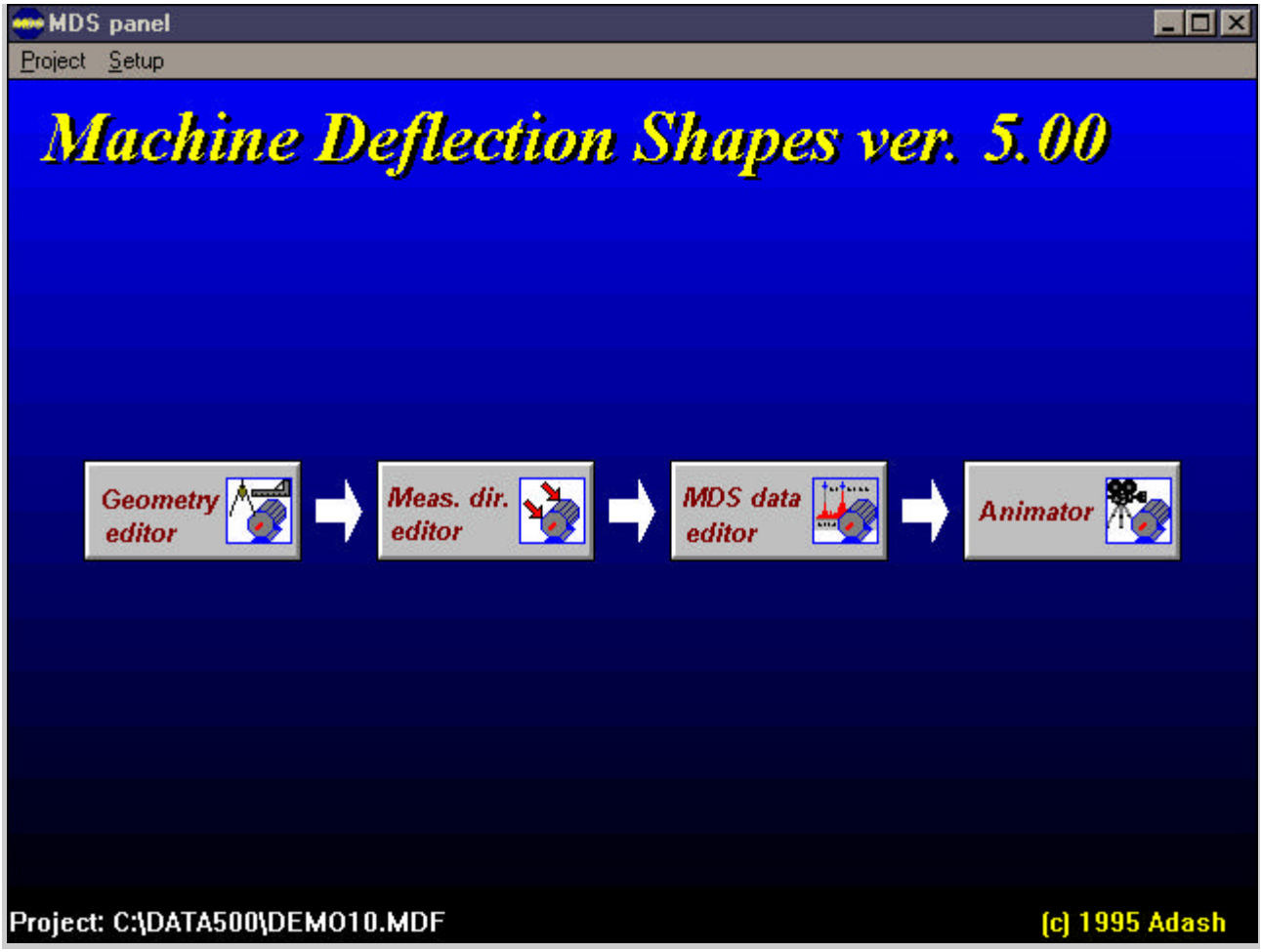
MDS Win

Ver. 5.00



Contents

Installation

Start the ***Setup*** program after inserting of installation disk into proper PC drive. The ***MDS*** program will be installed on selected directory on harddisk. ***MDS*** is offered as implicit directory.

HASP protection key

Before starting of majority of ***MDS*** program modules it is necessary to plug ***HASP*** key into parallel port (printer port). The printer is to be connected behind ***HASP*** key.
The only program, which is not blocked is the ***Animator*** . It is allowed to be freely distributed.

MDS panel - project administrator

MDS panel represents the application, which enables interactive work with MDS program chaining. Basic buttons start individual modules. The arrows between the buttons show the way of progress of the object definition as far as to final animation. The buttons are available or not with regards to which action is admissible for the object.

The main modules:

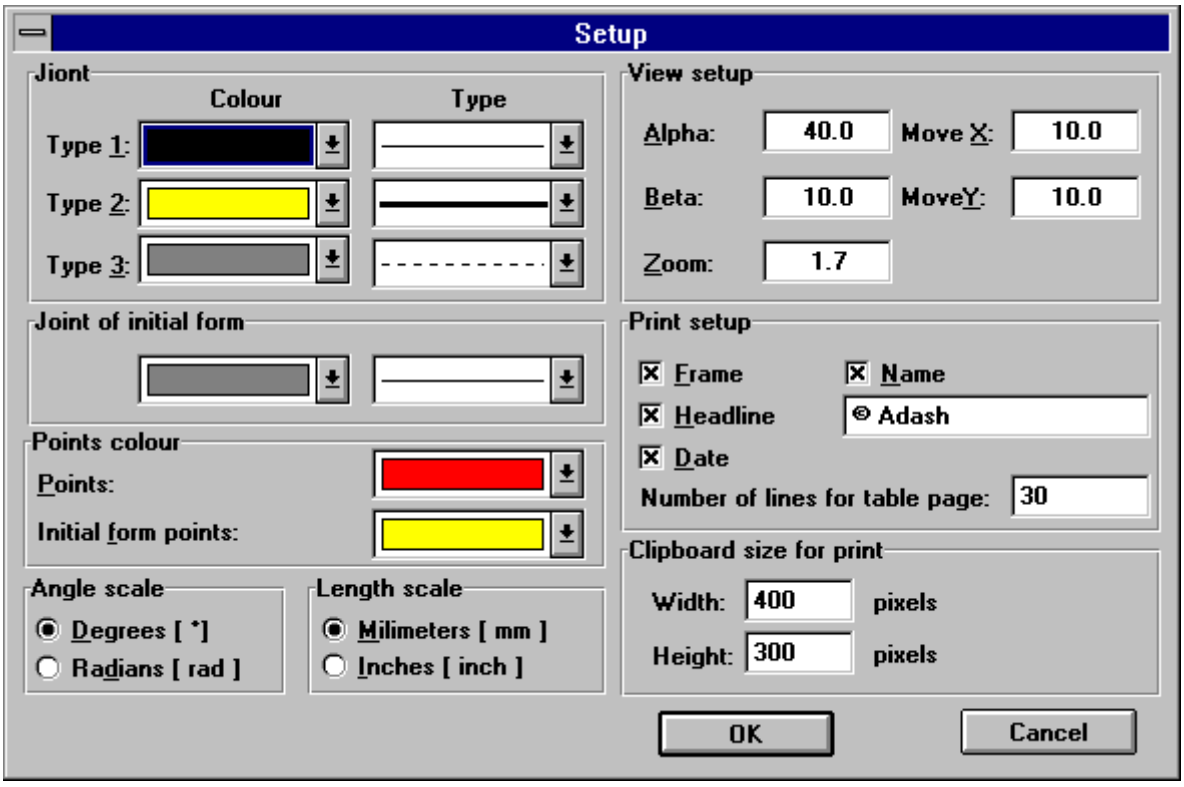
Geometry editor enables definition of geometry of the object. It is active whenever starting MDS panel, so that there would be possible to begin definition of new object.

Measurement directions editor enables definition of measurement directions on the model, created in previous module. It is available only when the project with defined geometry is open.

MDS data editor enables adding of the data to measurement directions, which will be used for animation. The data is possible to define manually or by processing of measured spectra by choice of dominant vibration frequencies.

