

# DIAdem™

## Getting Started with DIAdem

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# About This Manual

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You can use this manual to familiarize yourself with DIAdem features and how to use them.

This manual contains exercises for finding, analyzing, and presenting data, and for automating functions to process your data. The exercises do not take long, and they make it easier for you to get started with DIAdem. Each exercise contains diagrams that illustrate the steps involved. Each chapter concludes with a summary of the main points.

## Conventions

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The following conventions are used in this manual:

<>

Angles brackets 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 settings **Help»Examples** instruct you to open the **Help** menu and select the menu item **Examples**. DIAdem opens the Example Finder, where you can run examples for various DIAdem functions.



This icon 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. Parameters are also in bold type.

*italic*

Italic text denotes variables, emphasis, cross-references, or an introduction to important concepts. Italic text also denotes text that is a placeholder for a word or value that you must supply.

monospace

Text in this font denotes text or characters that you should enter from the keyboard, such as sections of code, programming examples, and syntax examples. This font is also used for the proper names of disk drives, paths, folders, 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 outputs to the screen.

## Related Documentation

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For more detailed information on DIAdem, refer to the following documentation:

- *DIAdem: Data Mining, Analysis, and Report Generation*

This DIAdem manual explains the structure of DIAdem and how to use DIAdem to mine data, to run analyses, to create reports, and to combine all functions in a script.

- *DIAdem Help*, which you open by clicking **Help»Contents**, or by pressing <F1>.

The DIAdem help offers you procedures and dialog box help for each panel, as well as references to functions, commands, and variables.

You use NI INSIGHT to project measured or simulated data onto a 3D model, for example, to display temperatures as shading on a crash test dummy or to display strain as deformation of a tunnel support.

The DataFinder server indexes data files in a network, to allow workgroups to search for data with DIAdem.

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# Introduction to DIAdem

DIAdem is the interactive National Instruments software for finding and managing technical data, for mathematically and graphically-interactively analyzing data, and for presenting the data in reports. In a uniform environment, DIAdem offers a unique combination of tools that are tailored to the requirements of technicians, engineers, and scientists. You can adjust all the tools to your tasks and automate them in scripts, thereby drastically reducing evaluation times.

The DIAdem DataFinder enables you to find test data quickly and easily, and to identify corresponding data. To use the DataFinder you do not require a database or support from the IT department, the DataFinder is ready for use directly after the installation. You use the Chart Wizard to create and to modify your diagrams quickly and easily. You use the video synchronization to synchronize videos and the associated measurement data during evaluation.

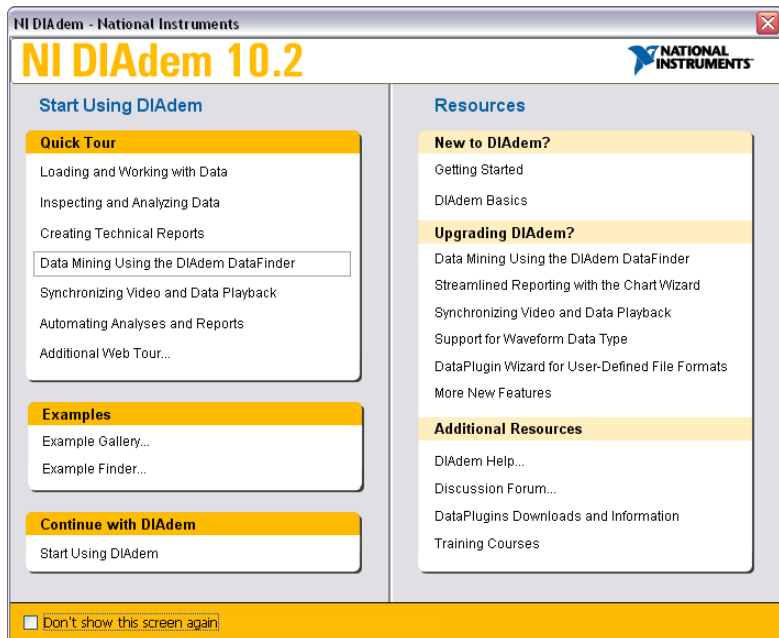
DIAdem organizes groups of functions into panels. Use the panel bar that is on the left of the DIAdem screen to switch panels. Each panel offers powerful tools that you use for the following tasks:

- You navigate data with DIAdem NAVIGATOR.
- You inspect data with DIAdem VIEW.
- You analyze data with DIAdem ANALYSIS.
- You create reports with DIAdem REPORT.
- You start LabVIEW from DIAdem and you use the LabVIEW DIAdem Connectivity VIs to transfer LabVIEW data to DIAdem.
- You automate functions with DIAdem SCRIPT.
- You project data onto 3D models with the separate software NI INSIGHT, which you install independently from DIAdem. For further information on NI INSIGHT visit [ni.com/insight](http://ni.com/insight).

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 on 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.

## Launching DIAdem

When you launch DIAdem, the DIAdem introduction screen appears. The introduction screen shown in Figure 1-1 contains videos and examples that you can run, to show you how to work with DIAdem. The information about DIAdem includes tips for newcomers and for advanced users, and gives you links to further information on the Internet.



**Figure 1-1.** The DIAdem Introduction Screen

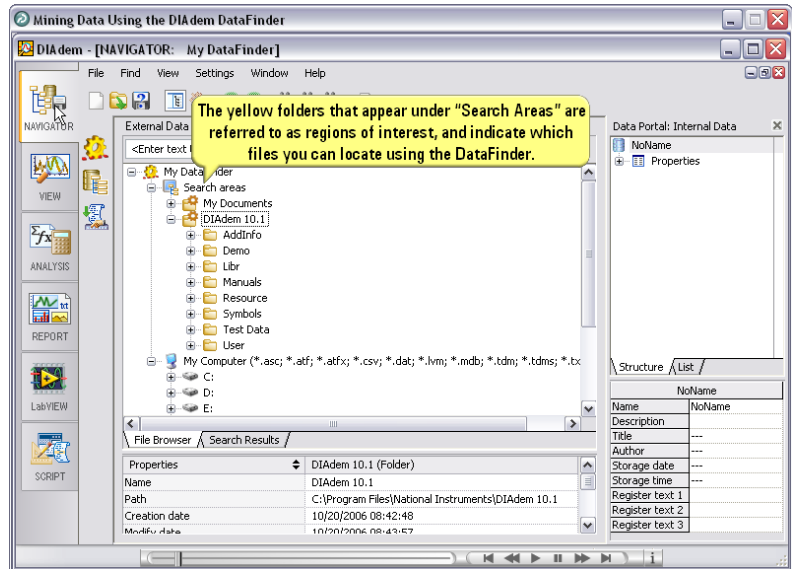


**Note** If DIAdem does not display the introduction screen when DIAdem launches, select **Help»Introduction** to open the introduction screen. Use the **Don't show this screen again** checkbox to specify whether DIAdem displays the introduction screen the next time it starts.

To run an introductory video, complete the following steps.

1. Select **Quick Tour»Data Mining Using the DIAdem DataFinder**.

DIAdem starts the video shown in Figure 1-2.



**Figure 1-2.** Videos Provide a Brief Introduction to DIAdem



2. Use the buttons on the bar at the bottom of the screen to control the video. Use the slider control to run the video from any point, for example, to repeat a certain section of the video.
3. Click the button shown on the left to close the video window and return to the introduction screen in Figure 1-1.
4. Select **Continue with DIAdem»Start Using DIAdem** to start work in DIAdem.

## Summary

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The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

## Quick Tour

Use these brief videos as an introduction that shows you how to use DIAdem.

## Examples

Select **Examples»Example Finder** to automatically load and execute examples for data analysis, for generating reports, and for creating scripts. The table of contents for the examples contains simple solutions as well as extensive applications that you also can use as the basis for your own applications.

## New to DIAdem?

Select **New to DIAdem?»Getting Started** to open the *Getting Started with DIAdem* manual on the screen. Select **New to DIAdem?»DIAdem Basics** for a brief introduction on how to operate DIAdem.

## Upgrading DIAdem?

Select **Upgrading DIAdem?** for more information about new functions.

## Additional Resources

Use the additional resources to open the **DIAdem Help**, to visit the **Discussion Forum** on the Internet, to obtain details on **Training Courses**, or to download **DataPlugins**, which are file filters, from the Internet.

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## Finding Data

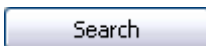
DIAdem NAVIGATOR finds, loads, and saves your data. DIAdem works with data from files and databases. To find files you can run a quick search with individual terms or you can combine search criteria. DIAdem displays the data found, in the search results.

The file browser offers a tree view of the file folders that are available. If the data format allows browsing, you can browse to channel level in the folders and the files.

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## Mining Data

Use the **Quick Search** to search for a term when you do not know whether the properties belong to a file, a group, or a channel. Use the **Advanced Search** to combine several search criteria and to describe precisely which property you are searching for.



To find data with the **Quick Search**, complete the following steps.

1. Select **DIAdem NAVIGATOR**.

The file browser in the NAVIGATOR panel offers external data in a tree structure.

