DIAdem™

Data Analysis and Report Generation

November 2003 Edition
Part Number 323082C-01

Worldwide Technical Support and Product Information

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About This Manual

The *DIAdem: Data Analysis and Report Generation* manual describes the structure of DIAdem as well as how to use the DIAdem functions to load data, to run analyses, to generate reports, and to compile all the functions into a script.

Read the *Getting Started with DIAdem* manual to familiarize yourself with DIAdem. Read the *DIAdem: Data Analysis and Report Generation* manual for more information about the functions and features in the DIAdem panels. While you are working in DIAdem you can refer to all functions, variables, and commands in the DIAdem help.

The DIAdem manuals are available in the Portable Document Format (PDF format) on the DIAdem CD.

Conventions

The following conventions appear in this manual:

<> Angles indicate a key you press to perform a function, for example, <Ctrl> for the control key.

» The » symbol leads you through nested menu items and dialog box options to a final action. The sequence **File»Page Setup»Options** directs you to pull down the **File** menu, select the **Page Setup** item, and select **Options** from the last dialog box.

 This symbol denotes a tip, which alerts you to advisory information.

 This icon denotes a note, which alerts you to important information.

bold Bold text denotes items that you must select or click in the software, such as menu items and dialog box options.

italic Italic text denotes emphasis, new terms, a cross reference, or an introduction to a key concept.

`monospace` Text in this font denotes text or characters that you should enter from the keyboard, formulas, sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, directories, programs, subprograms, subroutines, device names, functions,

operations, commands, variables, controls, events, methods, filenames and extensions, and code excerpts.

monospace bold Bold text in this font denotes the messages and responses that the computer automatically prints to the screen. This font also highlights command lines that are different to other examples.

1

Working with DIAdem

DIAdem is the National Instruments software for analyzing and documenting data from various sources. You navigate in various data types and data storages to drag and drop the data into DIAdem. In DIAdem you view the data to choose which data you run mathematical analyses on. You present calculation results in a report. If you frequently use one method to evaluate data, you generate a script that automates your evaluations in DIAdem.

DIAdem Panels

Panel:
DIAdem NAVIGATOR

DIAdem consists of several panels. Each panel deals with a particular type of task. If you want to record data in a report, you use at least two panels. Use DIAdem NAVIGATOR to load data from databases and from files and DIAdem REPORT to display the loaded data in a report. Switch panels using the panel bar, which is always visible on the left of the screen.

You obtain data from the Data Portal, which links all the panels. DIAdem VIEW, DIAdem ANALYSIS, and DIAdem SCRIPT can modify data and store the results in the Data Portal.

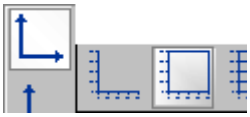
DIAdem SCRIPT links all the panel functions in scripts. You can use scripts to generate your own applications that process your tasks automatically.

If LabVIEW is installed on your computer, you can start it by clicking the LabVIEW button in the panel bar.

DIAdem CLIP and DIAdem INSIGHT are external programs that offer you special analysis and report functions. You can use DIAdem CLIP to compare videos and test data that are recorded simultaneously, and DIAdem INSIGHT to display measured data as shading and/or deformation on a 3D model.

DIAdem User Interface

When you select a DIAdem panel, the user interface changes for quick access to the functions you want. Each DIAdem panel has its own group bar to the right of the panel bar. Click a function bar button in the group bar and select the function you want when the function bar opens. The workspace also changes with the DIAdem panel and displays a folder hierarchy or a worksheet. Each panel has its own Toolbar and shortcut menus, which contain frequently used functions.



Function Bar
2D Axis Systems

To generate a report, select **DIAdem REPORT** in the panel bar. Select the **2D axis system** group bar to open the function bar with the predefined 2D axis system definitions. Click the **2D axis system with frame** button in this function bar. The function bar disappears and DIAdem REPORT inserts a framed 2D axis system into the worksheet.

In the worksheet you can resize the axis system and move it around as required. Double-click to open the axis system dialog box and define a curve. In the first dialog box level you can set which data channels to display or the display mode. Special settings like axis scaling are one dialog box level below.

You can use the shortcut menu to change the presettings for the functions in the function bars. For example, if you often calculate the arithmetic mean and the standard deviation, select **DIAdem ANALYSIS**. Click the **Statistics** group bar to expand the function bar. Right-click the **Statistical characteristic values** button. Select **Default setting** in the shortcut menu. Click **All off** in the dialog box and select the two characteristics **Arithmetic mean** and **Standard deviation**. Click **Change**. Now click the **Statistical characteristic values** button, and the dialog box is preset with the arithmetic mean and the standard deviation.

The bottom function bar is the same in all the panels. You can assign scripts to this function bar to use functions that you write in all the panels.

Report Wizard

The DIAdem Report Wizard helps you to generate your own reports. In the Report Wizard, you select data, define the curve, and select the layout for the axis system. DIAdem uses your settings to generate the report, which you can add comments to and illustrate with graphics in DIAdem REPORT.

In DIAdem REPORT and DIAdem VIEW, you open the Report Wizard by clicking the **Report Wizard** button in the Toolbar or by pressing <Ctrl-W> in any panel. In the DIAdem **General settings**, you can disable the Report Wizard so it does not appear automatically when the program starts.

Use the LabVIEW DIAdem Connectivity VIs to record LabVIEW measurements directly in a DIAdem report. The LabVIEW VIs open DIAdem, write the acquired data into the DIAdem Data Portal, and start the Report Wizard. The LabVIEW DIAdem Connectivity VIs are on the DIAdem CD, and you can download them from the NI Web site.

DIAdem Help

DIAdem help gets you started with DIAdem and helps you use functions and automate your tasks. DIAdem help offers you procedures and dialog box help for each panel, as well as references to functions, commands, and variables.

A procedure is a step-by-step description of the solution to your task. Procedures can solve anything from basic tasks to special tasks. Complete the steps to learn how to work with the described functions.

Dialog box help explains parameters for each dialog box, to help you use the functions correctly. References indicate more detailed explanations and related topics. You access dialog box help in any dialog box by clicking the Help button.

The function, command, and variable references list DIAdem commands and variables, Calculator functions, and special script functions for DIAdem VIEW and for user dialog boxes. For example, the help page of a command includes the command syntax, the command parameters with the value range, and a sample line.

DIAdem help provides examples of data analysis and report and script generation. The examples demonstrate simple solutions as well as complex applications. You can access the examples from the DIAdem Help menu or from online help pages containing related contents. For instance, DIAdem loads the data and the report layout automatically for a report example. Press <Esc> to stop an example.

The example descriptions contain the names of the files used, which you can use as a basis for your own solutions. Copy the example files into another folder or load them into the appropriate DIAdem panel.

NI License Manager

The NI License Manager helps you manage your NI software product licenses. To work with the complete version of DIAdem, click the **Activate** button and enter your serial number to activate your license. Now you can upgrade your evaluation version to a complete version without reinstalling DIAdem, and you can add new DIAdem elements.

The NI License Manager only enables functionality that is included in your license. For example, your license might not allow you to use 3D functions in DIAdem REPORT and DIAdem ANALYSIS. The buttons in the function bars are dimmed if the 3D functions are not included with your license. You must purchase another DIAdem package to access the 3D functions.

When you purchase a new DIAdem package, select **?(Help)»Activate License** to register the license. The NI License Manager dialog box appears, where you can enter the necessary details. Restart DIAdem to activate your license.

2

Loading and Saving Data

DIAdem NAVIGATOR

DIAdem NAVIGATOR loads and saves your data. You navigate data files, file folders, and databases to find external data. You load data into the Data Portal, which manages all internal data. The data are arranged in channels, each displaying a data series. All DIAdem panels work with the channels in the Data Portal.

Loading External Data

DIAdem NAVIGATOR displays external data as a hierarchical structure. You can navigate data on your computer, on other drives on the network, and on all registered databases. Use the function bar to select the type of data storage you navigate in. Drag and drop the required data into the Data Portal.

You can select file-based and server-based data storage in the DIAdem NAVIGATOR function bars. If you select file-based data storage, DIAdem displays the data files on your computer drives or on the network. If you select server-based data storage, DIAdem displays the data of the registered databases.

DIAdem Data

To load DIAdem data, click **DIAdem 9 files** in the function bar for file-based data storage. All the drives registered on your computer appear in DIAdem NAVIGATOR. Open the folder with the data you want. Drag and drop the data into the Data Portal. DIAdem copies the contents of the file into the Data Portal and lists all the channels contained in the file.

DIAdem automatically uses the associated loading procedure for the data type. If DIAdem cannot automatically load a file, you can specify the loading procedure. For example, if you want to load an earlier LabVIEW file in the ASCII format, right-click the file and select **Load with** from the shortcut menu. Select **ASCII Import** in the dialog box to import the LabVIEW data.

When you browse through a database, you can load channels and channel groups by dragging and dropping them into the Data Portal. When you browse through the folders on your computer drives, you also can load data files by dragging and dropping them. DIAdem displays selected channels,

channel groups or files that you can load into the Data Portal, with a blue background.

For example, select **Selective loading** in the shortcut menu to load single channels from a TDM file. Click the plus signs to view all the channels and channel groups in this data file. Select the channels you want and click **Load**. DIAdem loads the selected channels and adds the channels from the default group in the Data Portal.

You can use filter settings to limit the number of files listed in DIAdem NAVIGATOR. Select **View»Filter settings** to open the dialog box for filter settings. For example, to view all files called Test from a certain date, enter the name `test.*` and the date saved.

In the DIAdem NAVIGATOR **Configuration**, you can specify which data storage DIAdem loads when the program starts.

Registering Data Storage

The data storage manager displays all the external data storages available in DIAdem. You can configure, delete, and select the available data storage to load the data storage into DIAdem NAVIGATOR. You also can register new data storage in the data storage manager.

To register new data storage, select **File»Change data storage**. The data storage manager appears with the registered data storage, in a hierarchical structure. For example, select the data storage type **SQL** for a database. Double-click **New data storage** to register the new SQL database. Enter a name and the necessary settings.

The data storage available in the function bars have predefined names in the data storage manager, for example, `SQL Example` for **ODBC/SQL data**. Do not delete the predefined data storage. You can modify the configuration of the predefined data storage to have frequently used data quickly at your disposal. For example, if you want to change the registered SQL database for the SQL/ODBC data, right-click `SQL Example` in the data storage manager. Select **Properties** and switch databases.

Supported Data Storage

DIAdem supports many file formats and databases. The data storage manager and the dialog box for loading procedures contain information about which data the current installation of DIAdem can load.

DIAdem Data

DIAdem uses the TDM format to save the properties and the numeric data in various files with the same filenames. DIAdem saves the data properties in a text file with the filename extension `.tdm`, and the numeric data in a binary file with the filename extension `.tdx`.

Use the **DIAdem 9 files (*.tdm)** button in the **File-based data storage** function bar to load DIAdem data. DIAdem NAVIGATOR displays only data files with the filename extension `.tdm`. DIAdem reads the properties from the TDM file and loads the associated data from the TDX data file with the same name.

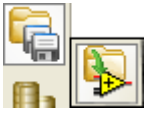
DAT Data

Click the **DIAdem 8 files (*.dat)** button in the **File-based data storage** function bar to load data from earlier DIAdem versions, DIA/DAGO or DIA-PC.

Before Version 8.1, the DAT format was the standard DIAdem format. In the DAT format, DIAdem saves the data properties as text in a header file with the filename extension `.dat`. DIAdem saves the numeric data in one or more binary files to take up the least amount of disk space. One data set can include several binary files, for example, files with the filename extension `.w16` or `.r48`.

DIA/DAGO saves the descriptive data in a header file with the filename extension `.dat` and the numeric data in binary files, the same way as DIAdem 8.

LabVIEW Data


LabVIEW Data

Use the **LabVIEW files (*.lvm)** button in the **File-based data storage** function bar to load LabVIEW data. DIAdem NAVIGATOR displays only data files with the filename extension `.lvm`. DIAdem reads the LVM file header and loads the data accordingly. LabVIEW saves descriptive information such as the delimiter used, the start value and the step width of the x-channel, and the actual values in a file.

Earlier LabVIEW data files have the filename extensions `.lvd` or `.txt`. These ASCII files only contain the actual values. Select **Load with»ASCII Import** in the DIAdem NAVIGATOR shortcut menu to load these files.

Use the LabVIEW DIAdem Connectivity VIs in LabVIEW to exchange data directly with DIAdem. These VIs can start DIAdem directly, to write acquired data straight into the Data Portal. The LabVIEW DIAdem

Connectivity VIs are on the DIAdem CD, and you can download them from the NI Web site.

Use the **LabVIEW DSC module data** button in the **Server-based data storage** function bar to open a database that the LabVIEW Datalogging and Supervisory Control (DSC) Module has generated. In addition to the measurement data, the LabVIEW DSC Module saves recorded data about the monitoring run, alarms that occur, and control tasks executed.

VI Logger Data

Use the **VI Logger data** button in the **Server-based data storage** function bar to load data from a VI Logger database. VI Logger saves measured data, including the record data, in the database.

Lookout Data

Use the **Lookout data** button in the **Server-based data storage** function bar to load data from a Lookout database. Lookout saves data from various sources and saves record data with the measured data. You can accelerate access to a large database by specifying a time interval for which you load data into the Data Portal.

ASCII Data

Use the **ASCII files (*.asc, *.txt, *.csv)** button in the **File-based data storage** function bar to import ASCII data. A wizard helps you to analyze the data to be imported. For example, you specify whether a file contains text, whether the values are organized in blocks or channels, and whether empty lines occur.

In the wizard preview, you check the settings, which you then save in a configuration file with the extension `.stp`. To import another ASCII file with the same structure, specify this configuration file in the wizard.

Excel Data

Use the **Excel files (*.xls)** button in the **File-based data storage** function bar to load Excel data from Excel 97 and later. A wizard helps you to analyze the data to be imported, similar to the ASCII wizard. You specify whether the file contains several table sheets and where text is located. In the wizard preview, you specify text as a channel name, comment, or unit.

You check the settings, which you can save in a configuration file with the extension `.stp`. To import another Excel file with the same structure, specify that configuration file in the wizard.

ASAM Data

Use the **ASAM-AOP data** button in the **Server-based data storage** function bar to load data from ASAM-compliant databases using the ASAM-ODS Protocol (AOP). The Association for Standardization of Automation and Measurement Systems data model saves values and descriptive metadata in a hierarchical structure.

If you use commands for communicating with ASAM databases in a script, use the ASAM data service. The ASAM data service navigates, reads, and writes in ASAM Transport Format (ATF) files and ASAM-compliant databases. Select **File»ASAM data service** to open the ASAM data service.

ODBC/SQL Data

SQL/ ODBC Data

Use the **SQL/ODBC data** button in the **Server-based data storage** function bar to load data from Access, Oracle, or ADO databases. Use SQL (Structured Query Language) commands to access an ODBC (Open Database Connectivity) database. DIAdem can also access data with OLE (Object Linking and Embedding) and with ADO (ActiveX Data Objects) in client-server architecture, and in Web-based applications.