Animator enables animation of defined object. Together with previous module it is active only when the project is open.

You can open the project, all modules will work with, after choice of **Project** and **Open** items from the main menu, or you can open the new one by means of **New** item. The project name will display on the lower left corner of the window. When opening a new project in geometry editor, the project name will appear till after leaving of this project.



The next main menu item represents **Setup**. This item enters ***MDS setup*** dialog window, which determines initial setting of MDS chain.

MDS setup

Joints - You can set 3 types of joints here. Every joint has optional colour and line type (width and connection).

Joint of initial form - The same possibilities as for joints. Initial form can be displayed in ***Animator*** module only.

Points colour - You can set points colour of the object and a colour of the points of the initial object form.

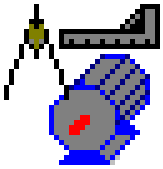
Angle scale and Length scale - Here you can select degrees or radians for angles and millimetres or inches for length. This setup is valid for all MDS modules.

View setup - By means of suitable setting of the values you can select rotation angle, zoom and move of the object for initial display. ***Alpha*** and ***Beta*** are inputted in degrees while ***Alpha*** represent rotation angle in horizontal direction (0 ° - 360 °) and ***Beta*** is rotation angle in vertical direction (-90° - 90 °). ***Zoom*** item defines coefficient for multiplication of final increase of the object.
For example, if zoom value in setup dialog in ***Geometry editor*** will be 2, resulting zoom will be calculated as follows: twice this item, that means 2 x 1,7 = 3,4. The last items represent ***Move*** values in X and Y axes. These values determine number of units for move (move step).

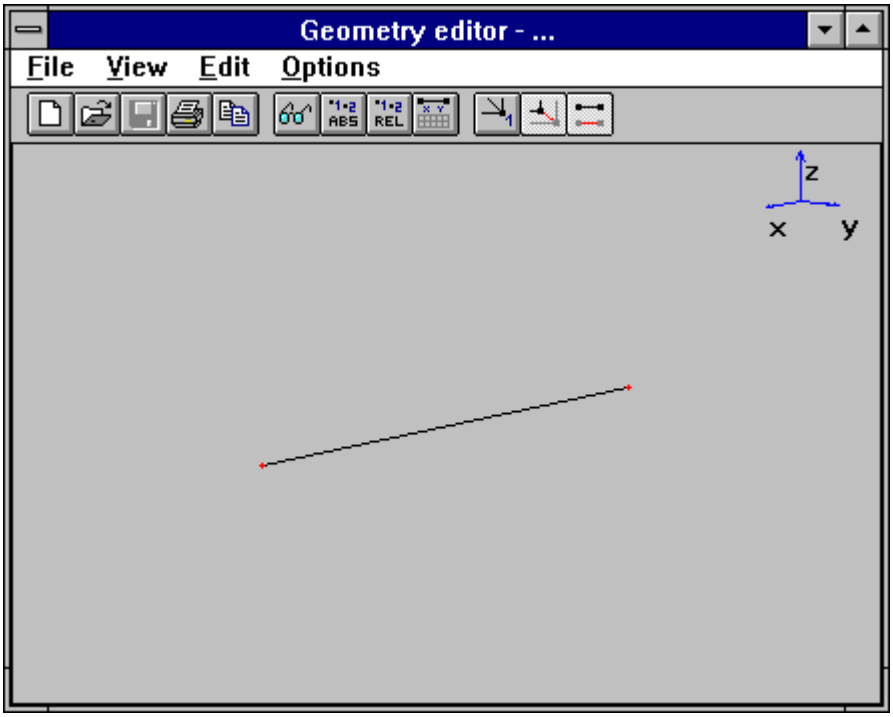
Print setup - You can define a form of the protocol for print here. By means of ***Frame*** check box you can switch over framing a paper sheet, ***Headline*** enables automatic writing of the protocol name by the object name. ***Date*** locates actual date into a lower left corner and ***Name*** writes the name inputted in edit box below into a lower right corner.

Clipboard size for print - You can select the clipboard size, the print will be performed in, after application of **Copy to clipboard** function.

Geometry editor



Geometric shape of measured object represents resulting product of this module. On the object points you can define degrees of freedom in ***Measured directions editor*** then. After start of this application the ***Geometry editor*** window appears.



Menu

The main menu consists of following items. **File** enables managing files, opening, creating new file, saving, printing, printing into the clipboard and exiting the application. **View** item displays view dialog for selection of object's view angle, zoom and move. Next item is **Edit**. This item enables editing of both points and joints absolutely and relatively. **Options** item serves for setting maximum points and joints number and further useful parameters.

File

The main menu item **File** opens next submenu. **New** enables to create new project. Two point and their joint appear as the base after that. **Open** loads the file with **MDF** extension, which is utilised by ***MDS*** projects. **Save** stores the file, but only if the file is already named. In opposite case, that means when window title is **...**, this item is not available. A name of the object arises after select of **Save as** item.

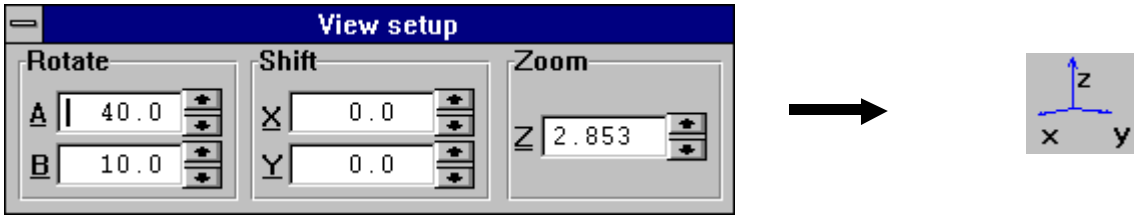
Next two items are determined for printing of protocols. After choice of **Print** item you can set print parameters and start printing as usually. **Print setup** allows configuration of a printer. **Copy to clipboard** makes the object's copy into the clipboard. Clipboard size you can set in ***MDS panel*** beneath **Configuration**. **Exit** item terminates the program.

Practically all these commands are represented as tool bar buttons. The tool bar is located below the main menu and it is not movable.

The sequence of the buttons is: **New**, **Open**, **Save**, **Print** and **Copy to clipboard**.

View

The main menu item **View** displays view dialog, which is the same in all modules.



The values of **A** (alpha) and **B** (beta) are displayed in ***Rotate*** section. They can be inputted either from the keyboard or by means of the mouse tuning by arrows near by editing boxes. In order to be more clear on what position is just the object situated, the axes cross is presented. The cross reacts upon the angles modifications. The items in ***Move*** section determine moving the object in **X** (horizontal direction) and **Y** (vertical direction) on the screen. Move step is appointed in ***MDS panel*** setup. For increase and decrease of the object there is ***Zoom*** item prepared in the last section. Minimum value is 0.001, maximum can reach 100.

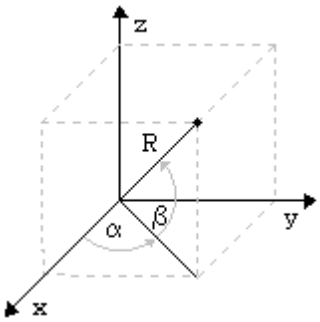
System of coordinates

For simplifying of editing of complicated objects, with e.g. cylindrical or another intricate forms, ***Geometry editor*** supports more systems of coordinates. Therefore you can use Cartesian, spherical or cylindrical coordinates.

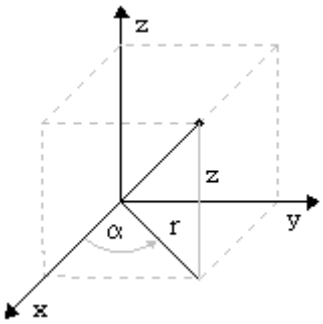
Cartesian coordinates are defined by means of triad of mutually vertical vectors, which determines directions of x, y and z axes. A point coordinates are defined by (x, y, z) triad. Cartesian coordinates are initially adjusted.

Spherical coordinates are determined by vector and a pair of solid angles (picture 1). These coordinates are suitable for circular parts of the object.