2. Enter `Weather` in the input area, to find all the data sets that contain the term weather.
3. Click **Search**.

In the quick search DIAdem does not distinguish whether the data set contains the term as the name or the property of a file, a channel group, or a channel. DIAdem displays all files that contain the term weather or compound terms, such as weather data, as **Search Results** similar to Figure 2-1.

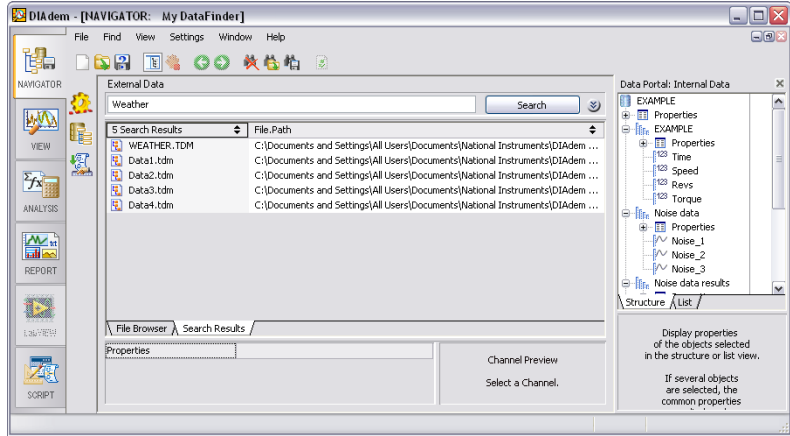


Figure 2-1. Search Results of the Quick Search

## Running an Advanced Search

To find data with the **Advanced Search**, complete the following steps.



1. Click the **Advanced Search** button shown on the left to specify the search results more accurately, as shown in Figure 2-2.

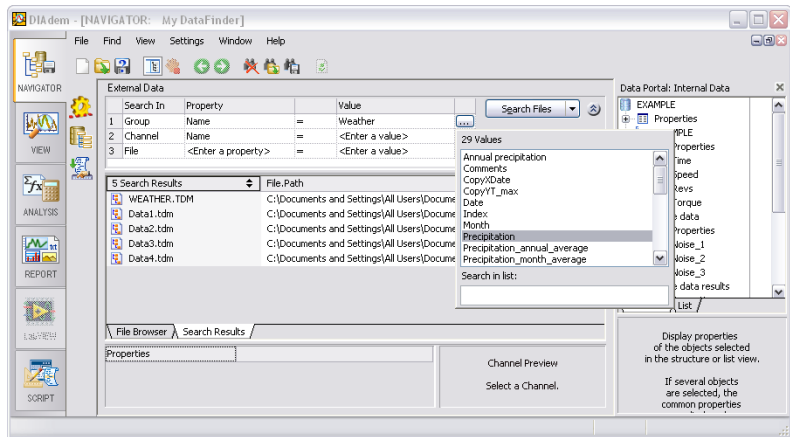


Figure 2-2. Selection List with the Channel Names of the Indexed Data

2. Click **File** in the **Search In** column and select **Group**.
3. Click **<Enter a property>** in the **Property** column of the same row and select **Name**.



4. Click the button with the three dots at the end of the same row. DIAdem lists the names of all the groups found.

5. Double-click the group name `Weather`.

Define another search criterion in the second row to specify the search more accurately. DIAdem uses the AND operator to combine several search criteria.



**Note** If the list does not contain the term `Weather`, DIAdem was not able to index all example files. Select **Settings»My DataFinder»Configure»Indexer»Start Now** to start indexing.

6. Click **File** in the second row of the **Search In** column and select `Channel`.

7. Click **<Enter a property>** in the **Property** column of the second row and select `Name`.



8. Click the button with the three dots at the end of the second row. DIAdem lists the names of all the channels found.

9. Double-click the channel name `Precipitation`.



10. Click **Search Files**.

DIAdem displays the **Search Results** similar to Figure 2-3. Each of the listed files contains a group with the name `Weather` and a channel with the name `Precipitation`.

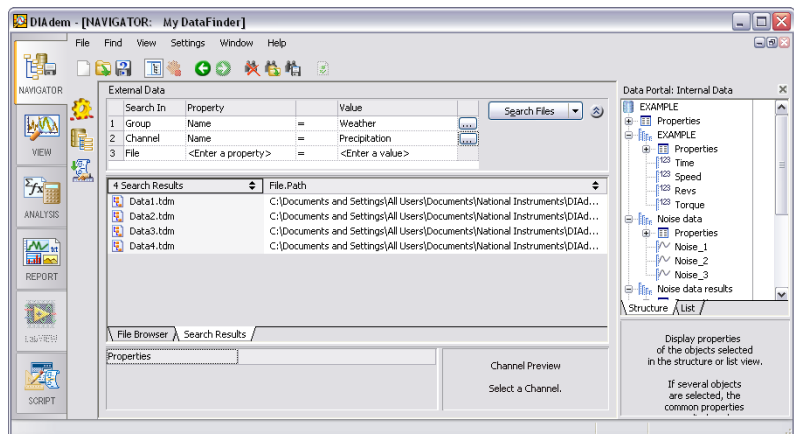




Figure 2-3. Search Results of the Advanced Search

# Browsing in Data Sets

To inspect search results, you can open data files in the file browser. In the file browser, you can browse down to channel level in files if the file format permits. To open data files, which were found, in the file browser, complete the following steps.

1. Right-click the `Data1.tdm` file in the search results to open the shortcut menu.
2. Select **Display in File Browser** from the shortcut menu.  
 DIAdem switches from the search results to the file browser and displays the `Data1.tdm` file with the TDM file symbol in the tree structure. If the file format is unknown, the file browser sets a question mark for the file symbol.
3. Click the plus sign in front of the file symbol to view the channel group.  

4. Click the plus sign in front of the `Weather` channel group to view the channels.  


DIAdem lists all the channel groups and channels that are contained in a file, in a tree structure. The **Properties** window below the **File Browser** contains more information, as shown in Figure 2-4.

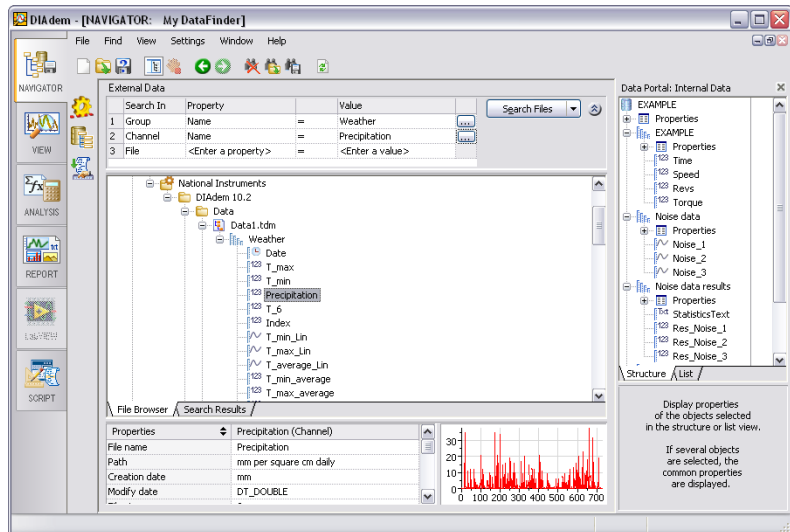


Figure 2-4. Browsing the Found Files in the File Browser

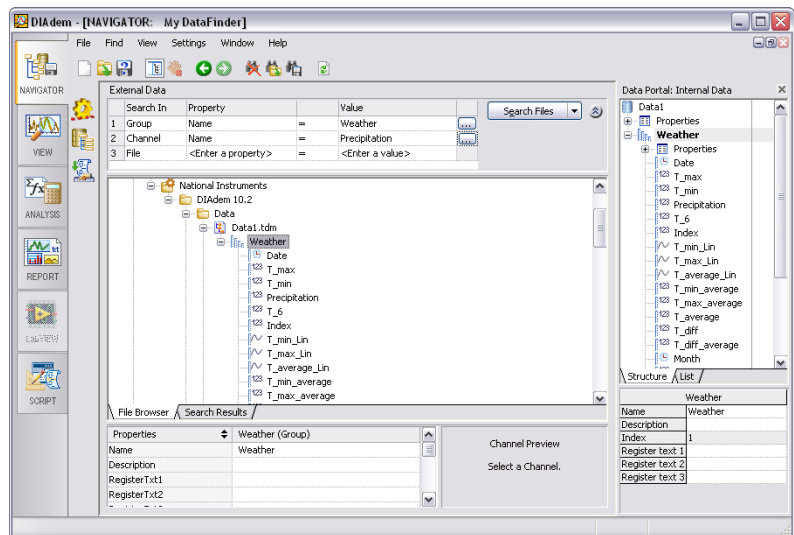
# Loading and Managing Data

If you want to work with the data you have found, you must load the data into the Data Portal. To load data and to remove unnecessary data, complete the following steps.



1. Click **Delete Internal Data**.
2. Click the `Weather` channel group to select this channel group.
3. Drag and drop the `Weather` channel group into the Data Portal.

The Data Portal displays the `Weather` channel group, with all the channels, similar to Figure 2-5.