Binary Data

Use the function **File»DAT files»Import via header** to import binary data. To import the data, you create a header file containing information about the data set and the data channels. Click **Execute** in the dialog box to load the channels into the default group in the Data Portal according to the header information. Instead of making all the header entries again, you also can load an existing header file and modify it for your binary file.

Crash Test Data

DIAdem can load Crash test data from the vehicle safety area in the EGV file format based on ISO DTR-13499, and in the MME format according to ISO-MME (TS 13499). To load EGV or MME data, you must register the appropriate GPI file filter by selecting **Settings»Desktop parameters»**

GPI-DLL registration. Load the function library `egvload.dll` for the EGV format and `gfsmme.dll` for the MME format, from the folder `..\diadem\addinfo`. Refer to Appendix B, *GPI Interface*, for more information about the GPI interface.

Special Data Formats

You can extend DIAdem to include other data formats not familiar to DIAdem. Table 2-1 lists special data formats for which DIAdem provides GPI file filters for importing external data. The GPI file filters are in the `..\diadem\addinfo` folder and at the NI Web site. You register GPI file filters by selecting **Settings»Desktop parameters»GPI-DLL registration**. When you restart DIAdem, you can load files in these special formats by dragging and dropping them, or by selecting **File»Open** or **Load with** in the shortcut menu.

Table 2-1. Special Data Formats

Filename Extension	File Format	GPI File Filters
.dbf	dBASE format	gfsdbase.dll
.dif	ASCII format for Excel	gfsdif.dll
.erg	ERG format	gfserg.dll
.lax	LAX format	gfslax.dll
Various	nSoft format	gfsncode.dll
.rsp	RPC3 format	gfsrpc3.dll
.tdf	LMS format	gfstdf.dll
.dat	TEAC format	gfsteac.dll
.wav	Non-compressed wave format	gfswave.dll

Editing Internal Data in the Data Portal

The Data Portal manages data that you load from DIAdem NAVIGATOR. Every panel in DIAdem works with internal data. The Data Portal contains data channels, time channels, and text channels. The Data Portal structures channels in groups and displays data properties. Internal data in the Data Portal is loaded only temporarily in memory. The changes you make to the internal data are only stored after saving in a file or a database.

Working with Channels

DIAdem organizes data in channels. A data channel contains measurements from a sensor; a time channel contains the corresponding time values. A channel is the fundamental element of DIAdem. Each panel in DIAdem uses channels. For example, in DIAdem ANALYSIS you select two channels from the Data Portal for an FFT calculation and in DIAdem REPORT you select two channels from the Data Portal for a curve display.

Use channel groups to organize channels in the Data Portal. When you add a file by dragging and dropping the file from DIAdem NAVIGATOR to the Data Portal, DIAdem creates a new channel group. Channel groups help you prepare and describe your data for evaluation and presentation. For example, the channel group Emissions contains all the channels from an auto emissions test.

DIAdem designates the last group of channels you load from DIAdem NAVIGATOR into the Data Portal as the default group. The default group is the destination for data channels in DIAdem that you do not control, such as channels calculated in DIAdem ANALYSIS. For example, designate the channel group Emissions as the default group by selecting **Set default group** in the shortcut menu and perform a smoothing calculation for the channel `Auto_Exhaust`. DIAdem stores the resulting channel `Y_smoothing` in the default group Emissions.

You use the shortcut menu in the Data Portal to manage channels and channel groups. Add and delete new channels and channel groups, change channel names and channel group names, move channels and channel groups, and cut and paste channels in the Data Portal by right-clicking and selecting the appropriate option. You can also delete all data in the Data Portal.

The Structure view in the Data Portal organizes channels hierarchically into channel groups. The List view lists all channels at the same level and you can determine the properties you use to sort channels. Select **Select Properties** from the shortcut menu in the List view for the channels to specify which channel properties are displayed. For example, one property that appears in the List view is the channel number.

Creating New Channels

You can create new channels in DIAdem in many ways. DIAdem NAVIGATOR creates new channels when loading data. DIAdem ANALYSIS creates new channels for calculation results. DIAdem SCRIPT creates new channels by calling copying commands or calculation commands from scripts.

To create a data channel manually, select **Create New Channel** from the shortcut menu in the Data Portal. For example, select **Numeric** from the **Display Format** menu and enter `5` as the channel length. Select the DIAdem VIEW panel and select **Display Type»Channel Table** from the shortcut menu. Drag and drop **Channel_0** from the Data Portal into the channel table. Enter the values `1`, `2`, `3`, `4`, `5` in the channel table data fields 1–5.

Data, Time, and Text Channels

DIAdem works with three different types of channels: data channels, time channels, and text channels.

A data channel contains acquired values, such as the measurements from a sensor, calculation results, manually entered values, or values from files. DIAdem can use each data channel in the Data Portal as a source for calculating and displaying graphs.

DIAdem creates a time channel from date and time statements coded numerically. DIAdem specifies the time and date by calculating the number of seconds from the year zero to the current date and current time. A time channel contains time values taken during a measurement. A time channel is often the x-channel for the calculation and the display of the corresponding measurement values in the y-channels.

A text channel contains character strings stored as unicode. This allows for characters from all major languages, including Chinese, Korean, Japanese, and Arabic. You cannot perform calculations on text channels, but you can view text channels as tables in DIAdem VIEW and DIAdem REPORT. Use a text channel to record observations about data values in a data channel.

Organizing 2D and 3D Data

DIAdem handles multiple channels individually. To display curves in DIAdem VIEW and DIAdem REPORT, you must use both an x-channel and one or more y-channels. When you drag and drop channels into a 2D axis system, you must select the x-channel first. If an axis system already contains a curve, you must select an x-channel and a y-channel to insert additional curves into the axis system. An axis system can display multiple x-channels simultaneously.

For displaying data three-dimensionally, DIAdem REPORT and DIAdem ANALYSIS read data in a matrix structure or a triple structure. Value triples have three data channels, representing x, y, and z values. One matrix contains an x-channel, a y-channel, and many z-channels. There must be as many z-channels as there are values in the y-channel. The z-channels must be the same length as the x-channel.

Editing Data Properties

Engineering software such as LabVIEW or CVI saves data properties and comments with measurement values. A data property for a data set includes the author and the date; for a channel group, includes the measurement name and comments; and for channels, includes the data type and the unit.

The Data Portal displays data properties in the properties area at the bottom of the Data Portal. If the Data Portal does not display the properties area, open the properties area by dragging it vertically from the bottom of the Data Portal. When you click on the root name in the Data Portal, the data set properties appear in the properties area. When you click on a group or a channel in the Data Portal, the group or the channel properties appear in the properties area.

Double-click property fields to edit them. For example, enter `Engine Test` in the Register text1 property field. Read-only channel properties, such as maximum length, and monotony, appear dimmed in the properties area. Changeable properties, highlighted in white, include name, comment, and unit for the different data. You can add custom properties using the shortcut menu.

Saving and Exporting Internal Data

You can save the entire data set in the Data Portal or save channel groups or individual channels. DIAdem saves data where you specify by dragging and dropping the data into a folder in DIAdem NAVIGATOR. When you drag and drop the data onto an existing file, DIAdem adopts the filename and can overwrite the file. Save all the data channels in the Data Portal by selecting **File»Save**.

You can selectively save single channels in a data file. Select the channels you want to save and drag and drop them to the folder in DIAdem NAVIGATOR where you want to save them.

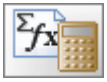
You can export data in the DAT format for other applications which can import DAT files. For example, export data in the DAT format to analyze these data with videos in DIAdem CLIP. To export data in ASCII format select **File»DAT files»Storage Parameters** and change the type of data to ASCII. If you then save data in DAT format, DIAdem creates an ASCII file.

To exchange data with ASAM applications and software, export data in the ASAM data format by selecting **File»ASAM data service** and by using the scripting features in DIAdem. You also can use SQL commands in DIAdem SCRIPT to export data to SQL databases.

Export data into the Excel format to evaluate your data in Microsoft Office. The Excel Export Wizard helps you transform the data structure of the Data Portal into an Excel spreadsheet.

3

Analyzing Data with Mathematical Functions

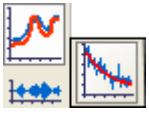


DIAdem ANALYSIS

You can use DIAdem ANALYSIS to analyze data in the Data Portal with mathematical functions. The dialog boxes for the standard mathematical functions guide you through the calculation so you do not have to enter a formula. You select only the input data and make the settings you want. Use the Calculator to define and calculate your own formulas. For complex calculations that are repeated, you can write scripts. Save your results in data channels or in variables.

Using Standard Functions

DIAdem has extensive libraries of standard mathematical functions in several function bars in DIAdem ANALYSIS. The functions include basic mathematics like differentiation, signal analysis like FFT, and 3D analysis like isoline calculations.



Smoothing

To use a standard function, click the associated button. You select the calculation settings in the dialog box that opens. For example, if you want to smooth data, select **Curve Fitting** and click **Smoothing**. Drag and drop the **data channel** to be smoothed from the Data Portal into the dialog box. Specify the **smoothing width**. If you have used the smoothing function in your current work session, the channel containing the last calculation settings appears in the dialog box.

DIAdem stores the calculation result in the default group of data channels. You specify the default group in the shortcut menu of the Data Portal hierarchical structure. If you select **Store result in original channel** in the function dialog box, the function stores the result data in the original channel(s). If you call another standard function, by default, DIAdem applies the function to the results of the last calculation. You can use all the data channels in the Data Portal in calculations. The DIAdem ANALYSIS workspace shows you which calculations you have run with which data channels.

Standard functions work with one or more data channels. If a standard function processes several data channels, for example, the Averaging function, a question mark appears in the channel selection field. Select all the channels you want in the Data Portal and drag and drop all the channels into the channel selection field.

The functions you can use depend on which options you have in your DIAdem installation and license. Functions not included or enabled in your installation are dimmed in the DIAdem interface. You can obtain additional function libraries from NI.

Calculating Formulas in the Calculator

Use the Calculator to analyze data with your own formulas. In the Calculator, you can run calculations on data channels and generate new data channels. You can calculate single values, save values in variables, and request variable values.


Calculator

Open the **Calculator** with the DIAdem ANALYSIS Toolbar button shown on the left.

Entering Formulas

Enter your formula in the Input box using the keyboard and the Calculator keys. DIAdem displays the status or the calculated result in the result line.

A formula consists of the assignment target, the delimiter, and the calculation instruction.

```
Assignment target := Calculation instruction
```

You usually enter a data channel as the assignment target. However, you also can calculate a single value and assign the single value to a variable. In the calculation instruction you use operations to link data channels or variables. The tabs at the bottom of the Calculator have numeric operations like sine functions, Boolean operations like AND, and text operations like text length.

For example, if you want to calculate the sine values for a data channel, insert the sine function into the **Input box** by double-clicking **sin(arg)** on the **Numeric Operations** tab. The insert sign in the Input box is automatically set in the argument section of the sine function, so you can double-click the data channel you want and move it from the **Channels** tab into your formula.

In the Calculator, always use a decimal point as the decimal separator and enclose strings in quotation marks (" ... ").

Note To use the operations, channels, and variables tabs in the Calculator, click the **Extended** button.

Calculating with Data Channels

To divide the second data channel by the first data channel in the Calculator, for example, enter the following formula in the **Input box**:

```
Ch(#) := Ch(2)/Ch(1)
```

DIAdem divides each value in the second data channel by the corresponding value in the first data channel. If the data channels are different lengths, the result channel is the same length as the shorter data channel.

The pound sign (#) on the left of the formula stores the result in the next free data channel. You can also enter the number or name of the result channel:

```
Ch(3)          := Ch(2)/Ch(1)
Ch("Result")   := Ch(2)/Ch(1)
```

If the data channel you specify already exists, DIAdem overwrites the values in it.

Calculating with Variables and Single Values

In the Calculator, you can store the values in variables, use variables in calculation instructions, and request variable values. These examples show how to enter these three alternatives for the auxiliary variable `R1` in the **Input box**, for example:

You assign the result of the square root of 8.391 to the variable `R1`.

```
R1 := Sqrt(8.391)
```

Enter a question mark after the variable name to request the value. The value is displayed in the result line.

```
R1?
```

Multiply every value in the third data channel by the `R1` variable and store the result values in the next free data channel.

```
Ch(#) := Ch(3)*R1
```

Tip To calculate a formula without saving the result, enter the calculation instruction in the Input box and a question mark at the end. The Calculator shows the result in the **Result box**.

Calculating in Scripts


DIAdem SCRIPT

Use scripts to automate complex calculations that you use repeatedly. In scripts, you can calculate standard functions or create your own formulas. A script is a VBS file that DIAdem processes row by row. To enter the following examples, generate a new script in DIAdem SCRIPT and enter the sample rows. Refer to Chapter 5, *Automating Sequences*, for more information about scripts.

Calling Standard Functions

In scripts, you can use all the standard mathematical functions available in DIAdem. Use the `Call` command to call standard functions. For example, to smooth the entire data channel 6 with a smoothing width of 12, and save the result in data channel 7, enter the following line in your script:

```
Call ChnSmooth(6,7,12,"maxNumber")
```

Creating Your Own Formulas

In scripts, you can also calculate your own formulas. For example, to divide the second data channel by the first data channel, enter the following line in your script:

```
Call FormulaCalc("Ch(3) := Ch(2)/Ch(1)")
```

Use the `Call` command to call the Calculator function `FormulaCalc`. Enclose the formula in quotation marks and use the same syntax you use for entering formulas in the Calculator.

Assigning Single Values

In scripts, you also can assign values to variables. You define the single value assignment with an equals sign. For example, to assign the square root of 8.391 to the auxiliary variable `R1`, enter the following line in your script:

```
R1 = Sqrt(8.391)
```

Tip If you enable the recording mode in the DIAdem SCRIPT Toolbar, DIAdem records the standard functions you have called, as well as the formulas you have calculated in the Calculator, with the complete syntax.

Using Variables

DIAdem provides three kinds of variables: program variables, auxiliary variables, and user variables. Refer to the *Using Variables* section of Chapter 5, *Automating Sequences*, for more information about variables.

Program Variables

Use program variables to set parameters for a command in a script. You set these parameters in the same way as you make settings in the dialog box for a standard function. The `SmoothWidth` program variable specifies the smoothing width for the `ChnSmooth` command in the standard function Smoothing.

Program variables can contain the result of a standard function. For example, the `StatArithMean` variable contains the arithmetic mean of a data channel when the characteristic statistical values are calculated.

Several program variables are included on the **Special Variables** tab at the bottom right of the Calculator. These program variables contain information on the loaded data channels, such as the maximum value of a data channel in the `CMax` variable.

Auxiliary Variables

Use auxiliary variables if you need a predefined variable that is not bound to a DIAdem command. In the Calculator, the auxiliary variables are at the bottom right on the **Single variables** and **Vectors** tabs. You can assign a value to the auxiliary variable in the **Variable contents** field next to the auxiliary variable. Double-click the name of the auxiliary variable to insert it into your formula in the **Edit** box.