Cylindrical coordinates are defined by vector, angle and z coordinate (picture 2). These coordinates are suitable for cylindrical surfaces of the object.



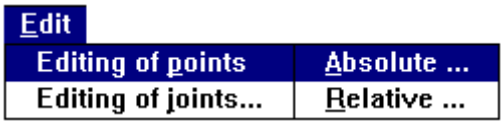
pic. 1 - spherical coordinates



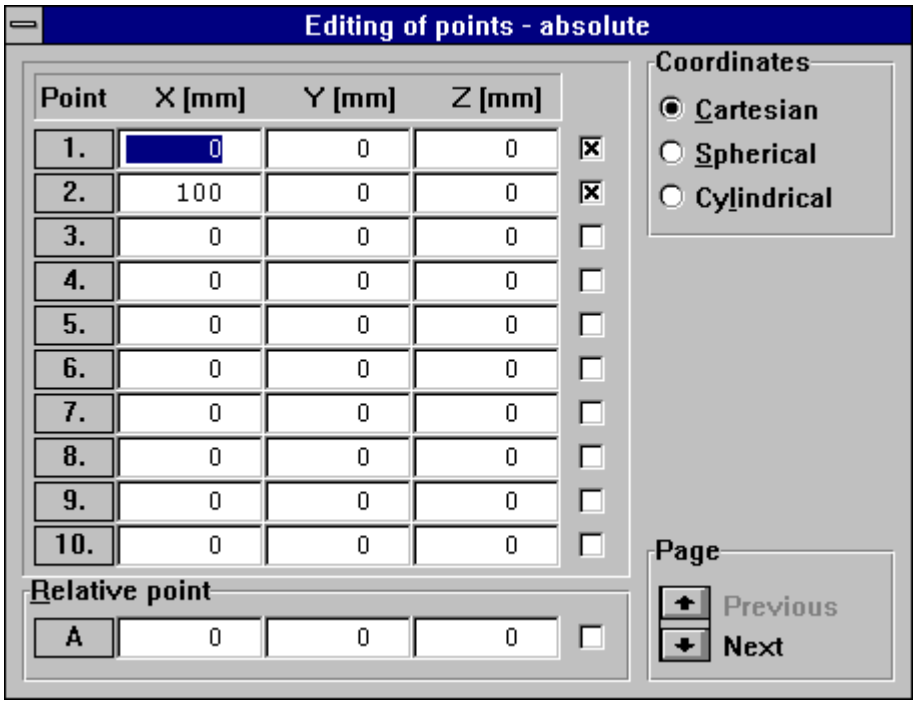
pic. 2 - cylindrical coordinates

Edit

Editing of points - absolute

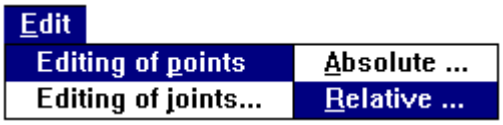


Editing of points - absolute dialog window appears after gradual selection of the items **Edit**, **Editing of points** and **Absolute ...**, or by pushing of appurtenant icon in the tool bar.



You can edit directly in the table here. Numbers of points are gradually displayed in the first column named ***Point***. The other columns are reserved for concrete points coordinates with regards to selected system of coordinates. Cursor move in the table is directed by *TAB* key (one cell forward) and *SHIFT* + *TAB* keys (one cell backward). The point can be selected as active or non-active by ticking of check boxes next to editing boxes.
Relative point serves for determination of the circumcenter during definition of a circle or its part. After tick of the check box, all points are automatically recounted respect to coordinates of this relative point. Geometric character (mark) of relative point is a point inside a square.
Page item serves for choice of another page. It shifts the table 10 lines downward or upward. This can be performed either by mouse or by *PAGE UP* and *PAGE DOWN keys.*
Switches in ***Coordinates*** section serves for selection of another system of coordinates.

Editing of points - relative



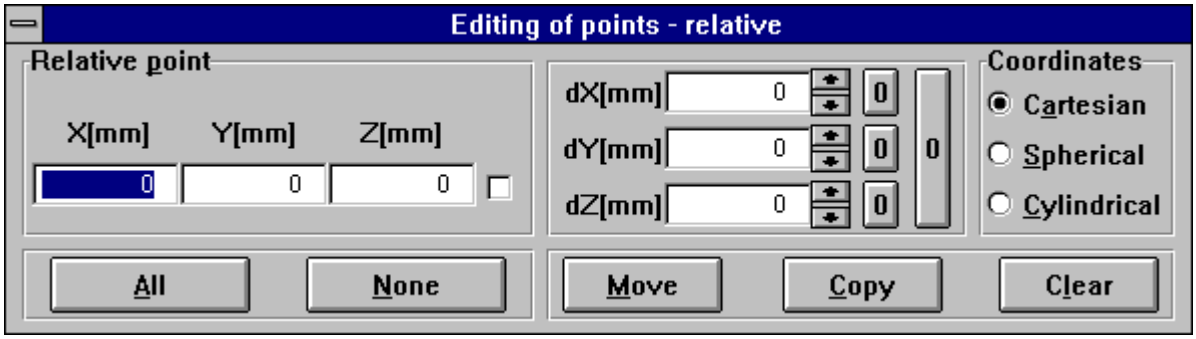
Editing of points - relative dialog window appears after gradual selection of the items **Edit**, **Editing of points** and **Relative ...**, or by pushing of appurtenant icon in the tool bar.

Relative editing requires selection of points, you want to operate with, first. You have to activate them by mouse.

Designation (activation) of points is to be performed by double click of the mouse on concrete point. This action displays white circle around the point. Similarly you can select relative point by double click of the right mouse button.

Relative point section is completely the same as in absolute editing.

The buttons below ***Relative point*** section have following meaning:



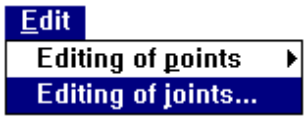
All - designates all points of the object.
None - deletes designation of all points of the object.

You can start proper editing after designation of the points. Set a values for copy or move of the points in ***dX***, ***dY*** and ***dZ*** control boxes. Inputting of the values is possible in two ways. By manual input or by arrows nearby boxes. In addition you can use zero setting buttons for each controller, or one for resetting all at once. Choice of system of coordinates is available too. When increase values are inputted you can select from following functions.

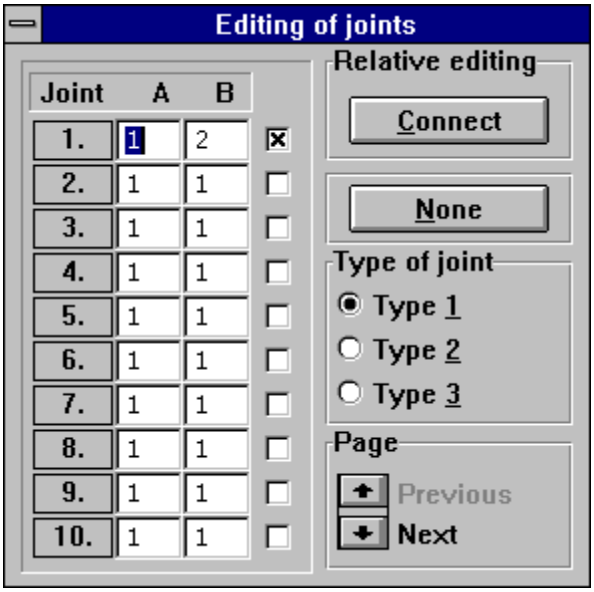
Move - shifts designated points into selected location.
Copy - makes copy of designated points into selected location.

Clear - deletes all designated points. Minimum number of points, which must remain valid is 2. The reason for that is calculation of the object scale.