**Figure 2-5.** Loading Data from the File Browser to the Data Portal



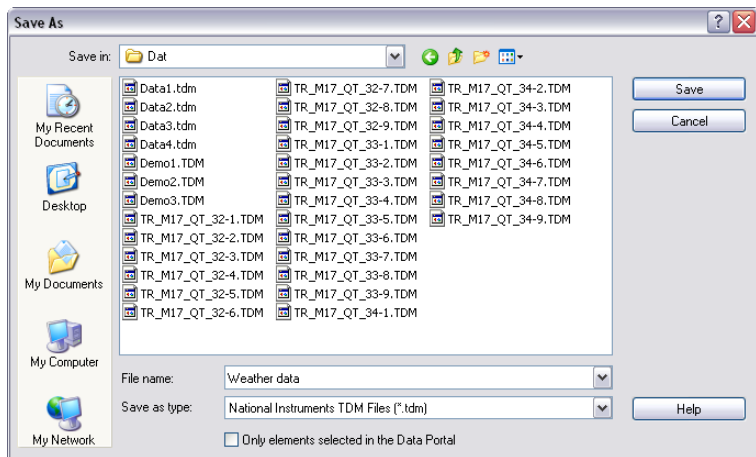
**Note** If you modify data in the Data Portal, DIADEM does not save the changes automatically. The changes are executed only in the memory and not saved in the data file from which you loaded the data. This enables you to experiment with data without modifying the original data.

## Saving Data



To save the data in the Data Portal, complete the following steps.

1. Click the **File Browser** tab in DIAdem NAVIGATOR.
2. Navigate to the `Data` DIAdem folder in the `Shared Documents` folder.
3. Select the `Weather` channel group in the Data Portal.
4. Drag and drop `Weather` to the `Data` folder.
5. In the **Save As** dialog box, enter `Weather data` as the filename, as shown in Figure 2-6.
6. Select the file type `National Instruments TDM Files (*.tdm)`.
7. Click **Save**.



**Figure 2-6.** Saving Data in DIAdem NAVIGATOR

# Summary

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The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

## External Data

External data is data that is saved outside DIAdem, in data files and databases. DIAdem displays the structure of external data on the **File Browser** tab in DIAdem NAVIGATOR.

## DataFinder

In the search input area of the DataFinder, you enter search criteria to help you find your data. The DataFinder uses the AND operator to combine several search criteria and lists the files found in the search areas on the **Search Results** tab.

## Search Areas

Search areas are folders of the file system, which the DataFinder browses. Select **Settings»My DataFinder»Properties** to modify the search areas of the DataFinder.

## File Browser

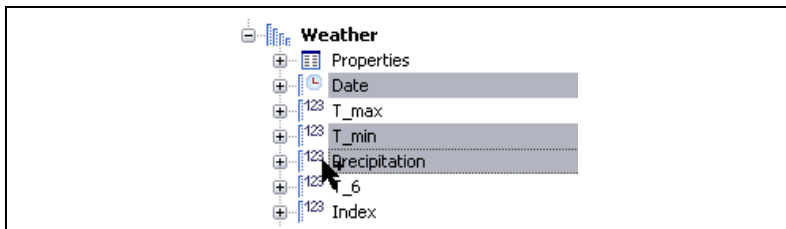
Use the shortcut menu of the **Search Results** to open the found data files in a tree structure in the **File Browser**, where you can browse. Right-click the empty space in the file browser and select **Display Local File System** in the shortcut menu to show all the folders on the computer.

## Internal Data in the Data Portal

DIAdem manages internal data in the Data Portal. You work with the channels of the internal data and their descriptive information in the various DIAdem panels. DIAdem VIEW, DIAdem ANALYSIS, and DIAdem SCRIPT store result data in the Data Portal. You can display and edit the contents of the channels in channel tables in DIAdem VIEW.



**Tip** You also can click the symbols next to the channel names in the Data Portal to select multiple channels or to undo a selection, as shown in Figure 2-7. If you use these symbols, you do not need to press <Shift> or <Ctrl>.



**Figure 2-7.** Selecting Channels with the Selection Cursor in the Data Portal

## Channel Groups

Channel groups contain channels and descriptive properties of the channel group. Use channel groups to organize data. You can define a channel group as a default group, for example, to automatically group all the calculation results in DIAdem ANALYSIS. DIAdem writes the group names of the default group in bold.

## Channels

Channels contain data series that you measured during a test, loaded from an external data set, or calculated with DIAdem. DIAdem distinguishes numeric channels, waveform channels, time channels, and text channels. Numeric channels contain data strings, waveform channels contain data strings and the associated x-channel as a generation instruction, time channels contain time data strings, and text channels contain text.

## Properties

Properties are information about the data, which DIAdem saves with the values in a TDM file. For example, the data set properties contain the name of the author and the storage date, the channel group properties contain the name of the measurement and comments, and the channel properties contain the data type and the unit. In addition to the standard properties, you can create your own custom properties for the root, the channel group, and the channel. DIAdem displays the properties in the properties window of the file browser and in the lower area of the Data Portal.

# Viewing and Evaluating Data

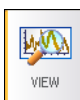
Use DIAdem VIEW to view data as curves, to zoom curve sections, and to move the graphic cursor along the curve. In channel tables you can edit and delete data and enter new data. After you record a video of a test, you can evaluate the data and the video synchronously. You can add graphics and text to the evaluation and save the layout as a template.

## Viewing Curves

To view the loaded data set in an axis system, complete the following steps.



**Note** If you have not completed the exercise from the previous chapter, load the data set `Data1.tdm` located in the DIAdem folder `Data`. This folder is located in the Windows Vista explorer under **Computer»C:»Users»Public»Public Documents»National Instruments** and in the Windows XP explorer under **My Computer»C:»Documents and Settings»All Users»Shared Documents»National Instruments**.



1. Select **DIAdem VIEW**.



2. Click **New Layout**.



3. Click **Regular Worksheet Partitions** on the group bar.



4. Click **Two Areas** on the function bar.



**Note** Each panel has its own group bar to the right of the panel bar. When you click a button in the group bar, DIAdem opens the function bar where you can click the function you want to select.

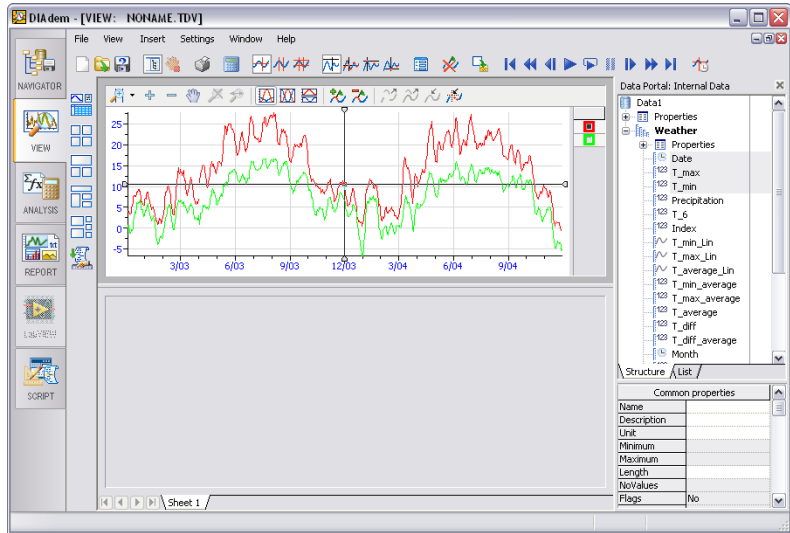


5. Select the `Date` time channel in the Data Portal.



6. Click the symbol shown on the left for the numeric channels `T_max` and `T_min`.

7. Drag and drop the three channels selected in the Data Portal into the upper worksheet area.
8. Select **2D Axis System**.  
 DIAdem displays the axis system similar to Figure 3-1.



**Figure 3-1.** Viewing Temperature Data as Curves



**Note** When you select several channels in the Data Portal and drop the channels onto an axis system, DIAdem assigns the first channel you select to the x-axis. If you select only one channel, DIAdem displays a numeric channel using its index and displays a waveform channel using its x-part.

## Zooming Curves

In DIAdem VIEW you can zoom curves with the band zoom or the frame zoom, and move the zoomed section. The zoom functions are located on the toolbar of the axis system.

For a close-up view of curves, complete the following steps.



1. Click **Band Zoom** on the axis system toolbar.
2. Click the axis system and drag open the band to specify the width of the curve section.
3. Click **Move** on the axis system toolbar and move the curves to the section that you want to magnify.



4. Click **Zoom In** on the axis system toolbar to increase the zoom in the selected section.



5. Click **Zoom Off** to return from the zoomed area to the complete curve.



6. Click **Move** on the toolbar of the axis system to enable the curve cursor.

## Editing Curves

---

In DIAdem VIEW you can measure curves, and copy, delete, and interpolate curve sections. Use the curve cursor, the maximum values cursor and the minimum values cursor on the DIAdem VIEW toolbar to measure a curve. To edit curve sections use the flag functions on the toolbar of the axis system.

## Measuring Curves

To use the curve cursor to follow the curve points in an axis system, complete the following steps.



1. Click **Curve Cursor** on the toolbar.
2. Click the axis system and move the curve cursor along the curve.

DIAdem displays the x-values and the y-values of the curve points in a tooltip at the crosshair cursor that follows the cursor.