Use dynamic enumeration variables as text variables to provide various keywords for selection, for example, the days of the week. For example, you define a selection list for the dynamic enumeration variable `G1` in the `G1Var.asc` text file. When you click **Variable contents** for G1 at the bottom right of the Calculator, a selection box with the days of the week opens.

User Variables

Define user variables if your task requires a project-specific variable that has a clear name and special dimensions or data types. You define user variables in a variable stock file, which is a text file with the extension `.vas`.

Activate User Variables File

Unlike the program and auxiliary variables, user variables are not automatically included with the standard DIAdem variables. First, enable the variable stock file by clicking **Activate user variables file** in the DIAdem SCRIPT Toolbar. You can then use your user variables in formulas and scripts.

Calculating with Invalid Values

During measurements, disturbances might occur in the sensors, causing incorrect values. In DIAdem you can declare these outliers as invalid values. In DIAdem, invalid values are called NoValues. To mark a value manually as NoValue, overwrite the value with `NoValue` in the DIAdem VIEW channel table. Standard functions exclude NoValues from calculations and the report in DIAdem REPORT does not display NoValues, as is shown in Figure 3-1.

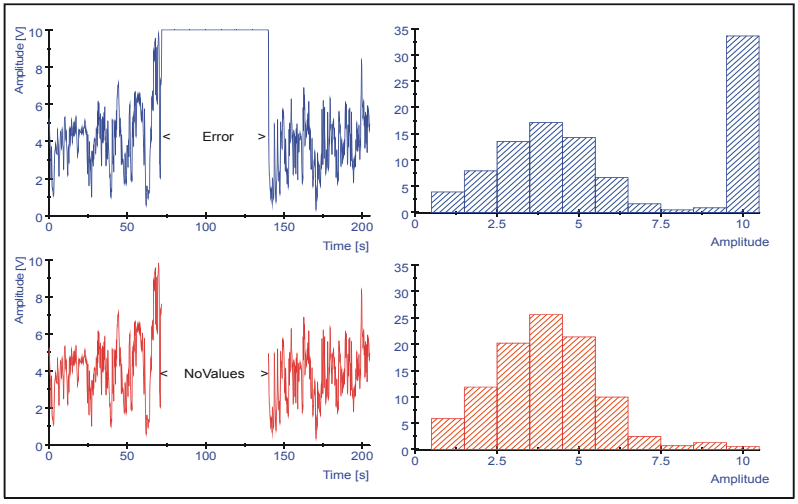


Figure 3-1. Measured Signal with Distortion and NoValues (left) and Result of a Classification (right)

You can use NoValues to eliminate entire ranges of a data channel, not just single values. For example, if you want to eliminate values that are greater than ten in the second data channel, because you know that the sensor used does not return higher values, enter the following formula in the **Input box** of the Calculator:

```
Ch(2) := Ch(2)+((Ch(2)>10)*NoValue)
```

The Boolean request `Ch(2)>10` returns 0 or 1. Multiplication by `NoValues` produces either 0 or NoValues. The result of the addition with the data channel is either the original channel value or NoValue. This replaces all values greater than 10 with NoValues.

This formula uses the following calculation rules for NoValues:

1. If one of the terms in a calculation operation is a NoValue the result is also a NoValue.

   ```
   10 * NoValue = NoValue
   10 + NoValue = NoValue
   ```

2. Multiplication and division by zero is the exception. If one of the factors is 0 the result is also 0.

   ```
   0 * NoValue = 0
   0 / NoValue = 0
   NoValue / 0 = 0
   ```

Tip With the *NoValues* function in the **Basic mathematic functions** bar, you can delete NoValues in data channels or replace them by linear interpolation of the neighboring values.

Function Libraries

DIAdem includes a library of standard mathematical functions for analyzing your data. These functions are arranged by category in the DIAdem ANALYSIS function bars:

- Basic Mathematical Functions
- Curve Fitting Functions
- Signal Analysis Functions
- Statistics and Classification Functions
- 3D Analysis Functions
- Crash Analysis Functions

Basic Mathematical Functions

The **Basic mathematic functions** bar includes basic functions like sorting, normalizing, differentiation, peak search, and RMS calculation.

For example, if LabVIEW has only stored the sensor signals of your measurement, you do not have the time channel you need if you apply standard mathematical functions or display measurement data in DIAdem.

Use the **Generate time channels** function to calculate the corresponding absolute time data, including the date. If you need a relative time channel from the beginning of the measurement, use the **Generate data** function.

Curve Fitting Functions

The **Curve fitting functions** bar includes functions like smoothing, envelope curve calculation, regression, approximation, spline calculation, and linear mapping. You can use the various functions to calculate a curve from a series of points. The curve reflects the original set of points as closely as possible according to specific criteria.

Use the **Linear mapping** function to recalculate the signals from two measurements with different time channels to a common time basis. Select one of the two time channels as the common time basis, and DIAdem interpolates and extrapolates the missing values.

Signal Analysis Functions

The **Signal analysis functions** bar includes Fast Fourier Transformation, digital filtering, frequency-weighted acceleration, and order analysis, which you use to check vibrations for frequency characteristics.

Fast Fourier Transformation (FFT)

Use FFT to transfer signals from the time domain to the frequency domain and back. For example, each button you press on a telephone makes a different sound, each of which consists of two sine oscillations. The exchange receives this tone and can detect which number you have dialed. In the time domain, the sound you create when you dial nine is difficult to distinguish from number five. The exchange runs an FFT on the received sound, because the sounds can be clearly distinguished in the frequency domain.

In DIAdem you can calculate the FFT for one time signal, the Inverse FFT for retransformation from the frequency domain into the time domain, the FFT for two time signals—the autocorrelation or the cross correlation, for example. The autocorrelation checks a signal for periodic characteristics by moving a copy of the signal along the signal on the time axis. The cross correlation uses the same method to check two different signals for similarities.

The third/octave checks the volume in the frequency domain, not the exact frequency distribution in the signal. The third/octave analysis sums up the amplitude values in the FFT in standardized logarithmic frequency intervals, as Figure 3-2 shows.

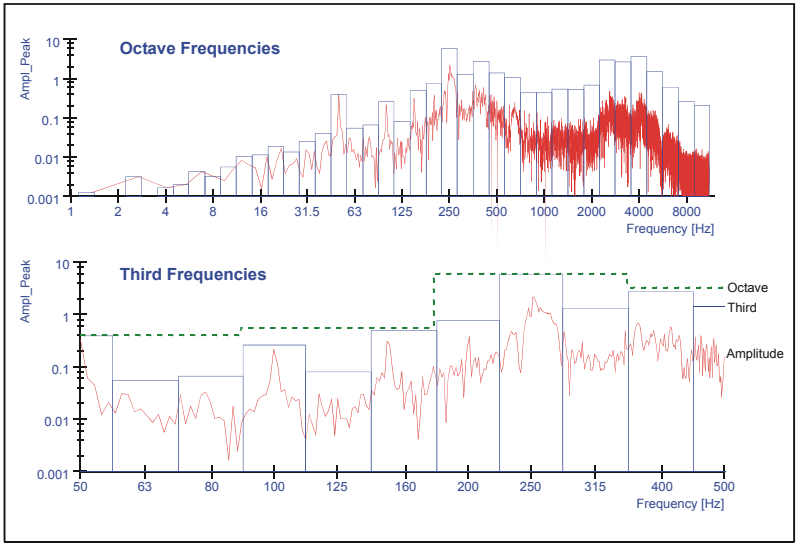


Figure 3-2. Third Octave Analysis of a Signal, Each Octave Consists of Three Thirds

Digital Filters

With the **Digital filter** function, you can attenuate or amplify selected frequency characteristics of a time-related signal. You can choose from various filters, like lowpass, bandpass, and bandstop, which only transfer certain frequency characteristics of the signal. The allpass filter, which lets through all the frequencies, is for signal delay and correcting phase distortion. You can use the various filters as IIR filters and FIR filters.

If, for example, a high-frequency distortion signal interferes with the actual measurement signal, you can filter out the distortion. To do this, enter the highest frequency in the undistorted part of the signal as the limit frequency for the **lowpass** filtering mode. The lowpass filters out all the distortion frequencies above this limit.

Frequency-Weighted Acceleration

The functions in **Frequency-weighted acceleration** are for calculating the extent to which measured vibrations affect the human body, in vehicles and at the workplace. For example, you can test the extent to which vehicle vibrations affect drivers by mounting various vibration sensors on the seat and analyzing the acceleration signals measured using the **Frequency-weighted acceleration** function.

Order Analysis

The **Order analysis** functions compare the frequencies in a signal to a reference frequency. The calculated order gives the multiple from the measured signal to the reference frequency. For example, the second order means that the analyzed frequency is double the reference frequency. As shown in Figure 3-3, you can run order analysis in the time domain or in the frequency domain.

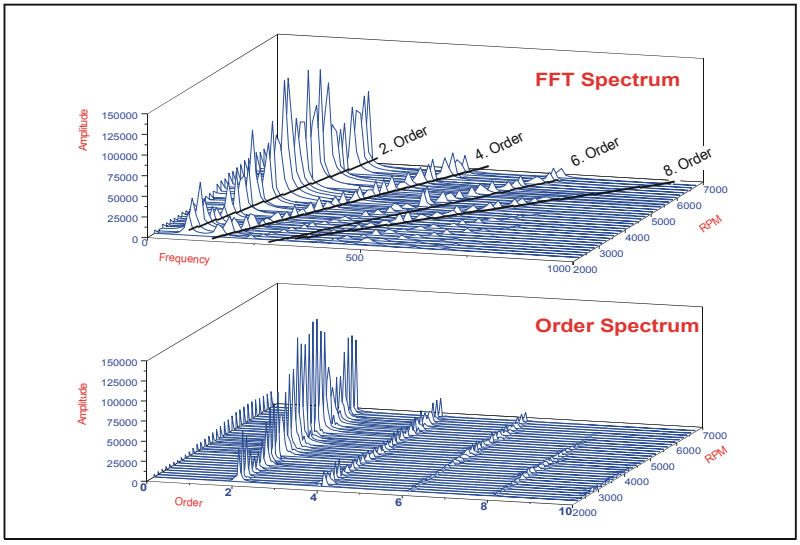


Figure 3-3. Order Analysis in the Frequency Domain (above) and in the Time Domain (below)

Order analysis is for analyzing noises and vibrations that are measured in engines and engine components. In engine acceleration tests, the relation between the vibration and the RPM is more important than the vibration frequency over time.

Statistics Functions

The **Statistics functions** bar has the functions for calculating the characteristic statistical values, like mean, quantile, and dispersion values. For example, you are testing the pressure resistance of cement. You run pressure tests on 25 blocks and measure the pressure under which the blocks crush. From the test results, you can calculate the arithmetic mean, the standard deviation, and the lowest and highest pressure. DIAdem stores the calculated characteristic values in a data channel and in the appropriate program variables, `StatArithMean`, `StatDeviation`, `StatMin`, and `StatMax`. You can enter these variables as text in DIAdem REPORT, so you can always record the latest characteristic statistical values in your report.

Classification Functions

The **Statistics functions** bar includes classification functions for determining frequency distributions for measured values. DIAdem divides the value range into classes, and counts how many measured values each class contains.

For example, if you want to compare series of test rig engine tests and driving engine tests. You select the required oil changes as the criterion. You count the oil changes per thousand kilometers and classify your results. Figure 3-4 presents the counts as curves and the classification results as a bar graph.

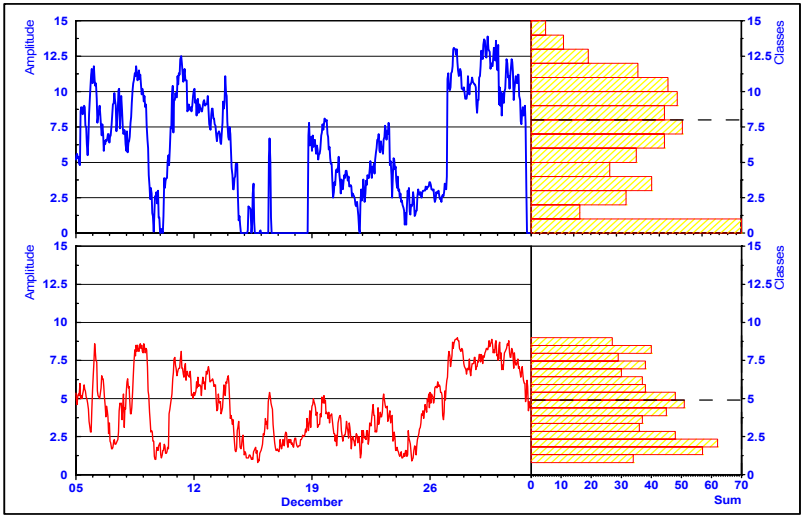


Figure 3-4. Classifying Two Test Series

Compound classification classifies two related data channels simultaneously, not just one data channel. The result of compound classification is a 3D matrix. You can use **Reducing classification** if you want to classify one or more data channels that correspond to the signal, not just the signal itself.

Rainflow Classification

Rainflow classification tests signals, in particular strain-time functions for special events like overshooting strain levels or strain changes.

If you want to test the duration of a spring, you prepare a test schedule that subjects one hundred springs to vibrations ranging from 10 Hz to 10 kHz. You count the number of strain runs until the spring breaks. In the rainflow matrix, you enter the runs in relation to the vibrations. You can display the results as a matrix.

3D Analysis Functions

Use the 3D analysis function bars to display your measurement data three-dimensionally. Figure 3-5 shows the characteristic field of an engine. DIAdem calculates contours and the boundary curve from the measured engine data.

You can organize 3D data as triples or matrices in DIAdem. DIAdem runs **Contour calculations** with data in matrices or triples. For 3D displays such as matrices, contours, or waterfall displays, DIAdem needs the matrix structure, and it needs the triple structure to display a 3D curve. The **3D basic functions** include functions for converting the triple structure into the matrix structure, and vice versa.

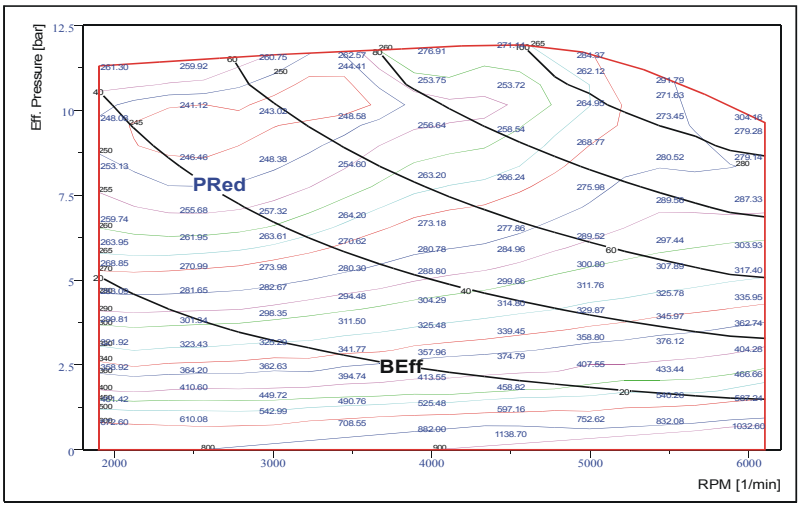


Figure 3-5. Input-Output Map with Isolines for Engine Performance and Fuel Consumption over RPM and Densification

Crash Analysis Functions

The **Crash analysis functions** bar contains functions for analyzing measurement data from vehicle safety tests. You can use the functions to calculate standardized injury criteria. For example, use the Head Injury Criterion to assess head injuries, the Neck Injury Criterion for the neck area, the Viscous Criterion for the chest area, and the Tibia Index for the lower leg area.