Editing of joints



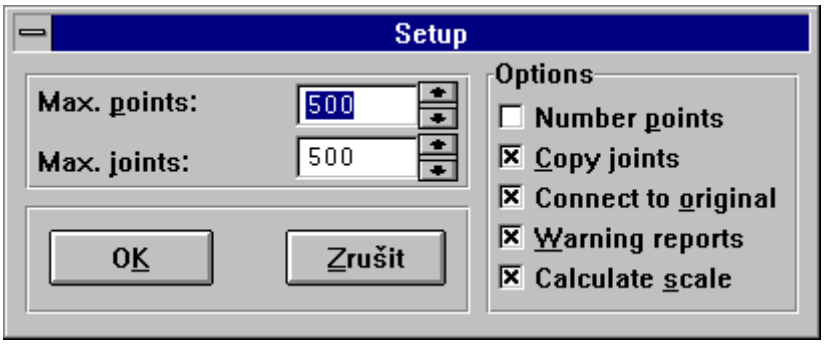
Editing of joints dialog window appears after gradual selection of the items **Edit** and **Editing of joints**, or by pushing of appurtenant icon in the tool bar.



You can edit joints here. Controlling of the table is the same as in ***Editing of points - absolute***. Relative editing is represented by the buttons **Connect** and **None**. You have to designate points for connection first, and to push **Connect** button then. Points are connected in the same order as they have been designated and with type of joint which is just set in ***Type of joint*** section. When the joint between the points already exists, it is deleted. Which joint corresponds to which individual type is selected in the main configuration program in ***MDS Panel***. **None** button deletes designation of all points.

Geometry editor setup

Setup window displays after selection of **Options** main menu item. Here you can set ***Geometry editor*** according your needs. Maximum number of points is limited to 1000 and maximum number of joints is 2000. This should be sufficient number for complicated objects.
Exceeding of this values evokes occupation of the disk or another medium memory space.
You can choose in ***Options*** section from:



Number points - switches on-off numbering of the object points. This option is useful in absolute editing for better orientation.

Copy joints - if joint exists between points when making copy, this joint will be copied. This is useful e.g. when copying the object parts.

Connect to original - inserts (plots) a joint between original point and copied point.

Warning reports - during relative editing you are asked for confirmation of all intended commands - copy, move, clear. You can delete this check by ticking of the proper box.

Calculate scale - deleting of this item raises the situation, when during any operation, recount for the object increase and centring will not be performed.

A cube (brick) construction procedure

1. In the main menu of the ***Geometry editor*** choose **File** and ***New***.

2. In the main menu of the ***Geometry editor*** choose **Options**. The ***Setup*** dialog window appears.

3. Tick the ***Number points*** check box.

 The same occurs after clicking of this button in the tool bar.

4. In the main menu of the ***Geometry editor*** choose **Edit**, **Editing points** and **Relative**. The ***Editing of points - relative*** dialog box appears.

 The same occurs after clicking of this button in the tool bar.

5. Activate points 1 and 2. You can do it by means of a simple click of the mouse directly on individual points or by pushing of the **All** button in the ***Editing of points - relative*** dialog box.

6. In the ***dY [mm]*** box, set value 100 by means of the arrows or type this value directly into this box and press *Enter*.

7. Choose the **Copy** button and confirm your intention.

8. Choose the **All** button.

9. In the ***dZ [mm]*** box, set value 50 by means of the arrows or type this value directly into this box and press *Enter*.

10. Choose the **Copy** button and confirm your intention.

11. Choose the **None** button.

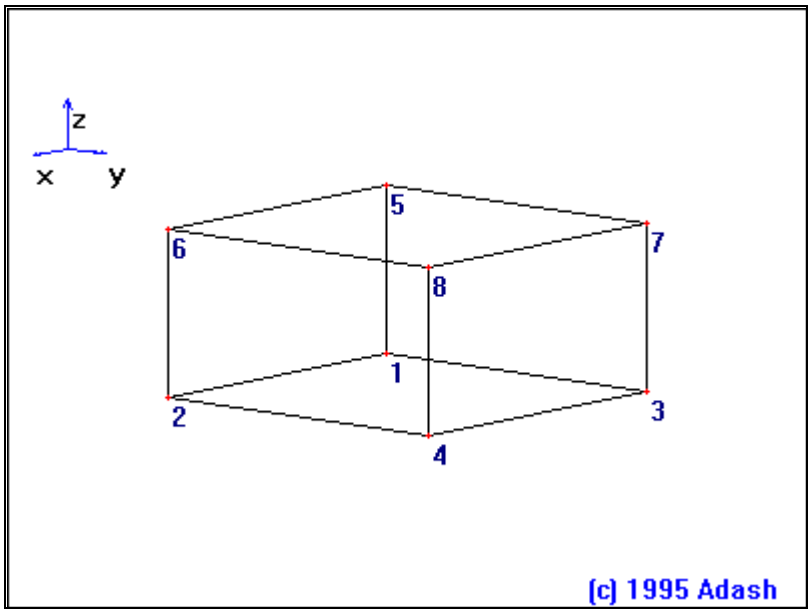
12. Close the ***Editing of points - relative*** dialog box.

13. From the main menu choose **View**. The ***View setup*** dialog box appears.

 The same occurs after clicking of this button in the tool bar.

14. Choose a suitable view angel and zoom.

15. From the **File** menu choose **Save as ...** and save the cube (brick) beneath some file name.


z
x
y
5
6
7
8
1
2
3
4
(c) 1995 Adash

A circle construction procedure

1. In the main menu of the ***Geometry editor*** choose **File** and ***New***.

2. In the main menu of the ***Geometry editor*** choose **Options**. The ***Setup*** dialog window appears.

3. Tick the ***Number points*** check box.

 The same occurs after clicking of this button in the tool bar.

4. Tick off the ***Connect to original*** box.

 The same occurs after clicking of this button in the tool bar.

5. Activate the point 2 by single click of the mouse.

6. In the main menu of ***Geometry editor*** choose **Edit**, **Editing points** and **Relative**. The ***Editing of points - relative*** dialog box appears.

 The same occurs after clicking of this button in the tool bar.

7. In the ***dY [mm]*** box, set 100 by means of the arrows or type this value directly into this box and press *Enter*.

8. Choose the **Copy** button and confirm your intention.

9. Activate the ***Connect to original*** item in the ***Setup*** dialog box or directly in the tool bar.

10. Mark the point 2 as the ***Relative point*** by means of the right mouse button. This point will be signed by rectangular and its coordinates appear in the ***Editing of points - relative*** dialog box in the ***Relative point*** section.

11. Choose ***Spherical coordinates***.

12. In the ***dB[^{o}]*** box, set 30 by means of the arrows or type this value directly into this box and press *Enter*. White circle appears on the location of a future point 4.

13. Choose the **Copy** button and confirm your intention.

14. Repeat the items 12-13 till to connection with the point 3, till finishing the circle.

15. Choose the **None** button.

16. Close the ***Editing of points - relative*** dialog box.

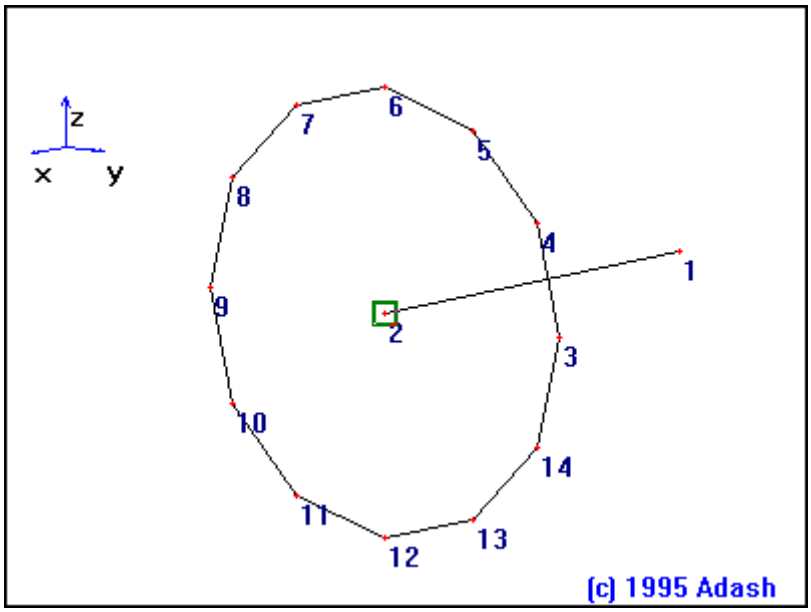
17. From the main menu choose **View**. The ***View setup*** dialog box appears.