3. Use the checkboxes to the right of the axis system to specify a different curve as the leading curve.

DIAdem displays the coordinates of the new leading curve in the tooltip.

## Copying Curve Sections

To select a curve section and to copy the data of the curve section into the Data Portal, complete the following steps.



1. Click **Band Cursor** on the toolbar.
2. Click the axis system and idle the mouse over one of the band cursor lines.

The cursor changes into a double arrow. Press the mouse button and specify the width of the band cursor.

3. Click between the two lines to move the band cursor over the curves.

4. <Ctrl>-click both checkboxes in the legend of the axis system to select both curves.
5. Drag and drop the selected curves into the bottom workspace.
6. Select **2D Axis System**.



7. Click **Scroll in Cursor Range** on the toolbar of the bottom axis system.

If you move the band cursor in the top axis system, DIAdem displays the curve section zoomed in the bottom axis system.

8. Move the band cursor over the period Dec/1/03 to Feb/23/04.



9. Click **Set Flags** on the top axis system toolbar to select all the points of the leading curve in the selected section.



**Note** If you press <Shift> simultaneously, DIAdem selects the points of all curves in this section.



10. Click **Flags: Copy Data Points** on the axis system toolbar to copy the data of the selected curve into new channels.

DIAdem creates a time channel and a numeric channel as shown in Figure 3-2.

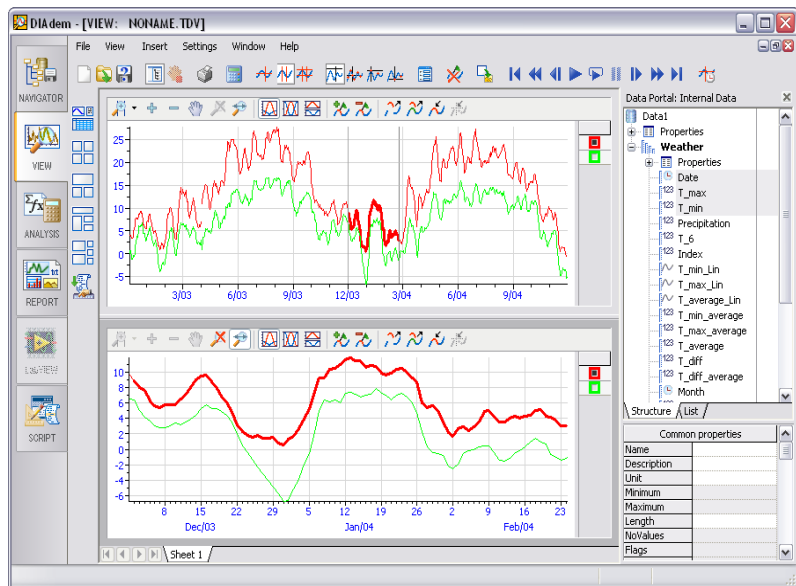


Figure 3-2. Selecting Curve Sections and Copying them into Data Portal



11. Click **Remove Flags from All Data** on the DIAdem VIEW toolbar to undo the selections.

## Evaluating Videos and Curves



Use video areas to evaluate a video of a test, for example. To insert a video and the respective data into a worksheet, complete the following steps.

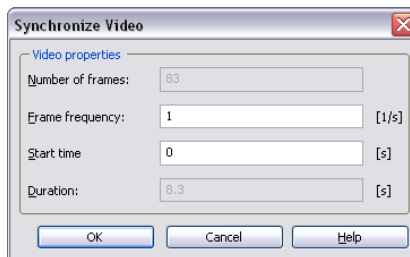
1. Click **Assigned Worksheet Partitions** on the group bar.
2. Click **Video/2D Axis System** on the function bar.  
DIAdem creates a new worksheet with a video area and an axis system.
3. Double-click the video area and select `Weather.avi` in the DIAdem folder `Documents`.
4. In the Data Portal select the copied channel `YCopy_YT_max`.
5. Drag and drop the channel selected in the Data Portal into the axis system.

DIAdem displays the numeric channel via the index. The selected curve section contains approximately as many curve points as the video contains pictures.

## Synchronizing Videos and Measurement Data

To evaluate a video with recorded data, you must synchronize the video and the time data. To display a picture for each curve point, complete the following steps.

1. Right-click the video and select **Synchronization** from the shortcut menu.
2. Enter 1 as the **Frame frequency** to display one frame for each curve point.



**Figure 3-3.** Synchronizing Videos



3. Click **OK**.
4. Click **Crosshair Cursor** on the toolbar.
5. Click **Curve Cursor** on the toolbar.

In this mode, the crosshair cursor moves along the curve when you move the crosshair cursor with the mouse.

6. Move the crosshair cursor anywhere in the axis system.

DIAdem synchronizes the video to the cursor position as shown in Figure 3-4.

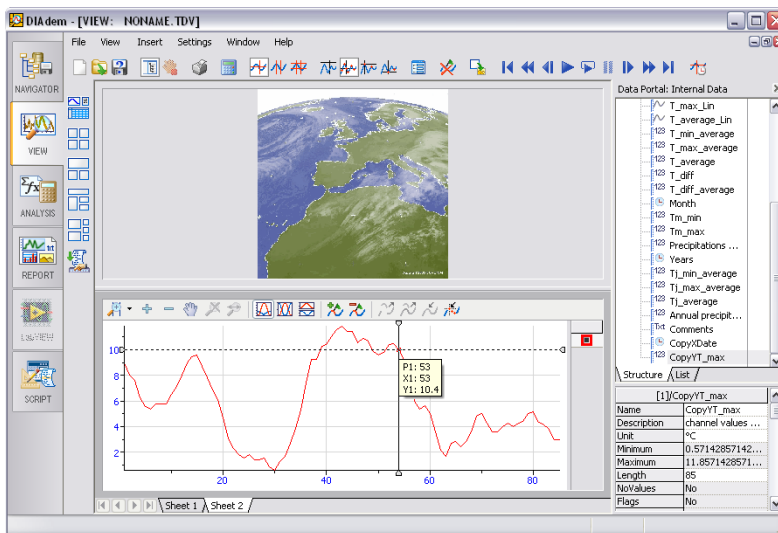


Figure 3-4. Evaluating Curves and Videos

## Running Videos and Measurement Data

You use the player functions on the toolbar to run videos. To run a video simultaneously with the associated data in an axis system, you must adjust the speed of the graphics cursor in the axis system to the frame rate of the video.

To set the cursor speed, complete the following steps.



1. Click **Cursor Parameters** on the toolbar.
2. Enter as the **Speed** to display ten frames per second.
3. Click **OK**.
4. Click **Play** on the toolbar to run the video.



DIAdem moves the crosshair cursor along the curve simultaneously.

# Working with Channel Tables

---

In channel tables you can edit and delete data and add new data. You can enter data manually or generate several data sets.

To create a channel table in DIAdem VIEW, complete the following steps.



1. Click **Assigned Worksheet Partitions** on the group bar.
2. Click the **Channel Table** button on the function bar.  
DIAdem creates another worksheet with a channel table.
3. <Ctrl>-click the channels *Date*, *T\_max*, *T\_min*, and *Comments* in the Data Portal.
4. Drag and drop the channels selected in the Data Portal into the channel table.

DIAdem displays the columns of the channel table in the order that you select the channels in the Data Portal.

## Editing Data

To edit values in a channel table, complete the following steps.

1. Click the cell in the **T\_max** column, row **10**.
2. Enter the value 5 and press <Enter>.

DIAdem displays the new value in the curve in the axis system on Sheet 1.

3. Click the **Comments** column, row **4**.

4. Enter the text `Video weather data`.

DIAdem displays the channel table similar to Figure 3-5.

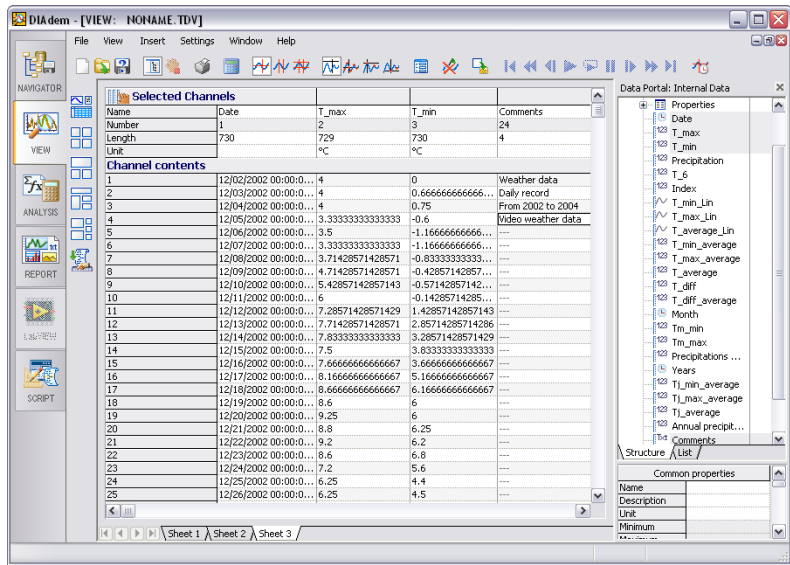


Figure 3-5. Editing Data Channels and Text Channels in a Channel Table

## Creating a Template

You can illustrate worksheets with text and graphics, and save worksheets as templates for other temperature data sets.