The calculations are in accordance with the current SAE, ISO, and NHTSA specifications. For digital phaseless filtering, you can choose from CFC60, CFC180, CFC600, CFC1000, and FIR100.

The example **Crash Evaluation Based on the MME Standard** shows an analysis of test data for vehicle safety, with a report. You can start this application example in the DIAdem help. This example uses a script to guide you through the analysis of a front or side impact in three steps. Figure 3-6 shows the report for the head acceleration in a frontal impact.

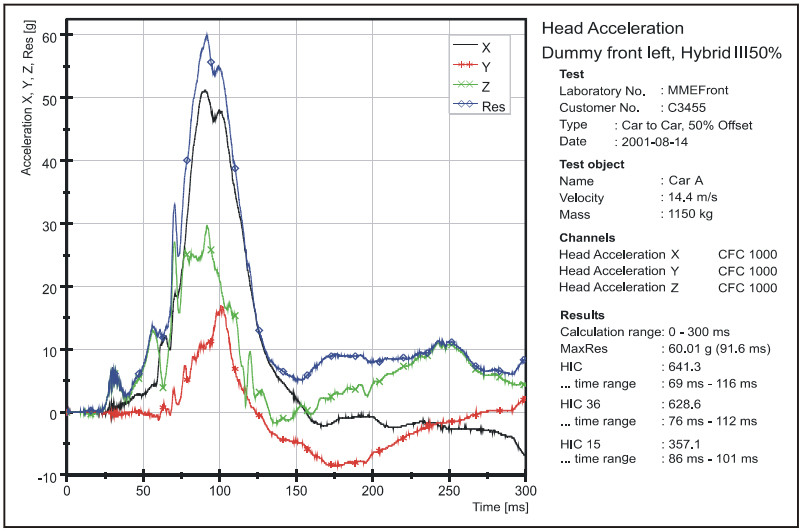


Figure 3-6. Crash Evaluation of a Frontal Impact

4

Displaying Data in Graphs

DIAdem provides several panels for displaying your data. Use DIAdem VIEW to view and process data. Document and present data with DIAdem REPORT. Compare measured data to simultaneously recorded video sequences with DIAdem CLIP. Project measured or simulated data onto a model of the test object with DIAdem INSIGHT.

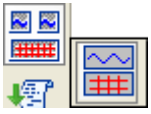
Viewing and Editing Data

DIAdem VIEW

You use DIAdem VIEW to view and edit the data in the Data Portal. Curves in 2D axis systems give you an overall view of your data. You examine the curves with a curve cursor, zoom curve sections, and delete or replace curve points. You list data, time, and text channels in channel tables where you can view and edit single values. If you modify curves or edit channels, DIAdem stores the changes in the Data Portal.

Designing Worksheets

You can include axis systems and channel tables in one worksheet, to see the data on the curve and the related numeric values at a glance. The function bars have templates for splitting the worksheet into varying numbers of sections in different positions.



Screen Partitioning

For example, if you want to display your data as a curve in an axis system and list the numeric values in a channel table, divide the worksheet into two areas. Click **Axis systems/channel table horizontal** in the second function bar from the bottom, **Predefined screen partitioning**. DIAdem inserts an axis system at the top and a channel table at the bottom.

To display a curve, select the x-channel and the y-channel in the Data Portal. Click the data channel you want DIAdem to use as the x-channel, for example, `Time`. Then press <Ctrl> and click the data channel you want DIAdem to use as the y-channel, for example, `Pressure`. Drag and drop this channel pair into the axis system. DIAdem VIEW displays the pressure over time as a curve.

For a numeric data list, select the channels you want in the Data Portal. Drag and drop the channels into the channel table. DIAdem VIEW lists each channel in a column, with the channel name as the heading.

To define one area as an axis system, right-click the area and select **Display type»2D axis system** in the shortcut menu. You can also use the shortcut menu to change the display mode for an axis system, so you can view the displayed channels in a channel table.

Editing Layouts

You can load a prepared layout as a view template. A layout file contains descriptions of all the axis systems, channel tables, and the data channels to be displayed. Layout files may contain several worksheets and have the filename extension `.tdv`.

Move the frame to zoom in and out on any worksheet area. You cannot move areas. To add new areas, split an area using the shortcut menu, or select different worksheet partitioning with more areas. If you select worksheet partitioning with fewer areas, the definitions for the surplus areas are deleted. If you select predefined worksheet partitioning, DIAdem deletes all the definitions in the displayed worksheet.

Which options are available in the DIAdem VIEW shortcut menu depends on where you right-click. For example, to insert another worksheet, right-click the worksheet tab. Select **Managing worksheets** from the shortcut menu. In the dialog box that appears, you can add, delete, rename, and change the order of the worksheets.


Transfer to REPORT

To transfer the current view of your data to DIAdem REPORT, click **Transfer to REPORT** in the DIAdem VIEW Toolbar. DIAdem REPORT generates a new worksheet with the axis systems and tables in the same layout as in the DIAdem VIEW worksheet.

Viewing Data as Curves

Use axis systems for an overall view of your data. If two data channels of a curve are not the same length, the curve is as long as the shorter data channel. Double-click the axis system to open the **Display** dialog box, where you add, modify, or delete curves.

You can change the y-axis scaling to compare curves that have different y-value ranges in one axis system. Click **1 system [%]** in the Systems shortcut menu to display the y-axis with percentages.

To show more legend, drag the dividing bar to the left. The legend contains the y-channel name and a checkbox that is the same color as the curve. The legend can display other channel properties such as extreme values or the cursor coordinates. To configure the legend, click **Select properties** in the axis system shortcut menu.

Analyzing Curves

Each axis system has a graphic cursor, which you move along a curve with the mouse. The standard graphics cursor is a crosshair cursor with three settings: freely movable, following the curve, or jumping to minimum values or maximum values.

For example, to examine the maximum values on a curve, select **Maximum values cursor** in the Toolbar. To open the coordinate display, click **Coordinates**. Move the graphic cursor along the curve and the crosshair jumps from one maximum value to the next. The coordinate display shows the x and y-values of each maximum value.

If one axis system has several curves, the graphic cursor only moves along the active curve. To specify the active curve, click the checkbox for the curve in the legend. If you have several axis systems in your worksheet, the graphic cursors move along the same value ranges in the other axis systems.

Zooming Curves

Select the band cursor or the frame cursor to zoom and to scroll curves. You set the width of the band cursor or the frame cursor to specify the zoom depth. The narrower the band cursor, the more the section is enlarged. You enable and disable zooming and scrolling in the axis system Toolbar.

For example, if you examine a section of a curve, and you want to see the entire curve at the same time, you create two axis systems with the same curve definition. One of the axis systems displays the whole curve and the other axis system zooms a section of the same curve. Click **Band cursor** in the DIAdem VIEW Toolbar, and click **Zoom, dynamic** in the Toolbar for the second axis system. If you now move the band cursor within the overview axis system, the zoomed axis system displays the section of the curve inside the band cursor.

Editing Curves

You also can edit curves in the axis systems. For example, if a curve has erroneous sections or outliers, you can replace the erroneous curve points. The delete, copy, and interpolation functions only affect curve points that are marked with flags.


Curve Points Select

Click **Band cursor** in the DIAdem VIEW Toolbar to select a curve section. Set the band cursor to a width that encloses the vertical lines of the curve section you want. Click **Set flags** in the axis system Toolbar to select all the curve points in this section of the active curve. Press <Shift> and click **Set flags**, to select the points on all the curves in this section.

Click **Flags: Delete data points** in the axis system Toolbar to delete selected curve points or curve sections. Select **Settings»Flag parameters** to specify whether deleted curve points are deleted from the data channels or replaced by NoValues.

Click **Flags: Copy data points** in the axis system Toolbar to copy selected curve points or curve sections. In the Data Portal, DIAdem generates a new x-channel and a new y-channel for each curve.

Click **Flags: Interpolate points** in the axis system Toolbar to interpolate selected sections of the active curve. Select **Settings»Flag parameters** to specify whether DIAdem applies linear interpolation or interpolates with a spline function. The calculated values are stored in the y-data channel of the active curve.

Note If a deleted section contains NoValues, you must mark these curve points with flags, to interpolate the section.

You also can select several sections to delete, to copy, or to interpolate all the marked curve points. Click **Set data point and flag** to mark single points with the crosshair cursor in the axis system Toolbar.

You can delete the flags on the active curve, or the flags on all curves, using the Toolbar or the shortcut menu of the axis system. Click **Global flag reset** in the DIAdem VIEW Toolbar to delete all the flags in the Data Portal.

Editing Data in Channel Tables

Use channel tables to display and edit data channels, text channels, and time channels. The channel table displays channels columnwise. The table heading includes the channel properties such as the channel name and the channel length. You can select a column for removing channels or deleting channels from the table.

Click a data field to delete or to overwrite the value or the text. Double-click a data field to edit the value or the text. If you select several data fields in a column or in neighboring columns, you can edit the data block.

Using the channel table, you can fill a newly generated channel in the Data Portal with values. Use the shortcut menu in the Data Portal to define a new channel, as described in the *Creating New Channels* section of Chapter 2, *Loading and Saving Data*. Drag and drop the new channel into the channel table and enter values or generate data series by clicking **Generate** in the shortcut menu of the channel table.

You also can use the shortcut menu for the channel table to modify the display. For example, to display other channel properties such as the maximum value, select **Select properties** in the shortcut menu. You can drag and drop the properties from the Data Portal properties window into the channel table. Select **Table settings** in the shortcut menu to modify the display of channel contents and properties such as font size.

Documenting Data

DIAdem REPORT

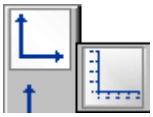
You use DIAdem REPORT to generate a report that documents measurement data and results. A report can consist of several worksheets that include axis systems, tables, text, and graphics. DIAdem displays the data in curves or bar diagrams in axis systems, and lists numeric data in tables. You can label worksheets with text and illustrate them with graphics.

Creating a Report

A report may consist of several worksheets with different views of your data. You save the structure of all the worksheets in a report, and maintain the links to the report data in the layout. You can reuse layouts as templates for similar reports.

To create another worksheet, select **Insert»Worksheet**. In the dialog box that appears, you can add, delete, rename, and change the order of the worksheets.

Editing Worksheets


2D Axis System

If you want to display data as curves in a 2D axis system, click **Simple 2D axis system** in the **2D axis system** function bar. DIAdem inserts a 2D axis system into the worksheet.

To display a curve, select the x-channel and the y-channel in the Data Portal. Click the data channel you want to use as the x-channel, for example, `Time`. Then press <Ctrl> and click the data channel you want to use as the y-channel, for example, `Temperature`. Drag and drop this channel pair into the axis system. DIAdem REPORT displays the temperature over time as a curve.

DIAdem REPORT requires two data channels to display a curve. DIAdem assigns each x-value the corresponding y-value. If the two data channels are not the same length, the curve is as long as the shorter data channel.

If you select more than two data channels, DIAdem REPORT uses the first data channel you select as the x-channel for all curves. To delete a curve or change the display mode, double-click the curve and the dialog box for that axis system appears.

Editing Objects

You can position objects such as axis systems, tables, text, graphics, and lines anywhere in the worksheet, as well as modifying their size. To zoom in or out on an object, click it. DIAdem selects the object with a dashed frame that has small squares in the corners and on the sides. Use the squares on the sides, top, and bottom to change the width and height. The squares in the corners zoom the object in and out, without affecting the proportions. Press <Ctrl> at the same time, to change the size but keep the center.

You can select several objects and move, zoom, and set parameters for all of the objects. However, you can only modify the properties that all the objects in the group share. If you select an axis system and a text object, you cannot set parameters for the group, because the group has no common properties. However, if you select an axis text and a heading, you can change the font for both.


Align Width

You can align selected objects and scale the size of the objects. The dashed frame around the object group is the reference point for DIAdem. To make an axis system and a table the same width, click **Align width** in the Toolbar. If you have a table to the lower right of an axis system, DIAdem sets the width at the left edge of the axis system and the right edge of the table.

Most objects consist of several subobjects, such as axes, axis text, and curves. You can select and edit each subobject. You can move selected axis text, or double-click the text to open the dialog box and edit the text or the text parameters.

Displaying Objects

You can superimpose axis systems, tables, text, and graphics in a worksheet. The superimposed objects are visible because the backgrounds are transparent. To highlight a text in an axis system, select **White** for the text background.

DIAdem displays objects in the same order you insert them. The new objects are in the foreground. You can change the order of the objects. To position a new graphic behind an existing axis system, right-click on the graphic and select **Move to background** in the shortcut menu.

When you move an axis system, DIAdem does not redisplay the entire worksheet, it only redisplays that axis system, which appears to move it to the foreground. Click **Redraw** in the Toolbar, to display all the objects in the correct order.

Formatting Numeric Data

You can use format instructions to specify numeric display on axes or in tables. As shown in Table 4-1, you can limit the number of decimal places and display numbers as exponents or powers of ten.

Table 4-1. Format Definition

Format	Format Definition	Numeric Display
Two Decimal Places	`d.dd`	`123.46`
Decimal with Exponent	`d.dde`	`1.23E+02`
Decimal with Power of Ten	`d.ddh`	$1.23*10^2$

Time Data Format

DIAdem formats time data with different wildcards for the day, month, year, hour, minute, and second. The time format definition starts with the # character. The number of wildcards used is the same as the number of places to be displayed, and wildcards in the uppercase ignore leading zeros:

```
#mm.dd.yyyy hh:nn:ss    04.09.2002 12:43:09
#www, DD. T, YYYY       Mon, April 9, 2002
```

The wildcards W and T display the day of the week and the month as text. You only can use format definitions for time data if the data channels or the variable contents are in the DIAdem time format.

Variable Formats

Use the Str function to display formatted numeric variables. For example, to display the current median value with four decimal places, enter the following line in a report:

```
@Str(StatMedian,'d.dddd')@
```

The Str function converts the numeric contents of the StatMedian variable into text. The format definition d.dddd rounds off the fourth decimal place. For DIAdem, the @ character indicates a variable expression.

Formats with User Commands

To display data in a format that DIAdem does not recognize, define user commands as format definitions. You define user commands in DIAdem SCRIPT. Refer to the *Defining User Commands* section of Chapter 5, *Automating Sequences*, for more information about user commands.