 The same occurs after clicking of this button in the tool bar.

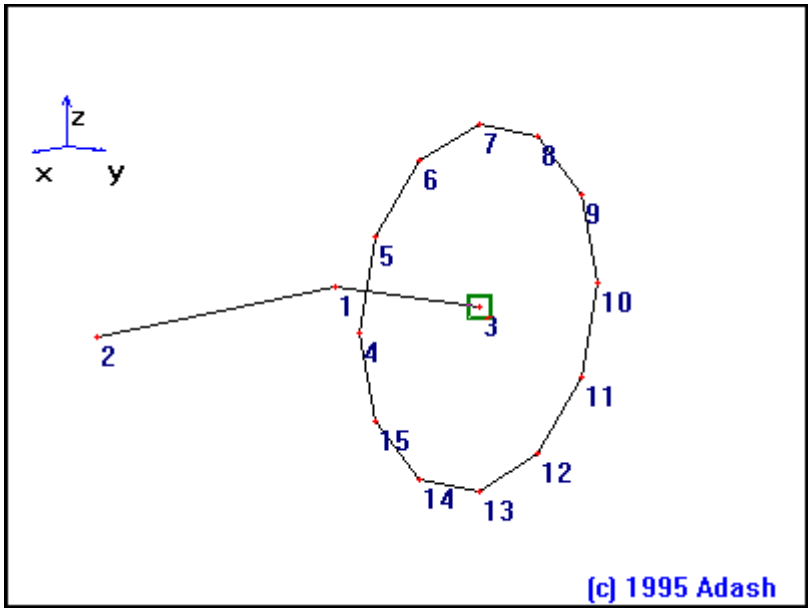
18. Choose a suitable view angel and zoom.

19. From the **File** menu choose **Save as ...** and save the circle beneath some file name.

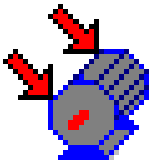
The circle upright X axis.



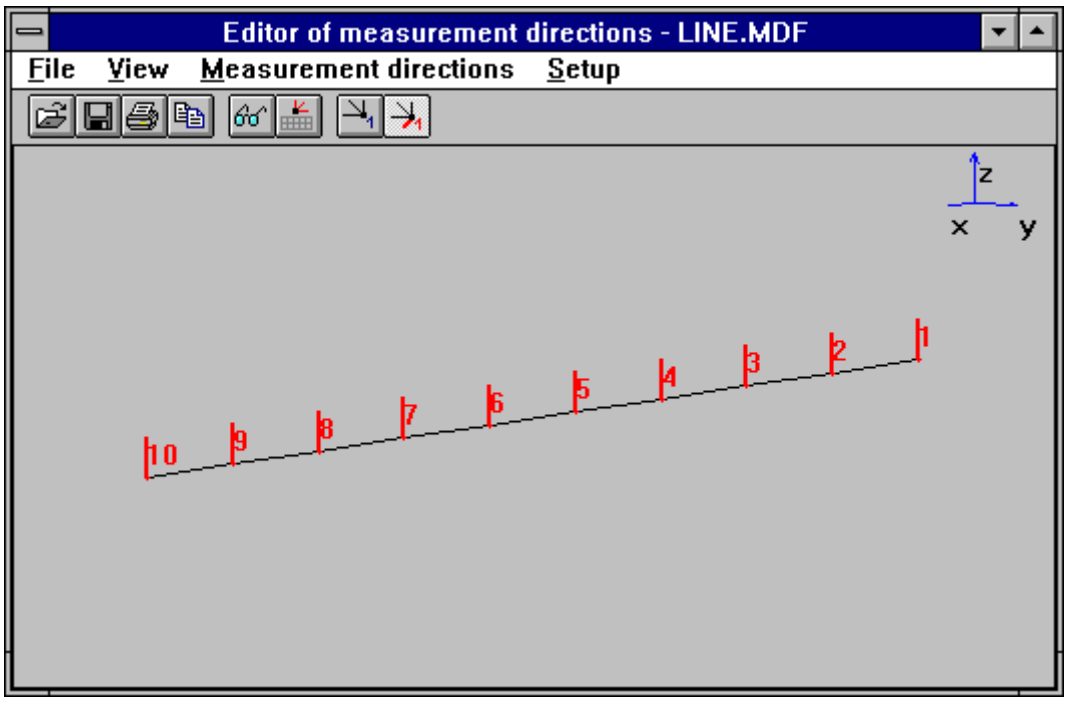
The circle upright Y axis.



Measurement directions editor



After definition of geometry you can pass to definition of degrees of freedom on individual object points. ***Editor of measurement direction*** window with the object name appears after start of this application. This module can be started only if geometry is already defined. For your better illustration the LINE.MDF object

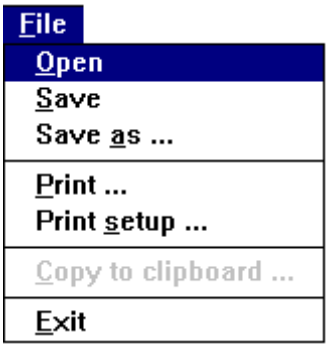


was created.

Menu

The main menu consists of following items. **File** enables opening the project, saving the project on a disk, printing, printing into the clipboard and the program exiting. **View** item displays the view dialog for choice of view angle, zoom and move. **Measured directions** item enables editing of degrees of freedom on the object points. The last item represents **Options**, where you can set maximum degrees of freedom and next useful parameters.

File



The main menu item **File** opens next submenu. **Open** loads the file with **MDF** extension. **Save** stores the file. **Save as** item stores the file with new name.
Next two items are determined for printing of protocols. After selection of **Print** item you can set print parameters and start printing as usually.
Print setup allows configuration of a printer. **Copy to clipboard** makes the object's copy into the clipboard. Clipboard size you can set in ***MDS panel*** beneath **Configuration**. **Exit** item terminates the program.

Practically all these commands are represented as tool bar buttons. The tool bar is located below the main menu and it is not movable.

The sequence of the buttons is: **New**, **Open**, **Save**, **Print** and **Copy to clipboard**.

View

The main menu item **View** displays view dialog, which is the same in all modules.
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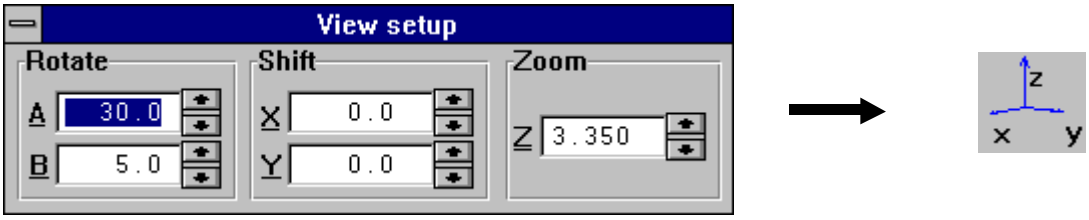
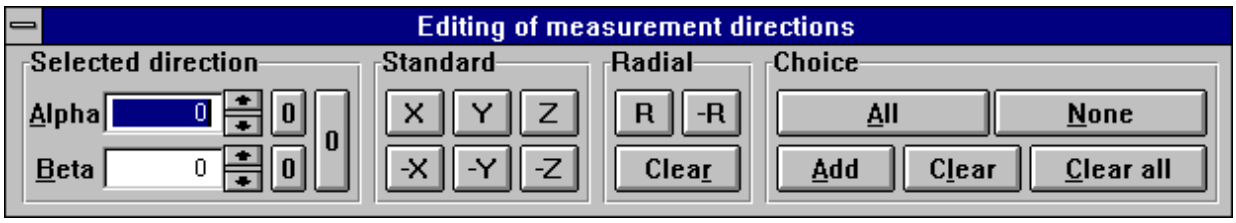


The values of **A** (alpha) and **B** (beta) are displayed in ***Rotate*** section. They can be inputted either from the keyboard or by means of the mouse tuning by arrows near by editing boxes. In order to be more clear on what position is just the object situated, the axes cross is presented. The cross reacts upon the angles modifications. The items in ***Move*** section determine moving the object in **X** (horizontal direction) and **Y** (vertical direction) on the screen. Move step is appointed in ***MDS panel*** setup. For increase and decrease of the object there is ***Zoom*** item prepared in the last section. Minimum value is 0.001, maximum can reach 100.