To create a template for an evaluation, complete the following steps.

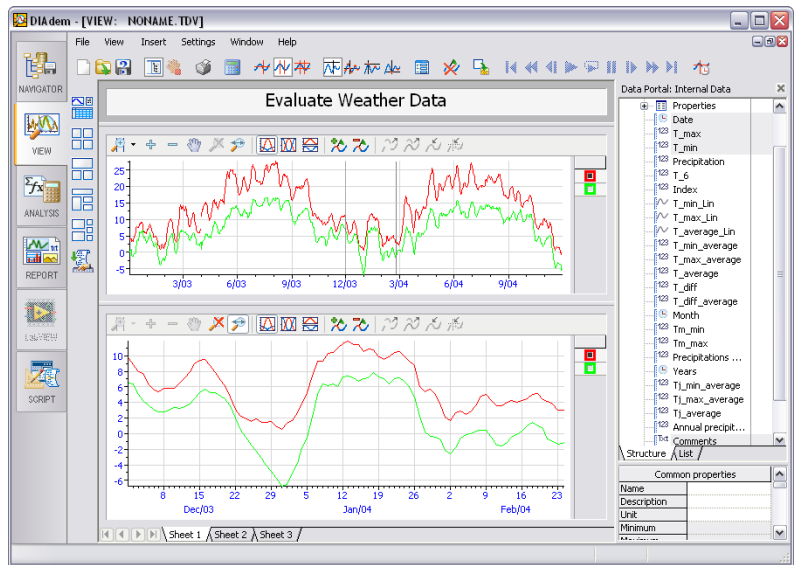
1. Click the **Sheet 1** tab to open the first worksheet.
2. Right-click the top axis system and select **New Area»Top** from the shortcut menu.

DIAdem creates a new workspace above the existing axis system.

3. Right-click the new workspace and select **Display Type»Textbox** from the shortcut menu.
4. Double-click the textbox and enter the text `Evaluate Weather Data`.
5. Right-click the textbox and select **Display** from the shortcut menu.
6. Select 20 as the font size and **Center** as the alignment.

7. Click **OK**.

DIAdem displays the first worksheet similar to Figure 3-6.



**Figure 3-6.** Layout with Textbox

8. Click **Save Layout As**.9. Enter the filename `MyView.tdv` and click **Save**.

After saving the layout, you can use it with any data file that has a similar structure.

## Summary

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The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

## Worksheets

You can add axis systems, channel tables, videos, text, and graphics to your worksheet. To add data to the worksheet, drag and drop channels from the Data Portal into axis systems and tables.

## Layouts

DIAdem saves the layout separately from the channels. Use the layout as a template for data sets with a similar structure. One layout can contain several worksheets.

## Axis Systems

Axis systems allow you to display data as curves. When you select several channels in the Data Portal, DIAdem assigns the first channel you select to the x-axis. If you select one channel, DIAdem displays a numeric channel using its index and displays a waveform channel using its x-part.

Use the band cursor and the frame cursor to zoom curve sections. You can move the curve section and zoom it further.

## Graphics Cursors

DIAdem VIEW offers various graphics cursors for evaluating curves in axis systems. With the curve cursor, you can move along a curve and evaluate individual values. You also can use graphics cursors to locate minimum values and maximum values within a curve.

If one axis system has several curves, the graphics cursor moves along the leading curve. To specify the leading curve, select the checkbox for the curve in the legend.

## Flags

Use the band cursor and the frame cursor to select specific curve sections in order to select enclosed curve points with flags. You can delete, copy, or recalculate the selected curve points.

## Channel Tables

In channel tables, you can view the individual data points for channels. In channel tables you can edit and delete the values of all channels, and create new channels. In the display properties of a channel table you can specify whether a channel table only displays the channels that were dragged and dropped into the table or whether the channel table automatically displays all channels of a group or of the Data Portal.

## Textboxes

In textboxes you can display descriptive information, for example the current date, as text and variables.

## Videos

You can run videos in video areas. If you display the associated measured values as curves in an axis system, you can move a graphics cursor along the curves to display the frame associated with each measurement value. Double-click a video area to load a video.

## Graphics

In graphics areas you can display pictures. Double-click a graphics area to load a picture.

---

# Analyzing Data with Mathematics Functions

With DIAdem ANALYSIS you perform mathematical functions on data. You can apply predefined standard mathematical functions, including basic mathematics, curve fitting, signal analysis, and statistics. The dialog boxes for the standard mathematical functions guide you through the calculation so you do not have to enter a formula. You select the input data and make the settings you want. Use the DIAdem Calculator to define and calculate your own formulas.

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## Using Standard Mathematical Functions

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DIAdem has extensive libraries of standard mathematical functions on several function bars in DIAdem ANALYSIS. The results of the calculations are in new channels in the Data Portal.



**Note** If you have not completed the exercise from the previous chapter, load the data set `Data2.tdm` located in the DIAdem `Data` folder. This folder is located in the Windows Vista explorer under **Computer»C:»Users»Public»Public Documents»National Instruments** and in the Windows XP explorer under **My Computer»C:»Documents and Settings»All Users»Shared Documents»National Instruments**.

To create a new group for the calculation results, complete the following steps.



1. Select **DIAdem ANALYSIS**.
2. Right-click in the Data Portal and select **New»Group** from the shortcut menu.
3. Enter `Results` as the **Name** and click **OK**.
4. Right-click `Results` and select **Set Default Group** from the shortcut menu.

DIAdem displays the name of the default group in bold in the Data Portal.

## Precipitation Summation



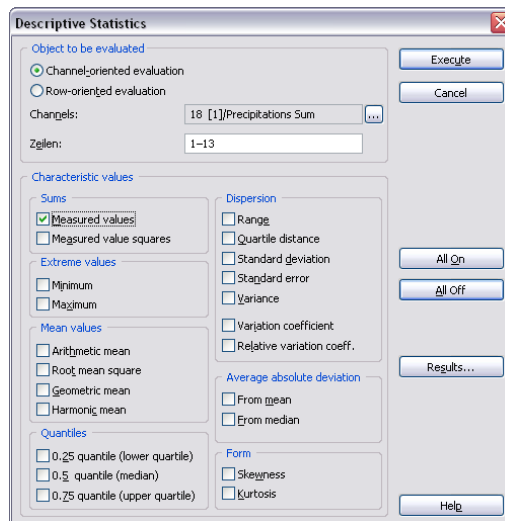
To total the precipitation for the year 2003, complete the following steps.

1. Click **Statistics** on the group bar.
2. Click **Descriptive Statistics** on the function bar.
3. Select Weather/Precipitations Sum in the Data Portal.  
This writing convention means the Precipitations Sum channel is in the Weather channel group.
4. Drag and drop the selected channel to the **Channels** entry field in the **Object to be evaluated** area in the dialog box.
5. Enter 2-13 as the **Rows**.



**Tip** To check which rows the precipitation for 2003 is in, switch to DIAdem VIEW and load the channels Month and Precipitations Sum into a channel table. The Month channel contains the time values for the monthly precipitation totals.

6. Click **All Off** to clear all the checkboxes for the characteristic values.
7. Select the checkbox under **Characteristic values»Sums»Measured values**. DIAdem shows the **Descriptive Statistics** dialog box similar to Figure 4-1.



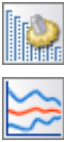
**Figure 4-1.** Precipitation Summation in Sections

8. Click **Execute**.

9. Right-click `Results/Sum` in the Data Portal and select **Rename**.
10. Enter `Precipitation_2003` as the channel name and press <Enter>.
11. Double-click the white entry field for **Unit** in the channel properties.
12. Enter `mm` and press <Enter>.

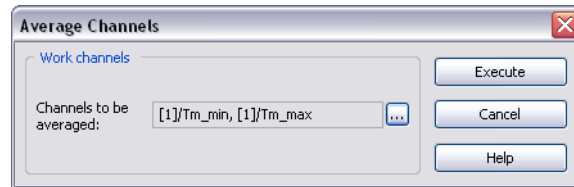
## Averaging Temperatures

To calculate the average monthly temperatures, complete the following steps.



1. Click **Channel Functions** on the group bar.
2. Click **Average Channels** on the function bar.
3. Select `Weather/Tm_min` in the Data Portal.
4. Press <Ctrl> and select `Weather/Tm_max`.
5. Drag and drop the selected channels into the **Channels to be averaged** field in the **Average Channels** dialog box.

DIAdem displays the dialog box similar to Figure 4-2.



**Figure 4-2.** Averaging Minimum and Maximum Temperatures

6. Click **Execute**.
7. Right-click `Results/Mean` in the Data Portal and select **Rename**.
8. Enter `Temperatures` as the channel name and press <Enter>.
9. Double-click the white entry field for **Unit** in the properties window of the Data Portal.
10. Enter `°C` and press <Enter>.

DIAdem ANALYSIS displays a record of the calculations similar to Figure 4-3, and the Data Portal contains the calculation results in new channels.