Figure 4-1 displays the same data in two axis systems that have x-axes in different formats. The top axis system displays the time in hours, and the bottom axis system displays the time in days after 5,000 hours. The CalcRelFun user command in the UserCmdExample.vbs script generates the second format. The format definition for the x-axis in the bottom axis system includes the following command call:

```
@@CalcRelFun(CFV, "01.12.2001 00:00:00")@@
```

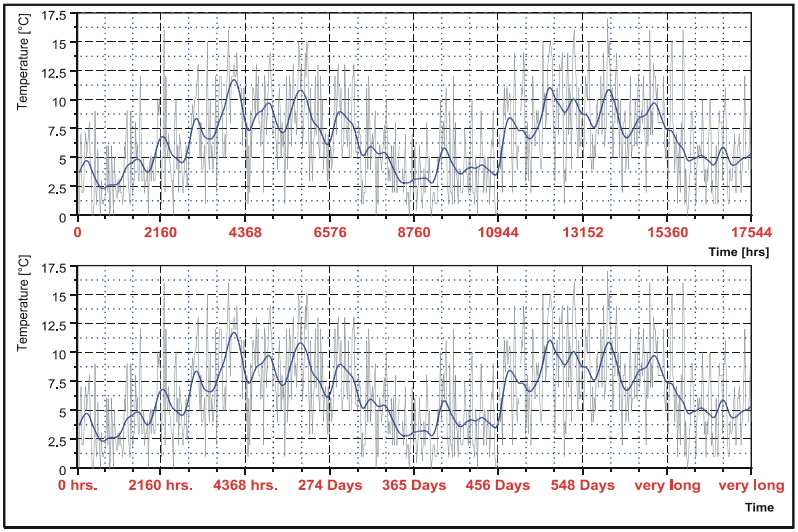


Figure 4-1. User Commands Format the Time Axis

To apply user commands when the report is updated, enter user commands in **Settings»Layout parameters»Commands to be performed**. You can define user commands not only to format axis systems and tables, they also can read information from databases and run calculations.

Editing Layouts

You save the descriptions of all the worksheets in your report in a layout file with the filename extension `.tdr`. The layout file contains descriptions of all objects, such as axis systems, tables, or text, and data links. You can alter or delete data assignments in the dialog boxes for the axis systems and tables.

The standard DIAdem REPORT works with channel numbers. This is useful if the data channels are always at the same position in the data set. If you do not know the data set structure, but know that the channels always have the same channel names, select the **Name-oriented channel reference** in **Settings»Layout parameters**. DIAdem then saves the channel names in the layout.

You can use the layout file as a template for other reports that have data in the same structure. In the **Panel-specific** settings, you can specify a template file as well as the start file that displays DIAdem REPORT when it opens. DIAdem uses this template when you create a new report by

clicking **File»New**. You can insert standard objects that every layout should include, like the company logo, in the template.

You can specify the page format as a ratio or a scale in DIAdem REPORT. Ratio-adjusted page format specifies the worksheet size as the height of the worksheet in relation to the width. In the print dialog box you enter the width of the printout, corresponding to the selected paper format. The standard DIAdem REPORT settings specify a ratio of `0.7` for A4 landscape format or `0.8` for letter landscape. If you modify this ratio, you move the objects in your report. This is because you specify the position of the objects as the distance from the bottom left corner, as a percentage of the width and height of the worksheet.

For scaled page format, you enter a fixed height and a fixed width for your worksheets in **Settings»Layout parameters**. DIAdem always prints your report in the specified size, regardless of the paper format. If you select a scaled page layout, you can scale your axis system manually to ensure that DIAdem always prints the same number of units per centimeter, for example, 10 °C/cm.

Inserting Report Objects

In the function bars, DIAdem provides predefined objects for documenting your data. You can change the definitions in the function bars. The following objects are arranged by category in the DIAdem REPORT function bars:

- 2D axis systems
- Polar axis systems
- 3D axis systems
- 2D tables
- 3D tables
- Text objects
- Graphics file

Inserting Axis Systems

Axis systems display data channels as curves and bar diagrams. Use a 2D axis system to display velocity over time as a curve. Use a 3D axis system to display a characteristic diagram of engine performance over RPM and densification. Use a polar axis system to display the sensitivity of a microphone in a circle diagram.

2D Axis Systems

Use 2D axis systems to display data channels as curves or as bar diagrams. The x-channel is often a time channel. You can use any other data channel as the x-channel, for example, the frequency of a spectral analysis.

You can combine various display types in one axis system. Use a bar diagram to display a statistical evaluation as a histogram. Numbers above the bars show the frequencies of the individual results. A horizontal line in the axis system represents the arithmetic mean.

If you set automatic scaling, DIAdem REPORT uses the entire data channel for curve display. To zoom a section, set manual scaling. Enter the first and last values for the x-axis and the y-axis in the dialog box for the axis system. DIAdem REPORT has various types of scaling, such as linear and logarithmic. You can scale the x-axis differently from the y-axis. To generate a probability network, set linear scaling for the x-axis and logarithmic scaling for the y-axis.

One axis system can include several curves. DIAdem automatically uses the data channel with the highest value range to scale the curves. You can define curves with the same x-channel or with different x-channels. Use subaxes if the axis system contains y-data channels that have different value ranges and different units. Each subaxis has a separate scale. Figure 4-2 shows a separate subaxis for each test parameter in an engine test, because the CO emission, fuel consumption, and exhaust temperature each have different units. If you zoom in or out in subaxes, DIAdem REPORT adjusts the display of the associated curves.

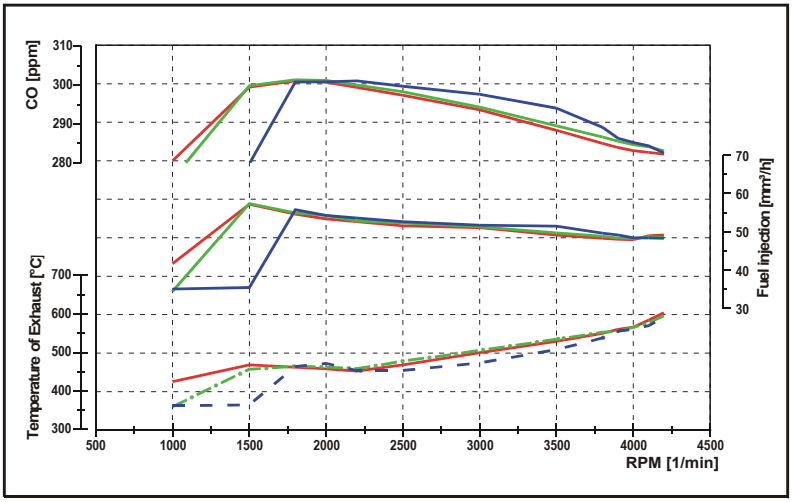


Figure 4-2. Engine Test Evaluation with Subaxes

Polar Axis Systems

Use polar axis systems to display curves in circle diagrams. For a polar axis system, select two data channels from the Data Portal, the same as for a 2D axis system. The x-channel contains the angle and the y-channel contains the lengths. Figure 4-3 shows different levels of sensitivity for two microphones. The polar axis system shows how the sensitivity of the microphones, which are positioned at the axis origin, depends on the direction of the microphones. You can define polar axis systems as semicircles, quarter circles, or with any angle from 0–360°.

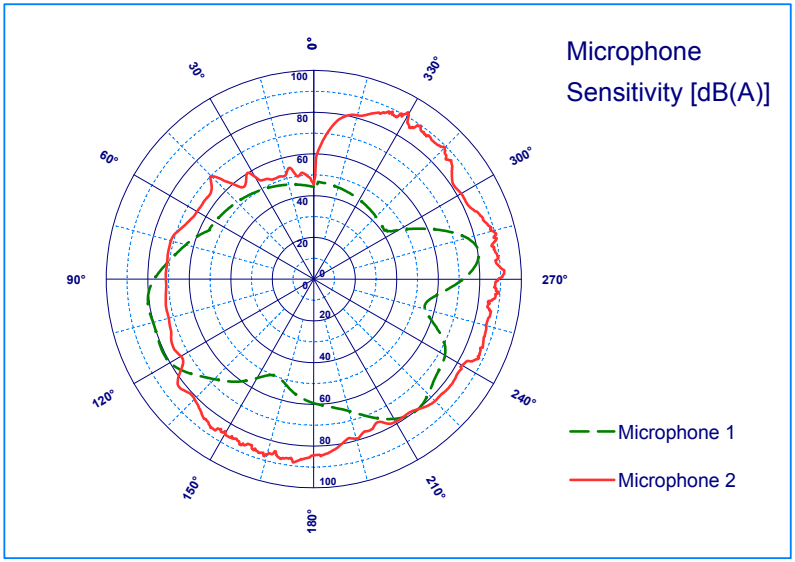


Figure 4-3. Sensitivitiy of Two Microphones

3D Axis Systems

Use 3D axis systems to display a characteristic diagram of engine performance over RPM and densification, as shown in Figure 3-5, *Input-Output Map with Isolines for Engine Performance and Fuel Consumption over RPM and Densification*, Figure 3-3, *Order Analysis in the Frequency Domain (above) and in the Time Domain (below)*, shows a waterfall display of the results of an order analysis.

Figure 4-4 shows a combination of several display modes for a spiral in a 3D axis system. To display the spirals as 3D curves, select three data channels in the 3D axis system dialog box. The arrows on the spiral are vectors that display the force for each point on the spiral. The xy and xz-planes show the spiral projections.

To change the view of a 3D axis system, rotate the axis system by resetting the axis definition dialog box. You can scale and label each display plane and specify the grid display separately. As Figure 4-4 shows, you also can move the display planes. To move a plane outwards, click the edge of the plane. The cursor changes to a triangle and you can move the plane outwards.

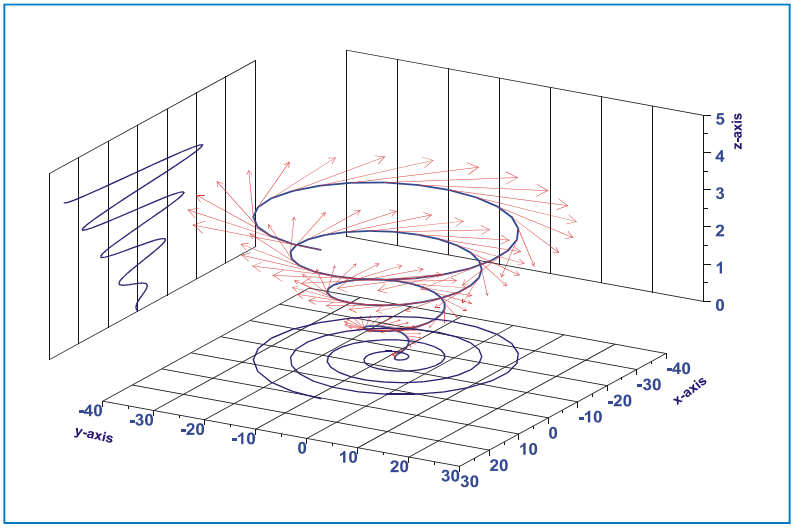


Figure 4-4. Vector Display of a Spiral with Projections onto the Plane

DIAdem organizes the data in a matrix structure for waterfall, surface, or isoline display. For these display modes, you select three data channels in the dialog box for 3D axis systems: one x-channel, one y-channel, and the first z-data channel in the data matrix. 3D display must have the same number of consecutive z-data channels as the number of values in the y-data channel. You can use the 3D analysis functions in DIAdem ANALYSIS to convert data channels into a matrix or a triple value.

Inserting Tables

Tables list data channels and time channels numerically. You can also display text channels and variable contents in a 2D table. Tables can be aligned horizontally or vertically.

2D Tables

Use 2D tables to list numeric data channels, time channels, and text channels in columns. For each column, select a channel, specify the display parameters, and enter a heading. You can change the order and the width of the columns. For long channels, you can specify the first value, the last value, and the step width.

Next Table Contents

Select the **Automatic expand** setting in the table dialog box for complete documentation of long channels. This defines a table that lists the channel contents on several pages. The button shown at the left is in the DIAdem REPORT Toolbar and scrolls the pages.

You also can display single variables and vector variables in a 2D table. Select **Variable** as the data type in the table dialog box and enter the variable name. If you enter the single variable `CurrDate` in the dialog box, the current date appears in the top line of the table. If you enter the `CD` vector variable, the units of all the channels in the Data Portal appear in the table column.

3D Tables

Use 3D tables for numeric display of the matrix structure of 3D data. Enter the x-data channel, the y-data channel, and the first z-data channel of the matrix structure in the dialog box for 3D tables, the same way as for the 3D axis system. Figure 4-5 shows how the 3D table assigns each xy-value pair the relevant z-value.

Temp. [°C]		Pressure [mbar]							
		0.01	0.06	0.11	0.16	0.22	0.27	0.32	0.37
Concentration [mol / l]	0.00	0.09	0.10	0.07	0.03	0.01	0.00	0.00	0.00
	0.05	0.14	0.19	0.11	0.03	0.01	0.02	0.02	0.01
	0.10	0.15	0.33	0.11	0.00	0.02	0.08	0.05	0.03
	0.15	0.07	0.08	0.01	0.10	0.03	0.09	0.13	0.12
	0.20	0.04	0.03	0.17	0.31	0.14	0.07	0.15	0.26
	0.25	0.13	0.21	0.43	0.63	0.26	0.06	0.25	0.41
	0.30	0.21	0.37	0.45	0.39	0.16	0.14	0.37	0.55
	0.35	0.17	0.20	0.16	0.07	0.03	0.27	0.50	0.65

Figure 4-5. 3D Tables Assign Each XY-Value Pair the Relevant Z-Value

The 3D table can display the entire data matrix or a section. You enter display parameters like font and display mode separately for the x, y, and z-values, not columnwise. To display 3D data in triple structure, list the three data channels in a 2D table. Each line has a triple.

Inserting Text

DIAdem REPORT provides the text cursor and the text object for generating text. With the text cursor, you generate one-line text such as headings, and with the text object you generate multiline text with different formats.

Text can include formula expressions and DIAdem variables, which DIAdem updates along with the rest of the report. For example, to display the current time, insert the `CurrTime` variable in a text object:

```
@CurrTime@
```

The @ characters indicate to DIAdem which parts of the text are variables. You can include user variables as well as the program variables and auxiliary variables. Refer to the *Using Variables* section of Chapter 5, *Automating Sequences*, for more information about variables.

One-Line Text

Use one-line text for short headings or comments.


Text

Click the **Text** button in the DIAdem REPORT Toolbar to activate the **text cursor**. Click the worksheet with the text cursor and enter, for example, the heading shown in Figure 4-6 `Ribs Left`. You end the text entry by clicking another position in the worksheet. If the text cursor is activated and you press <Enter>, DIAdem generates a new line, where you can enter `Dummy front left, Hybrid III 50%`.

To change one-line text, for example, double-click the text. Modify the text and the font attributes for that text in the dialog box. You can rotate one-line text. Click one of the squares at the corners of the selected text and rotate the text to the right or to the left with the curved arrow.