Measurement directions

Editing of measurement directions dialog appears after choice of this main menu item, or after pushing of the proper icon from a tool bar.



In ***Selected direction*** section you can set alpha and beta angles. The angles orientation is the same as in view dialog. The values can be inputted directly from the keyboard or by means of arrows next to edit boxes. The angle scale is selected in the main configuration program. Zero setting buttons serves for clearing of individual or both of boxes. In next section you can set ***Standard*** directions on all axes. You can also define ***Radial*** directions e.g. for definition of measured directions on perimeter. In ***Choice*** section there are following buttons presented:

All - for designation of all object points (same as in ***Geometry editor***)

None - for deleting of designation of all object points.

Add - for adding of direction (according to the values inputted in ***Selected direction*** section) to designated points.

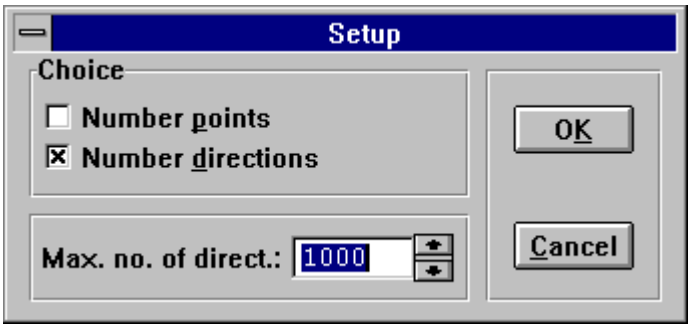
Clear - represents inverse ***Add*** function.

Clear all - deletes all directions on designated (active) points.

If you want to add measurement direction to some point, you have to designate (activate) the point by double click of the mouse and select either standard direction or to define own one (alpha, beta) and to push the button ***Add***. A short line appears on the point with inclination with regards to defined direction. Adding is finished thereby.
If you want to add ***Radial*** direction, you must designate ***Relative point*** (by double click of right mouse button) and designate the points on perimeter. Push ***R*** or ***-R*** button in ***Radial*** section. Adding is finished thereby.
Clear button represents inverse function.

Setting of measurement directions editor

Setup window displays after selection of **Setup** main menu item.



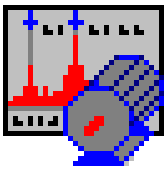
Here you can set ***Measurement directions editor*** according your needs. Maximum number of directions is limited to 1000. This should be sufficient number for complicated objects. Exceeding of this values evokes occupation of the disk or another medium memory space.

You can choose in ***Options*** section from:

Number points - switches on-off numbering of the object points. This option is useful in absolute editing for better orientation.

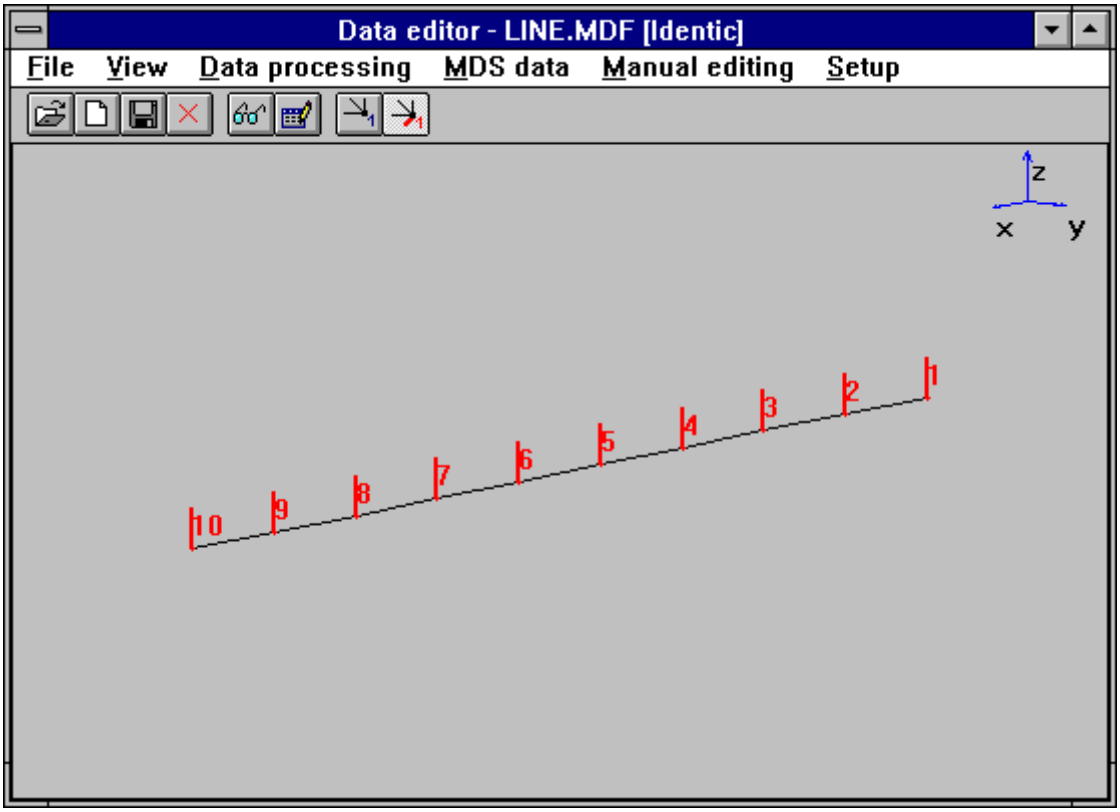
Number directions - switches on-off numbering of the object directions.

MDS data editor



If the object has measured directions already defined, it is possible to proceed to definition of the data. There are two ways how to do it. Either by means of manual definition of the data in the table, or by selection of dominant vibration frequencies from signals measured on individual measurement places.

After start of this module ***MDS data editor*** window appears.



Z measurement directions were selected in previous model on the demonstration object LINE.MDF. Since any spectra aren't added to these directions, you can read inside the brackets ***without data set*** (will be described below).

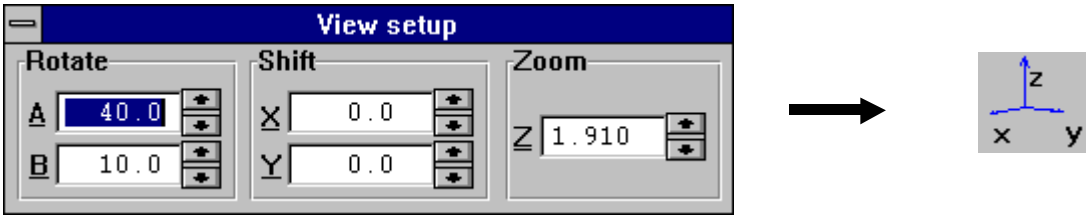
Menu

The main menu consists of following items. **File** enables opening a file with the object and exiting the program. **View** item displays view dialog, when you can select the object view angle, zoom and move. **New data set** item is active only when spectra on individual directions are presented. It enables to choose arbitrary set of the data. **MDS data** item ensures standard operations with output files for animator. **Manual editing** serves for edit of individual directions in the table. By means of **Option** item you can configure this file.

File main menu item always displays submenu with next options. **Open** loads the file with **MDF** extension. In order to there would be possible at all to load the object, measured directions have to be defined. **Exit** terminates work with ***MDS data editor*** module. Opening the file is also possible from the tool bar button.

View

The main menu item **View** opens the view dialog. It is the same in all modules.



The values of **A** (alpha) and **B** (beta) are displayed in ***Rotate*** section. They can be inputted either from the keyboard or by means of the mouse tuning by arrows near by editing boxes. In order to be more clear on what position is just the object situated, the axes cross is presented. The cross reacts upon the angles modifications. The items in ***Move*** section determine moving the object in **X** (horizontal direction) and **Y** (vertical direction) on the screen. Move step is appointed in ***MDS panel*** setup. For increase and decrease of the object there is ***Zoom*** item prepared in the last section. Minimum value is 0.001, maximum can reach 100.

