you double-click on a row you can alter the contents, delete or insert a column. Afterwards you may save this layout with a new name. Then for another project you can open it again by clicking its file name.

For more information see online help keyword Result Table.
14 Pass-By Level

This feature allows you to determine the time history of the sound pressure level resulting from the passing-by on a road, railway or other line source of one individual vehicle with a given emission.

Such a passing by can be reproduced acoustical by the computer with a sound-card and loudspeaker.

Generating this time history of the sound level is an efficient tool to check e. g.

• whether a noise-reducing device like e. g. a barrier yields a sufficient effect over the entire region,
• which reduction in level is to be expected when absorbent cladding is applied to a reflecting building facade, or
• to what extent the pass-by sound pressure levels caused by individual vehicles is reduced when e. g. the speed limit on an ordinary inner-city street is set to 30km/h.

For practising:

Test the procedure by means of a simple arrangement as illustrated below.
Now open the context menu by clicking the road centreline with the RIGHT mouse button, and select the **Pass-by Level** command from the context menu.

The dialog for the calculation of the Pass-by level-over-time curve.
Clicking the arrow button next to the immission point box opens a list of all immission points defined in the project. Select the point for which to determine the Pass-by level over time (in our example is only one point existing).

In the next box **Source Typ** select a type of vehicle **light** or **heavy**. If you choose (**user defined**) you may enter a sound power level.

Enter 0.1 for the sampling interval in the next box.

Sampling time and speed together determine the section lengths by which the fictitious vehicle or the source is moved between one calculation and the next. A sampling time of 1 s may suffice to check the necessary calculation time, a value of 0.1 s may be appropriate to represent a level record showing all level variations due to shielding and reflections.

Furthermore, you can select the direction of traffic (**Direction of Motion** box) with respect to the direction in which the road was inserted.

After confirming by clicking **OK**, and when the necessary calculation time depending on the complexity of the project has elapsed, a window opens to display the calculated level-over-time curve.

Please remember - the Demo program falsified the results!
Position the mouse pointer on the diagram and press the left mouse button: A vertical cursor line now appears at this location, the point in time and the sound pressure level are displayed on the title bar of the window, and on the centreline of the lane assigned to the direction of traffic in question, the vehicle location corresponding to the current cursor position is marked by a black square.

If, with the left mouse button held depressed, you move the mouse pointer horizontally across the level-over-time diagram, the car icon will also move along the road.

Alternatively you may select a value from the Animation menu.

By looking at the vehicle position in relation to the location of buildings for each variation in level, you will be able to recognise reflections (increases in level) and shielding effects (reductions in level).

Now test further coast-by variants by activating/deactivating the reflection from individual buildings and watch how this influences the level-over-time curve.
This diagram also facilitates the optimisation of barriers, because you can immediately see the effect of any modification. Going beyond the mere consideration of time-averaged levels, the coast-by feature offers you a tool which allows you to examine and visualise the effects of level-reducing measures on the instantaneous levels.

In the menu **Auralization|Properties** the saved sound file of the relevant process is opened after selection of a sound type in the list box and is re-
produced - regarding level height - according to the calculated time history of the pass-by level.

With the option **3D-Auralization** the Doppler effect when switching from approach to departure will be simulated realistically.

After you have made your settings you may calibrate the volume (Auralisation/Calibrate).

- Select the desired volume in the list box and adjust the corresponding playback at your audio-appliance.
- Hardware requirements: at least sound card and loudspeaker.

**Copy**

You can copy the level-over-time curve via the clipboard, as a series of numbers or as a graph, to other applications such as Excel or Word.

- To this end, just click on the **Copy** menu.
- After switching to Excel or Word, select *Edit/Paste Contents* or analogously and select either *Graphic* or *Text*. 
15 Scanned Maps - Insert Images

For the treatment of Bitmaps you would need the Option BMP additional to the Basic program!

Scanned maps (ground plans, cadastral plans) can be saved in various bitmap formats (e.g. BMP, PCX, TIF, JPEG, PNG; GIF etc). Such pixel graphics are produced if you e.g. have scanned plans or photos from a digital camera. Usually the scanner or camera software served those formats.

These bitmaps, when loaded as background images in CadnaA, serve as templates for the definition of sources, immission points, and other objects. CadnaA is capable of processing several bitmaps at a time.

When inserting bitmap files, CadnaA just makes reference to the file name and path. The bitmap file itself is not saved in the project file. If you move this project file and the bitmap to a different directory, CadnaA will still find the bitmap file provided it is in the same directory as the project file.