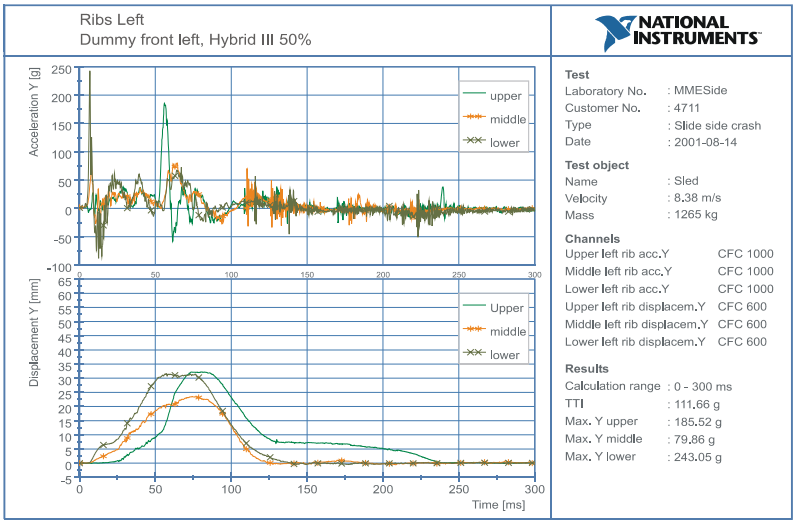


Figure 4-6. Crash Test Report with Heading and Text Field

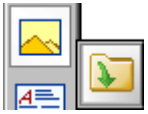
Multiline Text

Use the text object to generate multiline text with different formats.

To generate a multiline text, click **Text object** in the **Text** function bar. A white field appears in the worksheet. Double-click the text object and enter your text or import a prepared text file in ASCII, RTF, or HTML format. The text object editor offers functions for formatting single words and sections. Set up your text structure using list points, enumeration, tabulators, paragraphs, and tables.

You define the font size differently for text objects than for one-line text or axis labels. You specify the text size in absolute terms for the text object but in relation to the worksheet for one-line text. If you zoom one-line text, you enlarge the text itself. However, if you enlarge a text object, you only change the layout, not the size of the text.

Inserting Graphics and Lines


Load Graphics

Use graphics to include a diagram of a test stand or to insert a company logo into your report. You can use the **Graphics file** function bar to load graphics in various formats. You can position graphics behind axis systems and tables, because these objects have transparent backgrounds.

When you insert graphics, DIAdem generates a link to the graphics file. DIAdem saves the link with the path definition in the layout. If you load a layout and DIAdem displays a gray frame instead of a graphic, DIAdem was not able to find the graphics file in the folder specified. Double-click the graphic and correct the path definition.

Use frames to highlight a text field or a heading in the report. To display a frame, click the **Frame** button in the toolbar. The cursor appears as a square with arrows at the corners. Drag out a frame and position the frame where you want it in the worksheet.

You can also turn a frame into a line. A horizontal line is a frame with a height of zero, and a vertical line is a frame with a width of zero. To create a vertical line from a frame, enter the same position for the left and the right edges in the dialog box for the frame.

Linking Measurement Data with Videos and Models

With DIAdem CLIP and DIAdem INSIGHT, you analyze your measurement data together with videos and 3D models. You use DIAdem CLIP to compare simultaneously recorded videos and measurement data from a test. You use DIAdem INSIGHT to project measurement data onto a 3D model of the test object.

Analyzing Data and Videos Together

DIAdem CLIP

Use DIAdem CLIP to analyze data and videos that were simultaneously recorded. DIAdem CLIP displays data as curves in axis system areas and videos in video areas. DIAdem CLIP links each data point in a graph to the appropriate video frame. Use the Player bar to automatically play the scene or use the line cursor to inspect each point of the curve.

Note DIAdem CLIP is an external module you must install separately from DIAdem.

Creating Scenes

In DIAdem CLIP each scene contains axis systems and video areas, to analyze data and videos. The Data Window on the right of the DIAdem CLIP workspace organizes video files, data files, and picture files.

The prepared layout in the workspace contains one video area, one axis system area, and one picture area. For example, to create a scene of a frontal crash test, click **AVI-Files** in the Data Window. Drag and drop the `frontcrash.avi` video file into the layout. Click **DIAdem-Files** in the Data Window and drag and drop the `frontcrash.dat` file into the layout. DIAdem CLIP displays a curve for each data channel.

To resize and move a video area or an axis system area in the layout, click the edge of the area. Drag the small square blocks to adjust the size or drag the area frame to where you want to have the area. To delete a selected area or axis system, press <Del>.

Evaluating Scenes

Use the Player functions in the DIAdem CLIP Toolbar to gain an overview of the entire scene. Playing an entire scene helps you spot general trends and behaviors in your tests. The Player bar functions are similar to the buttons on the control panel of a video recorder. To loop the front crash test scene continuously, press **Play continuously** in the Player bar.

Use the line cursor in the axis system to pinpoint specific curve points to analyze a specific area of a scene. DIAdem CLIP displays the video frame for each corresponding curve point. For example, if an unexpected result occurs in the front crash test, you can move the line cursor to related data points. DIAdem CLIP cues the video to the video frame closest to the data point in question.

Synchronizing Videos and Data

DIAdem CLIP synchronizes videos and curves using the time channel from the data set and the frame rate of the video. If the data acquisition rate is greater than the frame rate, DIAdem CLIP displays the same video frame for multiple data points. For example, if the data acquisition rate is 100 kHz and the video frame rate is 1,000 frames per second (1 kHz), the video frame changes for every 100th data point in a curve.

If videos and axis systems do not have the same time range, you can specify the time range where they overlap. In DIAdem CLIP, the time range you specify is called the active segment. DIAdem CLIP only displays changing video frames when you move the line cursor inside the active segment.

Synchronization Parameters

To enter the starting point and ending point of the active segment, select **Synchronization parameters** from the video area shortcut menu.

Accept Cursor Position

Using **Accept cursor position**, you can use the position of the line cursor to designate the starting time for the video, or the starting point or the end point for the active segment.

Metronome

When analyzing a scene using the player bar, use the metronome to determine whether DIAdem CLIP displays the entire video or only a part of the video. If you drag and drop the metronome onto a video area, DIAdem CLIP plays the entire video and the line cursor follows along inside of the active segment of the axis system. If you drag and drop the metronome onto an axis system, the line cursor follows along the entire length of the axis system and the video plays only inside the active segment.

Saving Scenes, Presentations, and Layouts

When you save a scene, DIAdem CLIP saves the layout with links to data files, video files, and picture files. The file has the filename extension `.cis`.

You can load a prepared layout as an empty template for frequent evaluations of similar tests. A layout determines only the type and number of areas and axis systems, including their size and position. To load a

layout, select **File»Open layout** to open the layout library. To save the layout of the current scene in the layout library, select **File»Save layout**.

The MediaBuilder option enables you to save scenes as presentations. A presentation file combines all data, video, and picture files into a single `.cip` file. Select **File»Save** and choose **`.cip`** from Data Type to save a presentation file. Use the FREE Media Player to view presentations on computers without DIAdem CLIP. You can also password-protect a presentation to avoid alterations.

Adding Measurement Data, Videos, and Graphics

The Data Window lists directories containing video files, data files, and picture files. To add directories to the Data Window, right-click in the Data Window and select **New Directory** from the shortcut menu. To delete a directory, right-click on the directory and select **Delete** from the shortcut menu.

DIAdem Data

DIAdem CLIP uses DIAdem data files in the DAT format. To use other data sources in DIAdem CLIP, you must convert the data into the DIAdem `.dat` data format in DIAdem NAVIGATOR. Refer to *Saving and Exporting Internal Data* in Chapter 2, *Loading and Saving Data*, for more information on data conversion.

If you add a data file or data channel to an axis system, DIAdem CLIP automatically uses the time channel of this data file as the x-channel. If more than one time channel exists in this data file, you can select the x-channel you want to use. A downwards pointing arrow appears in front of the x-channel.

Axis Legend

Each axis system area has a legend. You can turn on and off the legend by selecting **Legend on/off** from the shortcut menu. A colored block in the legend represents the curve in the axis system with the same color. To delete a curve from the axis system, select the curve symbol in the legend and press <Del>.

DIAdem CLIP scales the y-axis automatically to the value range of all data channels and the x-axis to the value range of the time channel. To enlarge curve segments, you can select scaling and zooming from the shortcut menu. Use manual scaling to focus on specific data ranges in the y-axis of your axis system. Use the zoom function to focus on a specific time range of the x-axis.

Videos

DIAdem CLIP uses video files digitized in AVI (`.avi`) and MPEG (`.mpg`) formats. Each video area contains only one video. When you drag and drop a new video into the video area, DIAdem CLIP replaces an old video with the new one. Create additional video areas to display multiple videos. You can use the zoom function to zoom videos for a more detailed view.

Graphics

DIAdem CLIP uses pictures saved in the JPEG (`.jpg`) or BMP (`.bmp`) format to insert the company logo or a picture of the test object. The pictures enhance the appearance of your presentation. Each picture area contains only one picture. You can zoom a picture to display a detailed view.

Linking Data to a Test Object

DIAdem INSIGHT

With DIAdem INSIGHT, you project your measurement data onto a model of the test object as color shading or deformation. You load a grid model of a test object and assign the measurement data to the 3D model. You can examine the model from all sides. The DIAdem INSIGHT user interface works the same way as DIAdem CLIP.

Note DIAdem INSIGHT is an external module you must install separately from DIAdem.

Creating Scenes

The key object of a scene in DIAdem INSIGHT is the model of the test object. 3D grid models are made up of many grid points, which can represent sensor positions. You link the model points with measurement data from individual sensors. DIAdem INSIGHT displays the data on each grid point as color shading or deformation. The display reflects the changing measurement data on the model.

For example, to analyze the effects of an air conditioner on a driver, drag and drop the model of the dummy file `dummy.fem` from the Data Window into the DIAdem INSIGHT layout. To link measurement data with the model, open the data tab in the Data Window. Double-click on the data set `klimadummy` to see all the data channels. Drag and drop one data channel to a point on the model. A dialog box appears for selecting the display type, such as the **Color**. Assign additional data channels successively to other model points.

Use the Player bar to display the fluctuating temperature. Red coloring displays heating and blue coloring displays cooling on the dummy. While evaluating the scene, you can rotate and zoom the model. To rotate a model, depress the mouse button and move the mouse. To zoom in or to zoom out a model, depress the right mouse button and move the mouse horizontally. To move the model along a coordinate axis, depress the right mouse button, and press <X>, <Y>, or <Z> to specify the axis.

You can display data as shading or as deformation. Use color shading to display the effects of temperature on a dummy, use deformation to display displacements of the model surface.

You can combine display types on a model. For example, display temperature both as color shading and deformation. To combine the display types color and deformation, assign the same channel twice to the same model point. In the ToolTip for a point, you can see which display type and data channel you defined for a point.

You can assign a single data channel to multiple model points. To assign a single data channel to multiple model points, press <Ctrl>, drag a rectangle over the model points, and drag and drop the data channel to the model points.

You can simplify assigning multiple data channels to multiple model points. Name the model points in a model to match the data channel names. DIAdem INSIGHT automatically assigns the data channels to the matching model points, if you drag and drop the entire data file to the model.

When you have several data files for the same model, you do not need to reassign the data channels to the model each time you load a new data set. As long as the data channels have the same sequence as the original model assignment, the data channel assignment to the model points remains the same.

Delete Assignment

If you want to delete the data channel assignment from the model point use **Reassign a data channel** in the shortcut menu. To cancel multiple point assignments, press <Ctrl> and drag a box around the points to select the model points.

DIAdem INSIGHT uses the following types of grid models:

- VRML: Virtual Reality Modeling Language format
- FEM: ANTRAS finite element model
- MOD: ANTRAS geometric model

You can set various display and illumination features for the model area. Select **Display** from the shortcut menu to alter the settings for color shading, deformation, and size. Select **Lighting** and **Light Sources** from the shortcut menu to set the brightness and specify additional light sources for the model area.

5

Automating Sequences

DIAdem SCRIPT

For recurring work sequences such as standard calculations and serial evaluations, you can use DIAdem SCRIPT to combine the steps into one script. Control structures and dialog boxes help to design scripts for various data sets, analysis methods, and report displays.

Working with Scripts

The easiest way to generate a script is in the recording mode. DIAdem records the commands and the variable assignments for each interactive editing step. You can edit, test, and extend the recorded script.

Enable the Recording Mode

To record a script, select **Script»Enable recording mode** in the DIAdem SCRIPT Toolbar. In the recording mode, you generate script by interactively loading data or layouts, or running calculations. DIAdem SCRIPT records these actions as commands in the editor. To end the recording, select **Disable recording mode**.

DIAdem displays the recorded script in the script editor. Save the script for later use. To facilitate editing, you can use functions like line numeration, jump instructions, bookmarks, restoring, and find and replace. The syntax colors distinguish between comments, commands, and variables.

If you select commands and variables and move the cursor over them, the ToolTip displays parameters. If you set the indentation marker at a command or a variable, you can open the help page for the command or variable by pressing <F1>.

To start the script that is displayed in the editor, click **Run script** in the DIAdem SCRIPT Toolbar. To run a saved script, without loading it into the script editor, click **Execute script file**.

Script Function Bar in All Panels

You can assign frequently used scripts to a button in the DIAdem SCRIPT function bar. The bottom function bar is available in all the DIAdem panels, so you can use these scripts in all panels.

Note You can enter scripts in the DIAdem shortcut properties to run sequences automatically when DIAdem starts. Refer to the *Starting with Parameters* section of Appendix A, *Configuring DIAdem*.

Use the script debugger to find script errors. When an error occurs, the debugger stops at the script line with the error and displays a green marker. The error appears in the information area. To monitor variables in the information area, copy the variable from your script into the monitoring window of the information area. While you test the script, DIAdem displays the changing variable contents. You can set breakpoints at crucial points in your script.

Note The debugger functions are not installed with DIAdem because they are not included in the license. Refer to DIAdem help for information about installing the debugger functions.

Use the file overview when you edit projects with several scripts, variable stock files, and list files. Drag the left edge of the editor window to the right to open the file overview. The hierarchical display lists all the loaded files according to file type. Use the file overview to switch files, close files, and create new folders. You also can modify the syntax coloring for the various file types in the script editor.

To save all the settings in the file overview, select **Save workspace** in the shortcut menu. DIAdem generates a WSP file, which DIAdem links to the current desktop file. The *Starting with Parameters* section of Appendix A, *Configuring DIAdem*, explains how you start DIAdem with a desktop file and a prepared workspace, which loads all the files and settings you need for a project.

Creating Scripts

A script is a sequence of commands, variable assignments, and formula calculations. You use loops and branches to control the script. You can use comments, empty lines, and indentation to give the script a clear structure.

Calling Commands

You can use the commands from all the DIAdem functions in scripts. The recording mode in the DIAdem SCRIPT script editor records the command for each function that you call in the interface. DIAdem also includes commands that you can only use in scripts, such as the SQL commands for communicating with databases.