New data set

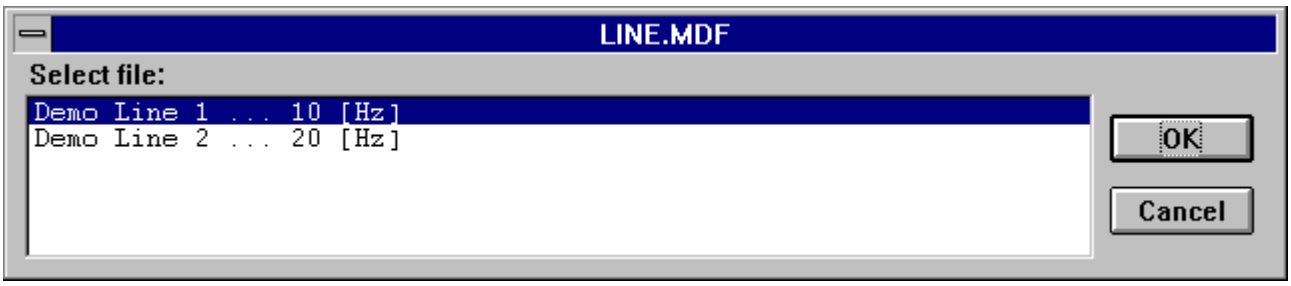
If you have spectra defined on measured directions, e.g. by means of ***DDS Interface*** module, or by another module which enables transfer of a data directly from a measured instrument (such modules are optional), you can select from one of 100 measured data sets. 100 is maximum. The name of concrete data set is displayed as the window title then.

MDS data

The main menu item **MDS data** opens the submenu. **New** item creates new animation data. **Open** loads already existing animation table. **Save** stores the animation table on a disk and **Delete** erases the animation table from a disk. These items are also presented in the tool bar below the main menu.

The sequence of the buttons is **New**, **Save**, **Delete**.

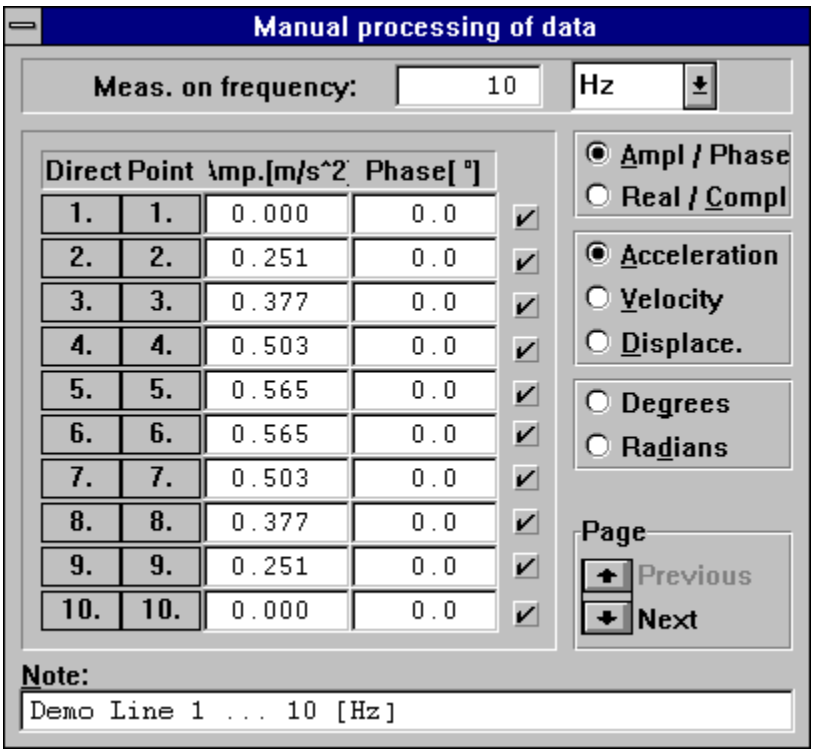
Open item enters the dialog with accessible animation tables. The origin of these tables is described in chapter named ***Editing of data***.



Save item stores just edited table. Even before saving, in case of manual editing, you have to input the frequency which the table will be created for. Otherwise you will be warned that it is impossible to store a table for 0 Hz frequency. During automatic data processing the frequency is created automatically according to selection in a measured spectrum. Deleting of animation table runs after pushing of ***Delete*** item and after selection from the dialog window. It is possible to delete more tables at the same time by multiselect function.

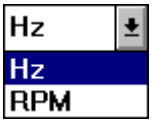
Manual editing of data

Two ways of data editing are prepared, as mentioned above. The first possibility represents manual editing of the data.



After selection of **Manual editing** item from the main menu, ***Manual processing of data*** window appears. This dialog contains so-called ***animation table***.

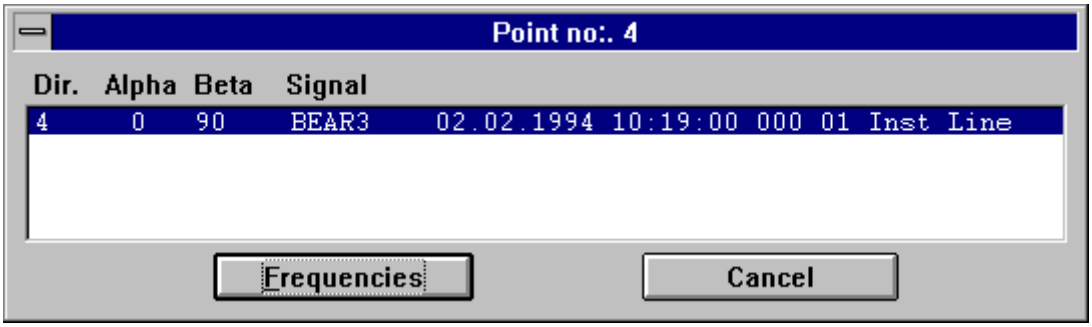
Managing the table is the same as in previous modules. In the first column named ***Dir.*** there are numbers of measurement directions displayed subsequently. In the second column named ***Point*** there are numbers of points connected with concrete directions listed.
Next two columns serve either for editing of amplitude and phase or by switch over ***Real/Compl.*** you can input real and imaginary part.
The values can be inputted in acceleration, velocity and displacement by selection of individual switches on the right part of the screen. Cursor move in the table is directed by *TAB* key (one cell forward) and *SHIFT + TAB* keys (one cell backward).
Page item serves for choice of another page. It shifts the table 10 lines downward or upward. This can be performed either by mouse or by *PAGE UP* and *PAGE DOWN keys.*
The data can be selected as valid or invalid by ticking of a small boxes next to editing boxes. Validity will be expressed with change of colour of the measurement direction. The direction with invalid data is red, direction with valid data is green.
For each animation table must be inputted the frequency, the table was created for. The value can be inputted either in hertz **Hz** or in revolutions **RPM.** The units selection is performed in combo box.



If you have the table already defined you can save it. The name of animation table can be edited in the box under ***Note*** item. Created animation table will be automatically lined into the list of tables and it is whenever prepared for further editing or modification.

Automatic data processing

If you are in possession of the module for communication with ***DDS*** database or with the measurement instrument, you can add measured signals to measurement directions and thus to create the data sets.