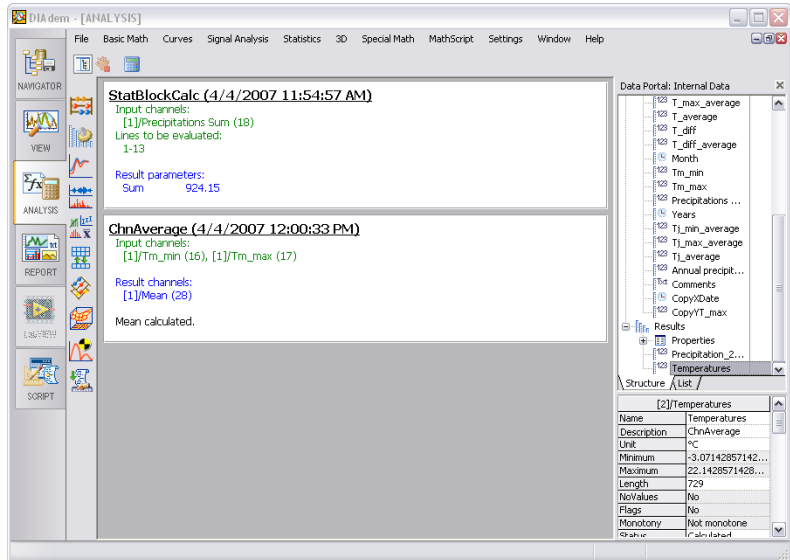


Figure 4-3. Record of the Calculations with Standard Functions

Refer to Figure 5-2 in the next chapter to view the curves of the average temperatures and the annual precipitation.

## Calculating Formulas with the Calculator

Use the DIAdem Calculator to mathematically analyze data with your own formulas. Use the Calculator to calculate channels, variables, and input values. DIAdem stores the results in channels or variables.

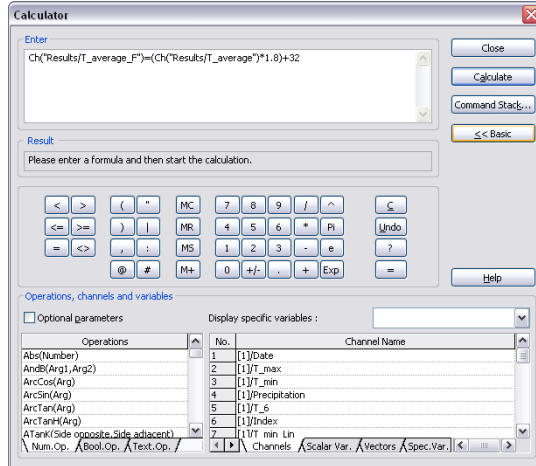
To convert the calculated average monthly temperature from degrees Celsius to degrees Fahrenheit, complete the following steps.



1. Click **Calculator**.
2. Enter the following formula in the Calculator entry field.

```
Ch ("Results/Temperatures_F") =
    (Ch ("Results/Temperatures") * 1.8) + 32
```

DIAdem displays the Calculator similar to Figure 4-4.



**Figure 4-4.** Calculating Formulas with the Calculator

3. Click **Calculate**.
4. Click **Close**.

DIAdem displays the new channel `Temperatures_F` in the `Results` channel group in the Data Portal.

5. Double-click the white entry field for **Unit** in the properties window of the Data Portal.
6. Enter °F and press <Enter>.

Figure 5-3 in the following chapter lists the values of the calculated channel `Temperatures_F` in a table.

## Summary

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The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

### Mathematical Functions

DIAdem ANALYSIS offers a variety of standard functions for analyzing your data. You assign input channels to a standard function, set parameters, and execute the calculation.

### Result Channels

DIAdem ANALYSIS saves calculation results in new channels. This enables you to analyze your data without overwriting the existing channels. However, you also can specify that DIAdem overwrites existing channels.

### Default Group

DIAdem stores the result channels of a calculation in the default group in the Data Portal. You set the default group to specify where DIAdem saves new data. DIAdem writes the group names of the default group in bold.

### Calculator

The Calculator allows you to specify your own formulas for analyzing data. The Calculator has functions that range from simple arithmetic to advanced scientific and engineering functions. Use the Calculator to calculate channels, variables, and single values. DIAdem stores the results in channels or variables.

# Creating Reports

With DIAdem REPORT you can present your data in reports. In several worksheets, you can use two-dimensional and three-dimensional axis systems, tables, polar systems, texts, variables, and graphics, to document and to present your data. Use the Chart Wizard to create and to modify 2D axis systems and polar axis systems. You can save a report layout as a template for later evaluations.

## Creating Axis Systems

To create a new layout with the Chart Wizard, complete the following steps.



**Note** If you have not completed the exercise from the previous chapter, load the data set `Data3.tdm` located in the DIAdem Data folder. This folder is located in the Windows Vista explorer under **Computer»C:»Users»Public»Public Documents»National Instruments** and in the Windows XP explorer under **My Computer»C:»Documents and Settings»All Users»Shared Documents»National Instruments**.

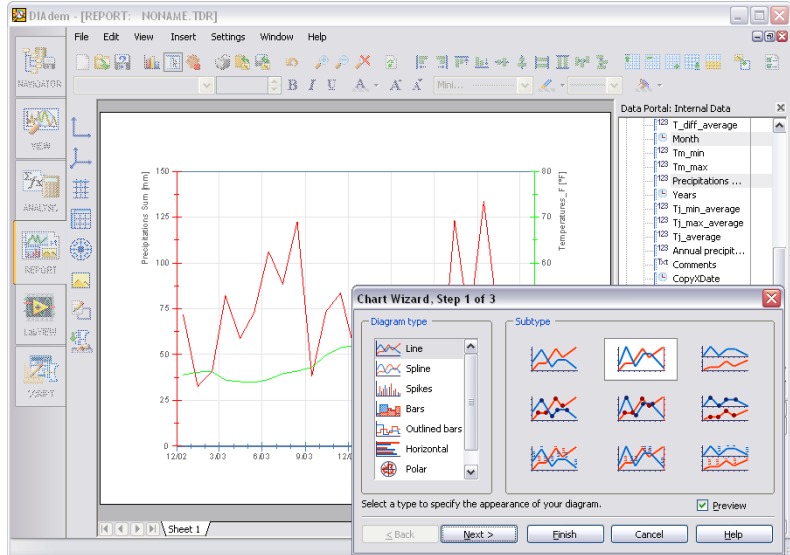


1. Select **DIAdem REPORT**.
2. Click **New Layout**.
3. <Ctrl>-click the channels `Weather/Month`, `Weather/Precipitations Sum`, `Results/Temperature_F`.
4. Right-click the selected channels and select **Chart Wizard** from the shortcut menu.

DIAdem opens the Chart Wizard and creates a new worksheet with an axis system. In the axis system, DIAdem displays the channels that are selected in the Data Portal as curves similar to Figure 5-1. DIAdem assigns the first selected channel to the x-axis.

In Step 1 you select the diagram type. In Step 2 you add or delete curves. In Step 3 you specify the diagram display on several tabs. The preview shows you how the diagram changes.

5. Click the diagram type **Lines with Several Y-Axes**.



**Figure 5-1.** The Chart Wizard Displays the Preview in the Worksheet

6. Click **Next** twice to complete Step 3 of 3.
7. Select the **X-Axis** tab.
8. Enable **Manual from** for the range of values and enter 01 . 01 . 2003 as the start and 12 . 31 . 2003 as the end.
9. Click **Finish** to create the axis system.

In the axis system, DIA dem displays the monthly precipitations and the monthly average temperatures above the date.



**Tip** If you want to display curves with various x-channels, open the Chart Wizard on the toolbar. If you want to integrate axis systems into the current worksheet, open the Chart Wizard from the **2D Axis Systems** function bar or the **Polar Axis Systems** function bar. If you want to edit an axis system, open the Chart Wizard from the shortcut menu of the axis system.

10. Double-click the axis system.
11. Click the **Type** entry field in the first row of the Month/ Precipitations Sum curve.
12. Select Bars as the **Display mode**.

13. Click **OK** twice to close the dialog box for the curve parameters and the dialog box for the curve and axis definition.
14. To reduce the width of the axis system, move the small square in the middle of the right edge of the axis system, to the left.

## Graphics and Lines

---

To enhance the appearance of your reports, add graphics or company logos. Use lines and rectangles to divide the worksheet with lines or to highlight a text field.

To add a graphic to your worksheet, complete the following steps.



1. Click **Graphics** on the group bar.
2. Click **Load Graphic** on the function bar.
3. Select `Weather.jpg` in the `DIAdem Documents` folder and click **Open**.
4. Click and drag the graphic to position it at the right edge of the workspace. Resize the graphic by dragging the small squares at the edges of the graphic with your mouse cursor.

To prepare a text field on the right of the worksheet, complete the following steps.



1. Click **Decorations** on the group bar.
2. Click **Line and Arrow** on the function bar. A small rectangle appears at the cursor.
3. Drag a line from the top of the worksheet to the bottom, to separate a textbox from the axis system with a vertical line.  
The line has an arrowhead at the end.
4. Double-click the line and select `No arrow` as the **End** on the **Arrows** tab.
5. Click **OK**.

## Using Text and Variables as Labels

---

Add text and variables to a report to highlight the contents and specific items. To add a text to your report, complete the following steps.