You execute DIAdem commands in the script with `Call`. Enter the parameters, like the data channels to be used and the selection terms for the calculation procedure, in brackets:

```
Call ChnPeakFind("Time","Speed","X_Peak","Y_Peak",
                 5,"Max.Peaks","Amplitude")
```

In this example, the peak search command searches for the five highest amplitude peaks in the curve that consists of the `Time` and `Speed` data channels, and stores the results in the data channels `X_Peak` and `Y_Peak`.

If the specified channel names recur in the Data Portal, DIAdem works with the data channels `Time` and `Speed` using the lowest channel numbers. You can add the channel group name and use `Example/Time`, for example. Select **Settings»Desktop parameters»General»Unique channel names for a group**, to ensure that your script does not return incorrect results due to channel names recurring in a channel group.

You also can use the channel numbers from the Data Portal list view for the original channel and the result channel:

```
Call ChnPeakFind(3,4,5,6,5,"Max.Peaks","Amplitude")
```

The peak search command then uses the original channels 3 and 4 in the example, and stores the results in channels 5 and 6. In the recording mode configuration, you can specify whether DIAdem records the channel numbers or the channel names.

Using Variables

DIAdem variables transfer parameters to commands or accept the results of mathematical calculations. DIAdem distinguishes between program variables, auxiliary variables, and user variables. Refer to DIAdem help for a list of all the program and auxiliary variables. You can use VBS variables as well as the DIAdem variables.

Program Variables

Use program variables to set parameters for a command in a script. If you use standard functions interactively, DIAdem saves your settings in program variables and then calls the command. For the peak search example described above, first assign values to the program variables `PeakNo`, `PeakType` and `PeakSort`, and then call the command:

```
PeakNo   = 5
PeakType = "Max.Peaks"
```

```
PeakSort  = "Amplitude"
Call ChnPeakFind("Time","Speed","X_Peak","Y_Peak")
```

Auxiliary Variables

Use auxiliary variables if you need a predefined variable that is not bound to a DIAdem command. You can use auxiliary variables as scalar or vector values with different data types, as shown in the Table 5-1.

Table 5-1. Data Types for Auxiliary Variables

Data Type	Scalar	Vector
Boolean	B1	—
Integer	L1	LV1
Numeric	R1	RV1
Text	T1	TV1
Dynamic enumeration list	G1	GV1

Assign values to auxiliary variables before you use the auxiliary variables in your script. To preset several auxiliary variables simultaneously, select **Edit»Auxiliary variables** to open the dialog box for auxiliary variables in DIAdem SCRIPT.

Use dynamic enumeration variables as text variables to provide various keywords for selection, for example, the days of the week. You define a selection list for the dynamic enumeration variable `G1` in the `G1Var.asc` text file, which is in the DIAdem library folder. Load the `G1Var.asc` file into the script editor and enter the day of the week:

```
Monday
Tuesday
..
Sunday
```

User Variables

Use user variables if your task requires project-specific variables that have clear names and special dimensions or data types. You define user variables in a variable stock file, which is a text file with the extension `.vas`.

To access the months in the Month_ user variable, generate the variable stock file MyMonths.vas in the script editor, with the following definition:

```
Month_: A ('January','February','March','April',
  'May','June','July','August','September','October',
  'November','December') <'May'>
```

The underscore in Month_ indicates that it is a user variable. The A after the colon specifies the user variable Month_ as an enumeration variable. The variable is preset with May. Unlike the program and auxiliary variables, the user variables are not automatically included in the DIAdem variable stock. You must activate your variable stock file MyMonths.vas with the UserVarCompile command at the beginning of the script, before you can use one of your user variables:

```
Call UserVarCompile("Demo\Aut\MyMonths")
```

VBS Variables

Unlike DIAdem, VBScript does not recognize predefined variables or data types. VBS variables are always data type variant, which uses different data types depending on what you use it for. A VBS variable reacts like a number when you use the variable in a calculation and it reacts like a string when you enter text.

Register VBS variables with the Dim instruction. The following example contains the registration for a numeric variable and a text variable. At the beginning of a script you can use the Option Explicit command to register VBS variables.

```
Option Explicit
Dim MyVariable, MyString
MyVariable = 10
MyString = "DIAdem"
```

Calculating Formulas

You can also use the formulas that you enter in the Calculator to calculate data channels and single values, in scripts. DIAdem records your formulas with complete syntax in the recording mode. For example, if you convert the Celsius data channel into degrees fahrenheit and store the result in the new Fahrenheit data channel, DIAdem records the following command line in the script editor:

```
Call FormulaCalc("Ch(Fahrenheit) :=
                 1.8 * Ch(Celsius) + 32")
```

DIAdem calls the Calculator function `FormulaCalc` with `Call` and calculates the formula that is specified as a parameter. Refer to the *Calculating Formulas in the Calculator* section of Chapter 3, *Analyzing Data with Mathematical Functions*, for a description of formula syntax.

Controlling the Script Sequences

If you create a script in the recording mode, DIAdem works down through the script line by line. For the script to run dynamically, you can insert loops and branches.

Use loops to repeat command lines. For example, you can use a For loop to set the 22 variables for calculating characteristic statistic values as `No`. Then set the variables that calculate the script as `Yes`.

```
For i = 1 to 22
     StatSel(i) = "No"
Next
StatSel(4) = "Yes" 'Minimum
StatSel(5) = "Yes" 'Maximum
Call StatBlockCalc("Channel", "1-", "2")
```

Use branches to apply various functions in association with conditions. If `L1` is not equal to zero, the following If...Then...Else instruction smooths the second data channel with a window width that depends on the channel length:

```
If L1 = 0 Then
   MsgBoxDisp("No Calculation")
Else
   SmoothWidth = trunc(ChnLength("Speed")/10)
   Call ChnSmooth("Speed", 5, SmoothWidth)
End If
```

Use control commands to stop, end, or repeat your script. For example, the `KeyWait` command stops the script until the user presses a key, and the `Pause` command stops the script for a specific length of time. The `AutoQuit` command terminates the script.

End Interaction

Using the interaction mode, you can stop your script to work interactively with DIAdem. You can, for example, use DIAdem VIEW to specify a curve section for analysis in a script. You enable the interaction mode in scripts with the `InterActionOn` command. To end the interaction mode, click **End interaction**, which is in the Toolbar in all panels.

Readability and Reusability

Scripts are easier to read and to reuse if you adhere to a few basic standards when you write your scripts:

- Only write one instruction per script line.
- Use comments to describe the structure of the script and the commands you use. Start comments with a single quotation mark and include them at any point in your script.
- Insert an empty line to separate sections for single functions.
- Indent the instructions for branches and loops, so the beginning and the end of the loop are in line and easier to recognize. This is useful for nested branching.

Generating User Interfaces

You can link your script to dialog boxes to select calculation methods, request entries, or load files. To set parameters for a standard mathematical function before the calculation, call the appropriate DIAdem program dialog box in the script. Use the DIAdem SCRIPT dialog editor to create user dialog boxes for making entries and specific project requests.

Calling Program Dialog Boxes

Program dialog boxes are standard DIAdem dialog boxes that you use in your script to set parameters for standard mathematical functions or to run file operations. Open the dialog box for standard mathematical functions with `DlgOpen`. The name of the program dialog box is in the DIAdem help page under script calls. For example, to call the selection and calculation of characteristic statistical values from your script, use the following script line:

```
Call DlgOpen("DlgStatBlockCalc")
```

Your script calls the dialog box, and you select the characteristic values you want, and click **Execute**. DIAdem calculates the characteristic values and continues the script.

To load files, add the following to your script:

```
Call FileNameGet("NAVIGATOR", "FileRead")
If DlgState = "IDOk" Then
   Call DataFileImport(FileDlgFile)
```

```
Else
    MsgBoxDisp ("No file selected")
    End If
```

The `FileNameGet` command opens the dialog box for loading data files in DIAdem NAVIGATOR. You select the data file you want in the dialog box, and DIAdem writes the file name into the `FileDlgFile` variable. If you click **OK** to close the dialog box, the script loads the file specified in `FileDlgFile` into the Data Portal.

Creating User Dialog Boxes

User dialog boxes are project-specific dialog boxes that you generate for entering values, requesting settings, or starting functions. Use the DIAdem SCRIPT dialog editor to create dialog boxes, which you save in a dialog box file with the filename extension `.sud`. You call user dialog boxes in the script with the `SudDlgShow` command. Include the dialog box name and the dialog box file. For example, the following call displays the user dialog box shown in Figure 5-1:

```
Call SudDlgShow("DlgEvalMain",
                "Crash_MMEEvaluation.sud")
```

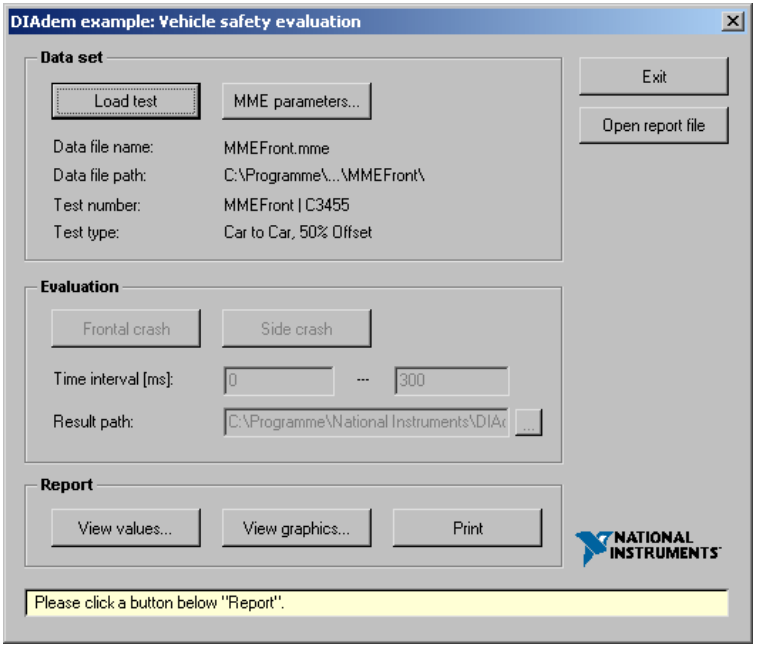


Figure 5-1. User Interface for Crash Evaluation

You can use events to logically connect the elements in a user dialog box. Figure 5-1 shows the main dialog box for a crash evaluation, in which the buttons are activated one at a time after the appropriate steps. In the first step you load the test data and indicate whether you examine a frontal impact or a side impact. In the second step you evaluate the selected data set. In the third step you select the display mode for the results.

Defining User Dialog Boxes


Dialog Box Templates

To generate user dialog boxes, call the dialog editor in the DIAdem SCRIPT Toolbar or use the templates in the **Dialog box templates** function bar. If you need a user dialog box for channel selection, click the **Select a data channel** template. Enter a name for your dialog box definition, for example `MyDialog.sud`. DIAdem loads the template into the dialog editor.

The dialog box template for selecting channels contains two selection boxes and a Cancel and an OK button. Use the dialog editor to include other controls like checkboxes, tables, or ActiveX objects. Use frames, text, and graphics to design your dialog box. You can modify the size and position of the controls and align them in relation to each other.

Each control has properties that you can view and modify in the properties window. The properties include color, font, design, ToolTip, and tab sequence. The tab sequence specifies the order in which controls receive focus when you navigate the dialog box using using the <Tab> key.

Variables connect the controls in your user dialog box to your script. In the **Select a data channel** dialog box template, the two selection boxes are linked to the auxiliary variables `L1` and `L2`. When you preset the two auxiliary variables in your script, the user dialog box displays the values in the selection boxes. If you change the values in the user dialog box, `L1` and `L2` have the new values and return the values to the script.


Dialog Variables

You must register DIAdem variables that you use in the user dialog box. Click **Variables** in the dialog editor toolbar. Click **New entry** to register variables.

Controlling User Dialog Boxes

You can control user dialog boxes in relation to events. For example, you can disable the **OK** button until the user enters values. To link a control to an event, select the event in the properties window and fill the appropriate VBS script with methods.

Select an event on the **Event** tab in the properties window. When you click **...**, the dialog editor opens the script editor, where you define the event. Click **Script view on/off** to switch to the dialog box view.

The `EventClick` event is linked to a button click. The `.Enable` method activates a control. To enable the **CalculateButton** by clicking the **LoadButton**, use the following VBS script:

```
Sub LoadButton_EventClick()
Dim This : Set This = LoadButton
   CalculateButton.Enable=1
End Sub
```

You can save parts of the user dialog box in the catalog window in the dialog editor. Click **Insert** in the shortcut menu to copy marked controls into the clipboard. Then click the catalog window and select **Insert** in the shortcut menu. You save the properties and events together with the control.

Special Script Functions

DIAdem SCRIPT gives you special functions for the following:

- Defining your own functions as user commands in scripts
- Running serial evaluations in scripts
- Using DIAdem interfaces to communicate with other applications in scripts
- Limiting the use of individual commands to user rights, and
- Accessing objects in layout files in DIAdem VIEW and DIAdem REPORT

Defining User Commands

You can define several user commands in a script, which extends the range of DIAdem commands. You can use these user commands in Calculator formulas, for axis systems formats in DIAdem REPORT, and as new commands in DIAdem SCRIPT.

For example, if you need a special format for data display in DIAdem REPORT, write a user command with the appropriate instructions. The right column in Table 5-2 shows a trend display with plus and minus signs corresponding to the values in the middle column. Instead of a format instruction, the definition of the right column has the following user command:

```
@@TabTrend(CFV)@@
```

The two @ characters show DIAdem that this is a user command, not a variable or a text format. The `CFV` or `CurrentFormatValue` variable stands for the current channel value.

Table 5-2. List of Monthly Measured Values with Trend Display Specified in a User Command

Date	Value	Trend
01/01/2001	0.000	Start
02/01/2001	270.000	+++
03/01/2001	-43.000	-
04/01/2001	72.000	++
05/01/2001	-43.000	-
06/01/2001	124.000	+++
07/01/2001	-92.000	--
08/01/2001	10.000	+
09/01/2001	166.000	+++
10/01/2001	-42.000	-
11/01/2001	59.000	++
12/01/2001	45.000	+

You define user commands as procedures or functions. Procedures can only include arguments, whereas the function can also return a value. The `TabTrend` user command shows a maximum of three plus or minus signs as text:

```
Function TabTrend(ByVal Value)
    if Value <= -100 then
     TabTrend = "---"
    elseif (Value > -100) and (Value <= -50) then
    .......
    elseif (Value >= 100) then
     TabTrend = "+++"
    end if
end Function
```

For DIAdem to add your user commands to the stock of commands, you must register script files that have user commands by selecting **Settings»Desktop Parameters»User Commands**. The `TabTrend` user command is in the registered script `UserCmdExample.vbs`. DIAdem saves the link to the script file in the desktop file. Your user commands are then permanent, until you delete the link or load another desktop file.

Analyzing a Series of Files

In DIAdem SCRIPT, you can automatically analyze and document a series of files in a script, without loading each file separately. For example, if you run a long-term test that saves a result file every day, you can analyze all the data that is recorded in one week at the beginning of the following week.

To do this, you create a list file, which is a text file with the names of the data files for analysis. The list file must have the same name as the relevant script and the filename extension `.lst`. The list file contains the filenames without filename extensions.