Geo referenced images, which are available from GIS (Geographical Information Systems) can be imported (File|Import|Format Bitmap) and positioned directly in CadnaA without repeating calibration. Therefore you may mark all bitmap files and their pertinent geo files - multiple selection is possible - then the bitmaps will be imported and placed all together simultaneously.
The following figure shows 42 bitmaps (scanned maps) which are imported as mentioned before.
With the magnifier you may blow up details and insert acoustically relevant objects like buildings, roads, industry areas etc over the bitmap.

Open the demo file DEMO1.CNA, by clicking either the menu **File|File open** or the pertinent icon on the icon bar.

In the open dialog double-click on the file name. The demo file opens. It includes a bitmap (DEMO1.BMP) as background and has been calculated already.

If the BMP frame shows only a „blockade” sign instead of the image, then it could be that your path definition for the file is not correct. In that case ensure that the file is in the same directory on your disc like the DEMO1.cna file or correct the path in menu **Tables|Other**
**Objects|Bitmap.** Double-click on a row and the edit dialog for the bitmap opens.

![Bitmap edit dialog](image)

Bitmap edit dialog - the position of the bitmap within the wrap-around is already defined with the bottom left and upper right corner.

Alternatively you can open the dialog by double-clicking on the border of the bitmap frame.

**Bitmap Size and Position**

To avoid a distorted representation of the background image on the **CadnaA** main window, you must specify its dimensions and its intended position within the main window or the limits.

You may do so by entering

- the coordinates of the bottom left and top right corners, or
- the resolution of the map in dots per inch (DPI) and the scale, or
- reference points the coordinates of which are known (calibration).

If the **Resolution** option is activated, you must know the resolution in DPI (e.g., 150, 200, 400 etc.) used when the map was scanned, and what was the scale of the map. This method is particularly convenient if only the rel-
ative positions of objects matter, and their absolute co-ordinates are irrelevant.

The Calibrate Bitmap button opens a dialog - in the demo program deactivated - which allows you to enter up to four points with known co-ordinates on the map. As soon as you have entered these points and confirmed by clicking OK, CadnaA will load the bitmap and prompt you to click the reference points on the bitmap which is displayed on the screen. CadnaA will then determine the correct co-ordinates for the representation. Under this mode, you may use the zoom magnifiers to enlarge the reference point to be clicked.

- If necessary close the dialog with OK.
- Zoom the graphic to the desired size. Therefore use the magnifier icons from the toolbox.

With the Bitmap icon from the icon bar you may switch off single bitmaps if you do not want to see them. Just try the different settings.

If the option Show Bitmap is deactivated only the image is invisible but the bitmap frame is still visible. To delete a bitmap just click on the bitmap frame and then the Del-key. In that case the bitmap is deleted also from the pertinent table (Tables|Other Objects|Bitmap).

In the bottom of the demo file are two railways existing.

- If necessary extend the graphic and double-click the centreline of a railway. The edit dialog opens and you can see and adapt the parameters.
For practice open the other edit dialog of the different objects like roads or buildings or just insert further objects. Define a new calculation area and execute the calculation (Grid|Calc Grid). Change also the Class Width or the other options in Grid|Appearance.

Insert also a new Bitmap frame with the icon from the toolbox.

- activate the bitmap icon - draw a rectangle - click with the Right mouse key once on the bitmap frame - the edit dialog opens - open the desired image file by clicking on the directory icon on the right hand side of the file box.
- Adopt the settings and confirm with OK.

We hope you have noticed how easily it is to insert, enter, edit and calculate objects.
16 Summary

So much for the demo version which is supposed to give you an idea of the strong suits CadnaA offers. Although its concept aims at ease of operation, CadnaA is an exact and professional tool for noise immission control. Whether you only give a brief acoustical expert opinion now and then, intend to check the noise immission caused by your plant, or to prepare noise immission maps for entire cities - you are already familiar with many of the necessary steps of operation.

Have also a look to the menus we did not talk about yet like the Calculation|Configuration. The register show the possibilities you have to calculate also beyond the standard respectively national guidelines by activating or deactivating options. You always find more information in the online help with the corresponding keyword.

And - should that once not be the case - get in touch with us. You may reach us in the usual office time via telephon, fax oder email.

If you should decide for CadnaA you may attend our different basic and advanced trainings or workshops. We offer them for single persons, groups or firms. Just talk to us.

We are quite confident that you, too, will soon be one of our satisfied CadnaA customers. We are looking forward to it.