1. Click **Decorations** on the group bar.
2. Click **Text** on the function bar. The cursor changes to a text cursor.
3. Click the header of the label field in the worksheet, where you want to enter a heading.
4. Enter `Weather Report` as the text.
5. Click outside the text to conclude the entry.
6. To resize the text, drag the small squares on the edges of the text with your mouse cursor.

### Adding and Formatting Variables

All texts can include formula expressions and DIAdem variables, which DIAdem updates along with the rest of the report. You can drag and drop channel properties from the Data Portal into the worksheet. You can select other variables from the dialog box of the text editor. Double @-characters indicate to DIAdem which parts of the text are variables.

To add the current date to your report, complete the following steps.



1. Click **Text** on the function bar.
2. Click below the heading with the text cursor, where you want to enter the date.
3. Enter `@@CurrDate@@` as the text.
4. Click outside the text to conclude the entry.

To add a channel property to your report and to edit the channel property, complete the following steps.

1. Select `Results/Precipitation_2003` in the Data Portal.
2. Click **Unit** in the properties window of the Data Portal and drag the channel property to the text field.

3. Double-click the inserted text.
  - a. Delete `Unit:` and enter `Precipitations Sum`, press `<Enter>`, and enter `@@ChD(1, "Precipitation_2003") @@` in the second line.
  - b. Click **OK**.

DIAdem displays the annual precipitation for 2003 with decimal places.

4. Double-click the text and add the format instruction `d` to the expression for the annual precipitation:

```
@@Str(ChD(1, "Precipitation_2003"), "d") @@
```

The `ChD` variable displays the first value of the `Precipitation_2003` channel. The `Str` function rounds off the value according to the format instruction `d`, with no decimal places.

- a. Click the **Position** tab and select `Centered` as the **Relative position**.
- b. Click **OK**.



5. Select all texts and the graphic and click **Center Vertically** on the toolbar.
6. Position the selected texts in the middle of the text field.

DIAdem displays the worksheet similar to Figure 5-2.

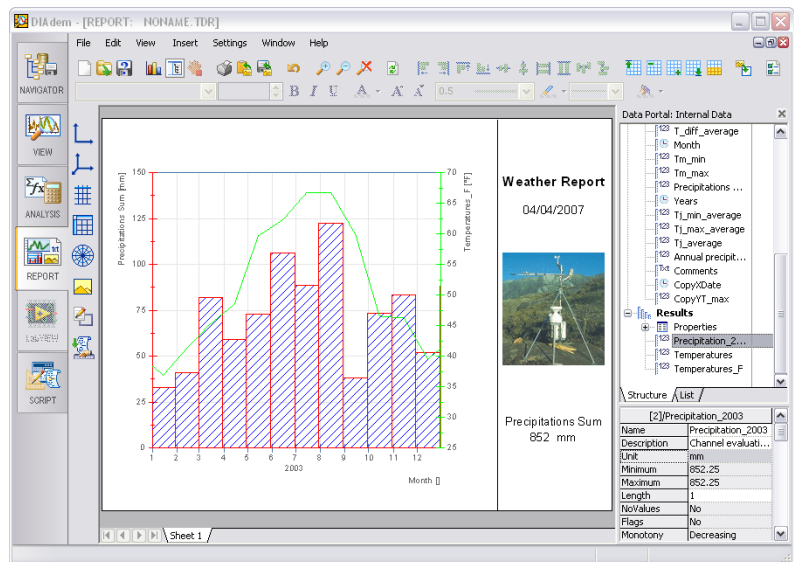


Figure 5-2. Labeling a Report

## Inserting and Editing Tables

Use tables in a report to list the contents of channels. To create a second worksheet for a table in portrait format, complete the following steps.

1. Right-click the **Sheet 1** tab of the worksheet and select **New** to create a second worksheet.
2. Select **Settings»Layout Setup»Worksheet Parameters**.
3. Select **Use local page format** and **Portrait**.
4. Click **OK**.

The second worksheet that DIAdem creates for the table is vertical, and the first worksheet remains horizontal.

To add a table to your worksheet, complete the following steps.



1. Click **2D Tables** on the group bar.
2. Click **2D Table with Vertical Separators** on the function bar. A small rectangle appears at the cursor.
3. Click and drag open the table frame anywhere in the worksheet. Resize the table by dragging the small squares on the edges of the table with your mouse cursor.
4. <Ctrl>-click the channels `Weather /Month`, `Weather / Precipitations Sum`, `Results /Temperature`, and `Results / Temperatures_F` in the **Data Portal**.
5. Drag and drop the selected channels into the table.  
DIAdem displays the channel contents with all decimal places.
6. Double-click a number in the first table column that has the heading **Month**.



- a. Click the button next to **Format**, which is shown on the left.
  - b. Select `Date` as the **Category** and `June 01` as the **Type**.
  - c. Click **OK**.
7. Select the second channel `Precipitations Sum` on the **Column Properties** tab.
    - a. Click **Format** and select `Number` as the **Category**.
    - b. Click **OK**.

8. Select the third `Temperature` channel on the **Column Properties** tab.
  - a. Click **Format** and select `Number` as the **Category**. Enter 1 as the number of **Decimal places**.
  - b. Click **OK**.
9. Select the fourth channel `Temperature_F` on the **Column Properties** tab and repeat Steps 8a and 8b.
10. Select the **Scaling** tab.
  - a. Enter 2 for **Start at row** and 13 for **End at row**, to list all the months of the year.
11. Click **OK** to conclude table editing.

DIAdem displays the table similar to Figure 5-3.

Month	Precipitations Sum	Temperatures	Temperatures_F
Jan 03	33	2.7	36.9
Feb 03	41	5.3	41.5
Mar 03	82	7.3	45.2
Apr 03	59	9.2	48.5
May 03	73	15.4	59.7
Jun 03	106	16.8	62.3
Jul 03	89	19.3	66.7
Aug 03	123	19.3	66.7
Sep 03	38	15.4	59.8
Oct 03	74	8.1	46.5
Nov 03	83	7.9	46.2
Dec 03	52	4.2	39.5

**Figure 5-3.** Inserting a Worksheet with a Table

You can use the layout with all the worksheets as a template for all similar data sets. To save the layout, complete the following steps.



1. Click **Save Layout As**.
2. Enter the filename `MyReport.tdr` and click **Save**.

## Summary

---

The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

### Worksheets

You can add axis systems, text, tables, and graphics to your worksheet. To add data to the worksheet, drag and drop channels from the Data Portal into axis systems and tables. In addition to selecting data channels from the Data Portal, you also can add data channels by double-clicking an axis system or a table.

Select **Settings»Layout Setup»Worksheet Parameters** to change the page format of the current worksheet from horizontal to vertical, for example.

### Layouts

DIAdem saves the layout separately from the channels. You can reuse the layout as a template for data sets with a similar structure. One layout can contain several worksheets.

### Reports

When you fill a layout with data, you create a report. Select **File»Append Layout** to import layouts you created previously.

### Chart Wizard

You can use the Chart Wizard to create and to modify 2D axis systems and polar axis systems. The preview function displays each changed setting in the worksheet.

### Axis Systems

Axis systems allow you to display channels as curves. After you double-click an axis system you can edit the displayed curves, add new curves, and delete curves.

### Tables

You list channel contents in tables. After you double-click a table you can edit the displayed columns, add new columns, and delete columns.

## Texts

You can add text to label worksheets. Text can also include variable information such as filenames or the current date. For DIAdem, the @@- characters indicate a variable expression. Click **Refresh** in the DIAdem REPORT toolbar to display the current variable contents.

## Decorations

Use comments, lines, arrows, rectangles, and circles in a worksheet to highlight certain areas or curve points.

## Graphics

You can add graphics and company logos to worksheets. DIAdem supports a number of different graphic formats including PNG, BMP, JPG, TIF, and WMF.

## Format Bar

Use the format bar below the toolbar to format report objects. The format bar provides the properties that are available for all the objects that are selected, for example, line width, line style, and line color for a selected curve.

# Automating Sequences

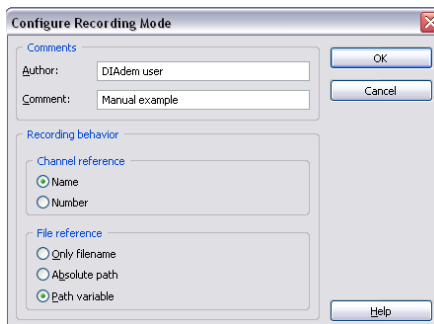
With DIAdem SCRIPT you can create scripts to automate sequences in DIAdem. The recording mode saves all the actions that you complete interactively in DIAdem, in a script. You can add program structures, user variables, and dialog boxes to recorded scripts.

## Creating Scripts

The recording mode is the easiest way to generate scripts. When you enable the recording mode, DIAdem creates a new script in the script editor and records the steps you make in this script. To create a new script in recording mode, complete the following steps.



1. Select **DIAdem SCRIPT**.
2. Click **Enable Recording Mode** on the toolbar to start recording the script.
3. Enter DIAdem user as the **Author** and Manual example as the **Comment**, similar to Figure 6-1.