To generate list files during recording mode, select **Activate series evaluation in the recording mode** in the DIAdem SCRIPT configuration. To record file types not covered in the recording mode, use the `DirLstWrite` command and copy the files into the list file.

In your script, you use a reference to the list file instead of using multiple file names in loading and saving commands:

```
Call DataFileImport("UseFileList")
```

If you have several different commands in your script that access the same list file, the order of those commands must match the order of the filenames that they call in the list file. For example, if you first call the `DataFileImport` command for loading data files, you must have a data file specified at the first position in the list file. If you then call the `PicLoad` command for loading layouts, you must have a layout file at the second position in the list file.

Communicating with Other Applications

You can use the DIAdem interfaces OLE, ODBC/SQL, and ASAM-ODS in scripts.

DIAdem exchanges data and commands with other applications through the OLE interface (Object Linking and Embedding). DIAdem can be the client as well as the server. DIAdem can use OLE to access other applications or to access another DIAdem. Refer to the DIAdem help page on *The OLE Interface in DIAdem* for more information.

DIAdem reads and writes to ODBC (Open Data Base Connectivity) databases through the ODBC/SQL interface. Use SQL (Structured Query Language) commands to access the ODBC databases. The DIAdem SQL commands can access any database that the ODBC administrator in

MS-Windows registers as a data source. Refer to the DIAdem help page on *The ODBC/SQL Interface* for more information.

You can use the ASAM-ODS interface (ASAM Open Data Service) for read and write access to ASAM-compliant data files and databases. Open the ASAM data service as a user interface for navigating in ASAM data. DIAdem has special ODS commands for accessing ASAM data. Refer to the DIAdem help page on *ASAM Data Service* for more information.

Assigning User Rights

You use the user management dialog box to organize which users have access to certain functions in a script. To do this, you set up password-protected user accounts that have varying rights. DIAdem saves this information in a coded ADM file.

When a user starts your script, the script opens the dialog box for logging in. The log in includes information for DIAdem about the user account. For example, to limit database access, query `DataExchange` rights for the account before OLE use. DIAdem only starts the database link if the user has the appropriate rights. Refer to the DIAdem help page on *User Administration for DIAdem - General Information* for more information.

Accessing Objects in DIAdem VIEW

The main objects in DIAdem VIEW are worksheets, areas, axis systems, curves, channel tables, and columns. In your script, you can generate new objects and modify or delete objects. You access objects in DIAdem VIEW using the object hierarchy. The global object is the view object, which can be several worksheets long. The worksheet can be split into several areas, each of which contains either an axis system or a channel table, or is empty.

The following script deletes all the worksheets in DIAdem VIEW and generates the new worksheet `MySheet`. In the new worksheet, the script generates the `NewArea` as a 2D axis system, and generates a curve in the axis system with the x-channel 1 and the y-channel 3.

```
Call View.Sheets.RemoveAll()
Set MySheet = View.Sheets.Add("NewSheet")
Set NewArea = MySheet.ActiveArea
NewArea.DisplayObjType = "CurveChart2D"
Call NewArea.DisplayObj.Curves.Add(1,3)
```

Accessing Objects in DIAdem REPORT

DIAdem REPORT objects include such things as axis systems, tables, and text. To access objects in DIAdem REPORT, first open, edit, and close the main object, and then open, edit, and close the subobject. The following script lines change the color of a curve in a 2D axis system:

```
Call GRAPHObjOpen("2DAxis1")
    Call GRAPHObjOpen("2DObj3_Curve1")
        D2CURVECOLOR ="Red"
    Call GRAPHObjClose("2DObj3_Curve1")
Call GRAPHObjClose("2DAxis1")
```

To use the object hierarchy in your script, open the axis system dialog box by double-clicking in the axis system and pressing <Ctrl-A>. Switch to DIAdem SCRIPT and insert the contents of the clipboard into your script by pressing <Ctrl-V>. The script editor displays the commands with the object names and the variable assignments from the dialog box.

A

Configuring DIAdem

Appendix A contains information about configuring DIAdem, installing from a network, starting the program with parameters, and the DIAdem folder structure.

Settings

You can configure various DIAdem properties in the **Settings** menu:

- In the general settings, you specify all the general DIAdem properties, such as the unit, the time format, or how the Report Wizard responds.
- In the panel settings, you specify which folders the DIAdem panels search for files in, and which start files the DIAdem panels load.
- In the memory management you specify the amount of memory space available in the Data Portal for internal data. This menu item only appears when you close all the panels by selecting **Window»Close all**.
- In the log file settings, you specify whether DIAdem records only error messages or other messages as well. To open the log file, select **?»View log file**.

DIAdem saves the settings in the desktop file `desktop.ddd`. You can set up different DIAdem configurations for different users or projects, save the settings in desktop files, and load the files when you need them.

To save the current settings in a new desktop file, click **Window»Close all** to close all the panels. Click **Save desktop** and enter a name for your desktop file. DIAdem automatically restarts when you load the desktop file.

Click **Load desktop** to load a desktop file. Refer to the *Starting with Parameters* section for more information about loading the desktop file.

DIAdem loads the parameter file with the desktop file. DIAdem saves the function bar definition in the parameter file. The parameter file has the filename extension `.par`. You can define project-related or user-related function bars and save the settings in various parameter files.

To create a new parameter file, copy the standard file `userpar.par` to the DIAdem folder and name the copy `myparams.par`, for example. Start

DIAdem and select **Settings»Parameter file**. Add the new entry `myparams.par` and delete the parameter file `userpar.par`. You can now define the function bars for your project. Generate a new desktop file to save your definitions. DIAdem opens your `myparams` parameter file with the new desktop file.

Starting with Parameters

You can launch DIAdem with optional parameters in order to preconfigure DIAdem or to start executing a script on start up. Enter the parameters in the properties for the DIAdem call. To change the Windows shortcut to DIAdem, right-click the **DIAdem** icon. Select **Properties** in the shortcut menu. Add the call parameters you want in the **Target** textbox.

Use the **`/D`** parameter to start DIAdem with a specific project desktop file. The desktop file contains the DIAdem settings like file paths, units, or the time format. To load the desktop file `testrig.ddd` when DIAdem starts, change the call to the following:

```
"diadem.exe" "/DC:\diadem\testrig"
```

Use the **`/C`** parameter to perform a command as soon as DIAdem starts. To run the `MyScript` script when DIAdem starts, change the call to the following:

```
"diadem.exe" "/CScriptStart('MyScript.vbs')"
```

Use the **`/S`** parameter to specify the local system folder for a DIAdem client in a network installation. The DIAdem client searches the system folder for interface files and system files required for the program start. To specify the system folder `system` when DIAdem starts, change the call to the following:

```
"diadem.exe" "/SC:\diadem\system"
```

You can use various parameters in one call, and you can use the same parameter several times. For example, to start an application on a test computer, change the call to the following:

```
"diadem.exe" "/DC:\diadem\engine1"
"/CScriptStart('MainTest.vbs')"
"/CScriptStart('TestReport.vbs')"
```

First, DIAdem loads the desktop file `engine1.ddd`, with the paths and settings set up for the project. Then, DIAdem starts the script `MainTest`, which displays the user interface for the test. When you close the user

interface, DIAdem stops the script `MainTest` and starts the second script, `TestReport`.

Folder Structure

Figure A-1 shows the three-level folder structure in DIAdem: program layers, structure layers, and file layers.

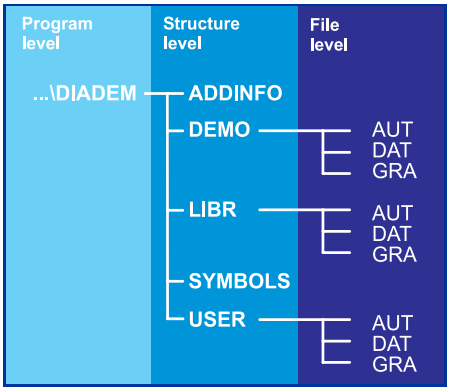


Figure A-1. Folder Structure

1. The program layer is the folder that contains the program files.
2. The structure layer breaks down the files as follows:
   - **`ADDINFO`** and **`SYMBOLS`** contain system files.
   - **`LIBR`** contains examples and templates.
   - **`DEMO`** contains user manual files.
   - **`USER`** is for your own files, and is initially empty. You can create other folders for other users and projects.

   Each DIAdem panel always searches for files on two paths: first on the user path and then on the library path. You can change both paths in the settings. When you load a file in the dialog box, DIAdem automatically adjusts the user path.

3. The file layer contains files from the DIAdem panels in various folders:
   - **AUT** contains scripts (`.vbs`), list files (`.lst`), variable definitions (`.vas`) and user dialog boxes (`.sud`).
   - **DAT** contains data header files (`.tdm` and `.dat`) and data files (`.tdx`, `.r64`, `.asc`, `.txt`, and `.lvm`).
   - **GRA** contains layout files (`.tdr` and `.tdv`) and graphics files (`.wmf`, `.bmp`, `.tif`, and `.jpg`).

B

GPI Interface

Figure B-1 shows a diagram of the General Programming Interface (GPI), for which you can program your own variables and commands or data file filters for loading external formats. This DIAdem extension is a function library (DLL). Use the GPI Wizard to define framework for your function library. You write code for the functions you want in Microsoft Visual C++ (Version 6.00).

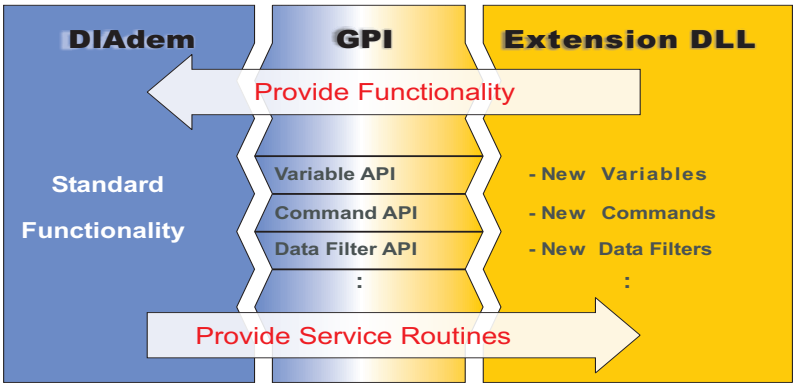


Figure B-1. General Programming Interface

To use your function extensions in DIAdem, register the function library in the menu **Settings»GPI-DLL registration**. DIAdem saves the reference to the additional registered GPI-DLL in the desktop file. After an automatic program restart, you can use the extension the same as the original DIAdem functions.

C

Converting AUT Scripts

In DIAdem SCRIPT, you can load, edit, and run VBS scripts and AUT scripts from earlier DIAdem versions. The two script types have the following differences:

Table C-1. Differences between VBS and AUT Scripts

Script Element	AUT Script	VBS Script
End of line	`;`	Line feed
Assignment	`:=`	`=`
Calling a command	`FileNameGet()`	`Call FileNameGet()`
Channel operation	`Ch(2):=Ch(1)`	`FormulaCalc ("Ch(2):= Ch(1)")`
User variable	`Uservariable$`	`Uservariable_`

You can convert AUT scripts into VBS scripts, for example, to use the debugger in DIAdem SCRIPT. Start the conversion by selecting **Script»AUT/VBS script converter** in DIAdem SCRIPT.

The following is a basic description of converting AUT scripts:

- The converter deletes the semicolon at the end of an AUT script line.
- The converter splits one AUT script line with several instructions into several VBS script lines, so that each VBS script line only contains one instruction.
- The converter transforms channel operations into a call for the `FormulaCalc()` command.
- The converter does not modify Calculator operations that correspond to VBS functions with the same name, like `abs`, `sin`, `exp`, `log` and `ltrim`. When DIAdem runs the VBS script, DIAdem calls the VBS function.

- To be able to convert object access of the x-axis in an axis system in DIAdem REPORT, for example, you must open DIAdem REPORT before the conversion.
- The convertor converts AUT procedures into SUB procedures.
- The converter replaces an underscore in AUT procedure names with an `x`.
- The converter cannot convert nested procedures. You must convert them later.
- The convertor replaces For loops in AUT scripts with Do-While loops, because VBS scripts do not accept DIAdem variables as loop variables:

AUT Syntax	VBS Syntax

`For L1:= 1 to 3 Do`
`Begin`
`.....;`
`End`
	`L1=1`
	`Do While L1<=3`
	`....`
	`Loop`

  The converter inserts the comment `"Step 1 or Step -1"`, because it does not know whether the loop counts up or down.
- The converter cannot convert requests for NoValues.
- The converter adds the comment `"case sensitive"` to text comparisons because VBS scripts are always case-sensitive.
- The converter replaces all Boolean values that are not equal to zero with TRUE. TRUE is not automatically the value 1 in VBS scripts, which means that numeric calculations with Boolean values return different values than in AUT scripts.

Refer to the AUT/VBS converter topic in the DIAdem help for more information about the converter.

D

DIAdem File Formats

Filename Extension	Description
ASC, TXT, CSV	Text files in ASCII format
AUT	AUT script from DIAdem 8
DAT	Data files from DIAdem 8
DDD	Desktop files with DIAdem settings
LST	List files with filenames for series evaluation
LVD, LVM	LabVIEW data files
PAR	Parameter files with the function bar definitions
R64, R48, I16	Binary data files from DIAdem 8
TDM	DIAdem data files with references to TDX binary file
TDR	Layout files from DIAdem REPORT
TDV	Layout files from DIAdem VIEW
TDX	Binary files for DIAdem data file
VBS	Script files from DIAdem SCRIPT

Note The *Special Data Formats* section of Chapter 2, *Loading and Saving Data*, includes a list of additional data formats for which DIAdem provides file filters.

E

Technical Support and Professional Services

Visit the following sections of the National Instruments Web site at ni.com for technical support and professional services:

- **Support**—Online technical support resources include the following:
  - **Self-Help Resources**—For immediate answers and solutions, visit our extensive library of technical support resources available in English, Japanese, and Spanish at ni.com/support. These resources are available for most products at no cost to registered users and include software drivers and updates, a KnowledgeBase, product manuals, step-by-step troubleshooting wizards, conformity documentation, example code, tutorials and application notes, instrument drivers, discussion forums, a measurement glossary, and so on.
  - **Assisted Support Options**—Contact NI engineers and other measurement and automation professionals by visiting ni.com/support. Our online system helps you define your question and connects you to the experts by phone, discussion forum, or email.
- **Training**—Visit ni.com/training for self-paced tutorials, videos, and interactive CDs. You also can register for instructor-led, hands-on courses at locations around the world.
- **System Integration**—If you have time constraints, limited in-house technical resources, or other project challenges, NI Alliance Program members can help. To learn more, call your local NI office or visit ni.com/alliance.

If you searched ni.com and could not find the answers you need, contact your local office or NI corporate headquarters. Phone numbers for our worldwide offices are listed at the front of this manual. You also can visit the Worldwide Offices section of ni.com/niglobal to access the branch office Web sites, which provide up-to-date contact information, support phone numbers, email addresses, and current events.

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