**Figure 6-1.** Configuring the Recording Mode

DIAdem writes this information directly into the script code to help you identify the script in the future.

4. Click **OK**.

The text **Recording mode is enabled** and the recording mode symbol appear in the status bar.

5. Click **DIAdem NAVIGATOR**.



6. Click **Delete Internal Data** to delete the data in the Data Portal.

7. Enter *Weather* in the search input area of the quick search.

8. Press <Ctrl-A> to insert DIAdem instructions as a template for the search entry.

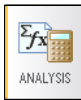
DIAdem inserts several lines in the recorded script. Before you use the script, you must edit these lines. If you do not press <Ctrl-A>, DIAdem does not record the instructions for the search.



9. Click **Search**.

10. Drag and drop the *Data1.tdm* file into the Data Portal.

11. Select **DIAdem ANALYSIS**.



12. Click **Channel Functions** on the group bar.

13. Click **Average Channels** on the function bar.

14. <Ctrl>-click the channels *Weather/Tm\_min* and *Weather/Tm\_max* in the Data Portal.

15. Drag and drop the selected channels into the **Channels to be averaged** field in the **Average Channels** dialog box.

16. Click **Execute**.

17. Select **DIAdem REPORT**.



18. Click **Load Layout**.

19. Select the layout *Report2.tdr* and click **Open**.

DIAdem automatically refreshes the display to show the data set you have just loaded.

20. Select **DIAdem SCRIPT**.



21. Click **Disable Recording Mode**.

DIAdem displays the recorded script in the script editor similar to Figure 6-2.

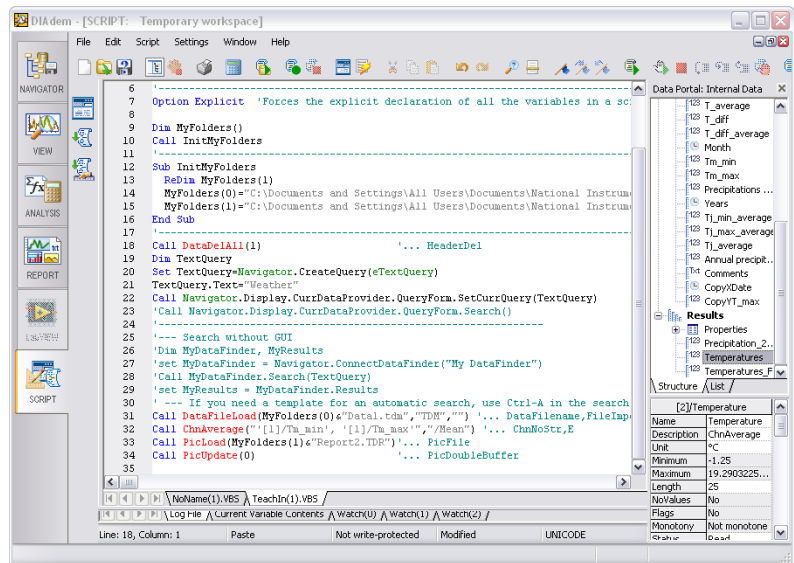


Figure 6-2. Recording Actions in the Script Editor

After the header comments, DIAdem declares the `MyFolders` path variable and assigns the paths to the data folder and to the document folder to this variable. If you want the script to load the data file or the report file from another folder, you only need to change the path at this point in the script.

## Editing Scripts

In the recording mode you pressed <Ctrl-A> to record the search for the weather data. DIAdem has inserted parts of these lines as comments, to allow a search with or without the DIAdem NAVIGATOR interface. To allow interactive data selection in the script, complete the following steps.

1. Delete the quotation mark at the beginning of script line 23 and convert the comment into a command.  
The command executes a search with the user interface.
2. Replace the script line for loading the data file `Data1.tdm` with the following script lines:

The first script line opens the NAVIGATOR panel and the second line stops the script so that you can load data interactively.

DIAdem displays the modified script similar to Figure 6-3.

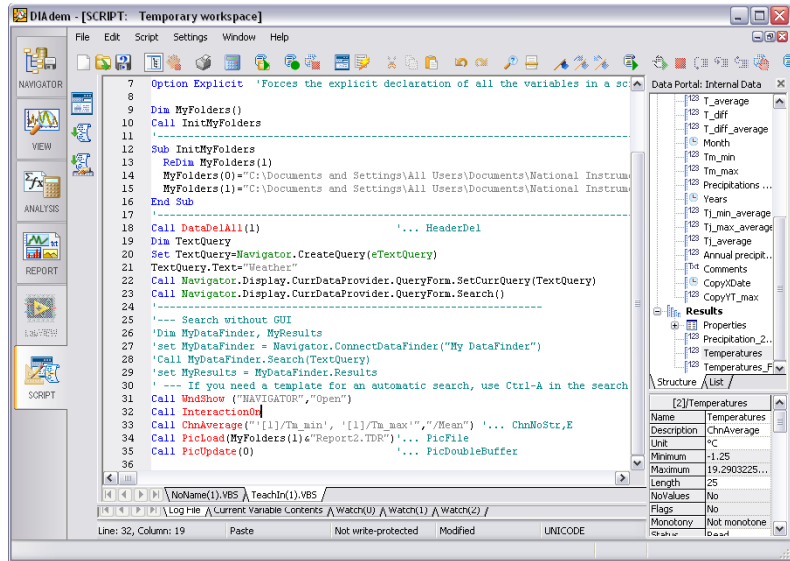


Figure 6-3. Edited Script in the Script Editor

## Testing and Saving Scripts

To test the modified script, complete the following steps.



1. Click **Run Script**.

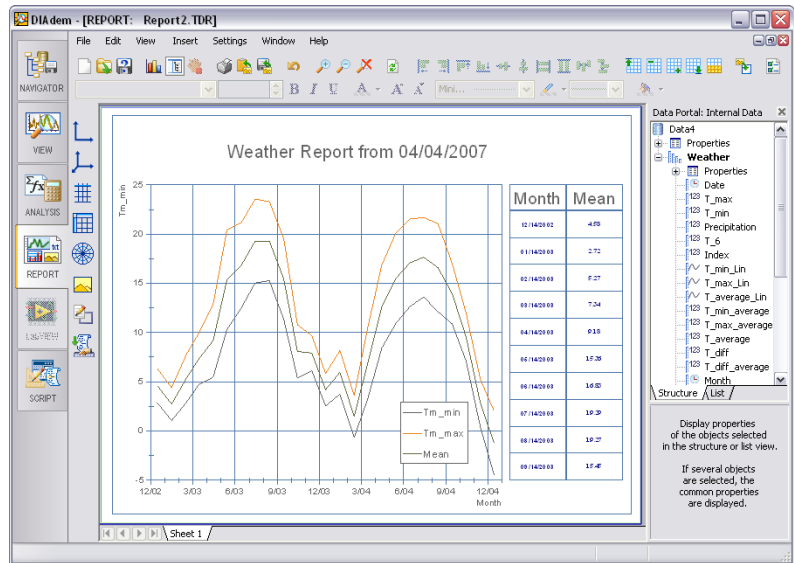
The script opens the NAVIGATOR panel and displays in the **Search Results** all the data files that contain the term `Weather`.

2. Click the file symbol in front of the `Data4.tdm` file to select the file.
3. Drag and drop the selected file into the Data Portal.



4. Click **End Interaction** on the toolbar.

The script opens the **REPORT** panel. DIAdem refreshes the date in the heading similar to Figure 6-4.



**Figure 6-4.** Report Created with the Script

To save the script, complete the following steps.

1. Select **DIAdem SCRIPT**.
2. Click **Save File As**.
3. Enter `MyScript` as the name and click **Save**.



## Summary

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The summary provides an overview of the topics discussed in this chapter. It also includes additional information.

## Scripts

Scripts allow you to execute a series of commands for finding data, loading data, analyzing data, and creating reports. You can use VBS syntax and DIAdem commands in scripts. You can integrate the standard dialog boxes in scripts or you can create your own dialog boxes.

## Recording Scripts

DIAdem records every command you perform in the recording mode in the script file.

### <Ctrl-A>

In the recording mode, DIAdem does not usually record the value assignment for program variables. For example, press <Ctrl-A> in a DIAdem REPORT dialog box to record the values of the program variables. If DIAdem is not in the recording mode, press <Ctrl-A> to copy the program variable value assignment to the Windows clipboard.

## Script Editor

The script editor displays the program code of scripts. While the recording mode is activated, DIAdem records the commands associated with the actions that you perform, in the script editor. Use the Microsoft Windows script debugger in the script editor to work through scripts step by step and to find errors.

## Interaction Mode

When you use the interaction mode, you can stop your script to work interactively with DIAdem. You enable the interaction mode in scripts with the `InterActionOn` command. To end the interaction mode, click **End Interaction**, which is on the toolbar in all panels.

## User Commands

To add commands to DIAdem, you can define user commands in a script. You use these user commands in Calculator formulas, for axis systems formats in DIAdem REPORT, and as new commands in DIAdem SCRIPT.

## User Dialog Boxes

You can create user dialog boxes in the dialog editor in DIAdem SCRIPT to enter values, to request settings, or to start functions. You can use events to link elements from user dialog boxes, for example, to specify the selection in ListBoxes in relation to the previous settings.



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