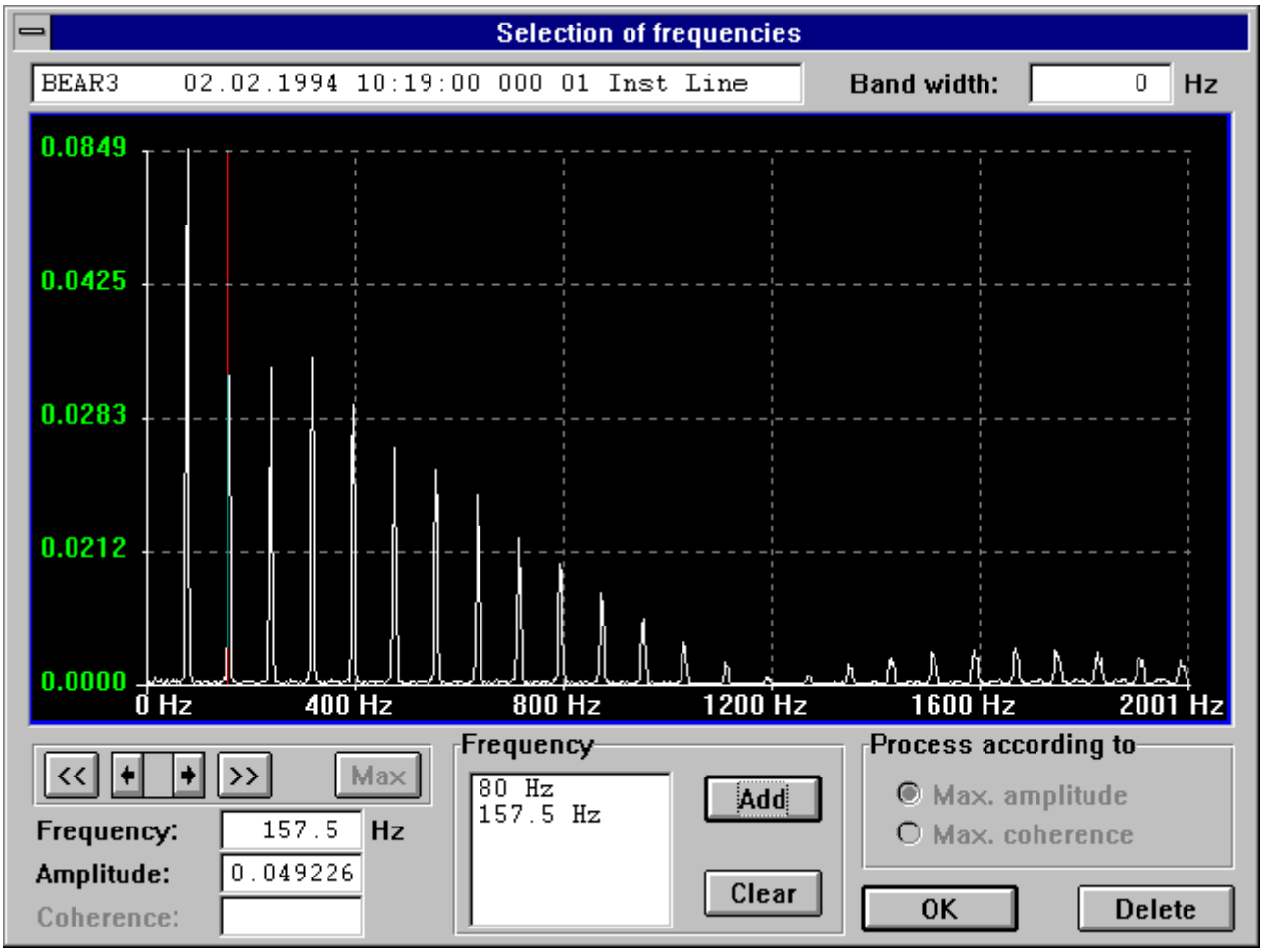


After start of ***MDS data editor*** the window appears, in which you can choose one from 100 data sets. After selection of the data set you can choose spectrum, on which you will select required frequencies. If the point has directions with defined spectra, the window appears, in which you can select spectrum of required direction.

The items of this dialog window have following sense. ***Dir.*** determines direction number, which is active (signal is defined). ***Alpha*** and ***Beta*** provide information about direction orientation and ***Signal*** item contains description of measured signal. If you want to proceed processing push the button **Frequencies**.

Selection of frequencies

There is a trace of measured signal displayed in this window. Signal identificator is displayed above the signal. Vertical red line - cursor determines individual signal samples. The cursor is directed as describes below.



 Move cursor one sample left and right.

 Move cursor 20 samples on the left.

 Move cursor 20 samples on the right.

 Searching of maximum peak in concrete band width.

Below these controllers there are editing boxes ***Frequency*** and ***Amplitude*** situated. They are determined for input of cursor's position and for display of amplitude value. ***Band width*** is determined for choice of width of a band, in which maximum amplitude or coherence will be searched. Band width will be expressed by white transparent oblong along the cursor. Informative box ***Coherence*** serves for orientation reading of coherence value (if it is a part of data set), which can reach values from 0 to 1.
On the picture you can see selected dominant frequency 192,5 Hz. By means of pushing **Add** button in ***Frequency*** section, this value will appear in the list of frequencies. ***Delete*** button takes out concrete frequency or more from the list. Thus you can select arbitrary amount of frequencies for processing.

Process according to section enables to perform processing according to maximum coherence amplitude or according to maximum signal amplitude.

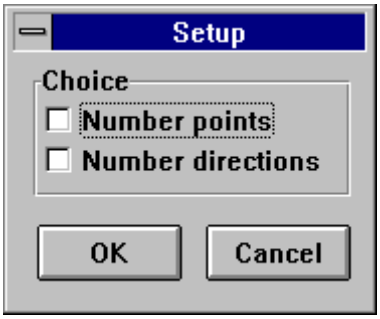
OK button will start processing on all directions, where spectrum or response function is defined and automatic storage of all animation tables with selected frequencies is executed.

Setting of MDS data editor

After selection of **Setup** main menu item ***Setup*** window appears.
You can select from:

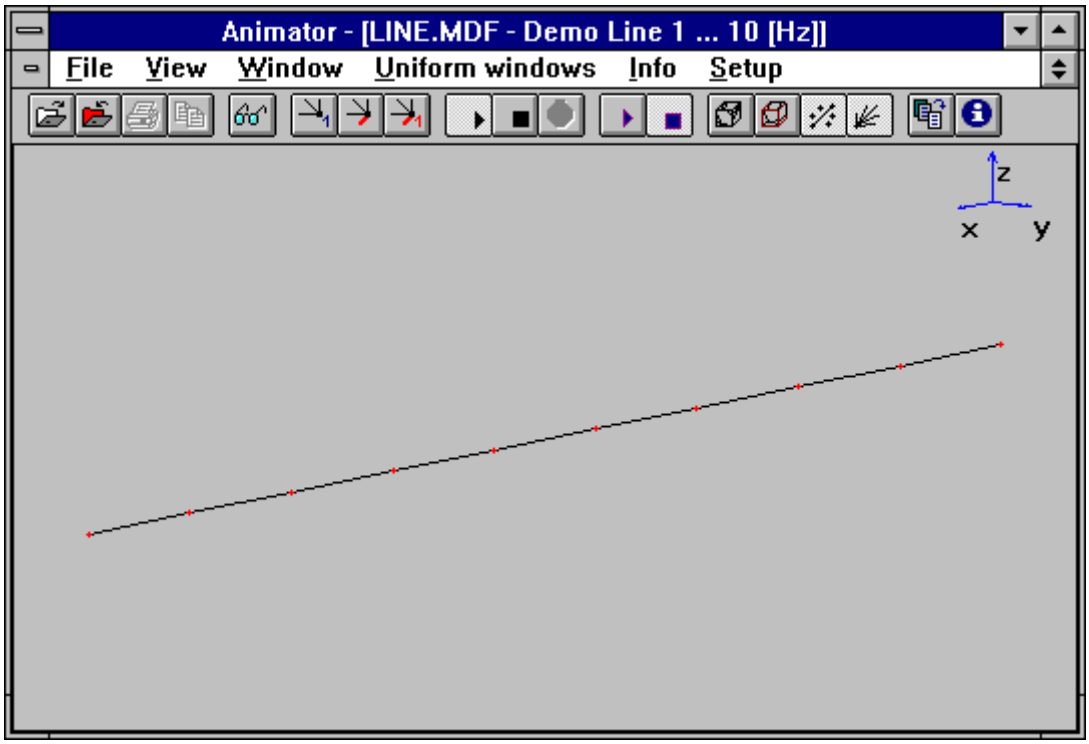
Number points - switches over numbering of object's points. This option is suitable during editing for better orientation.

Number directions - switches over numbering of individual object's directions.



Animator

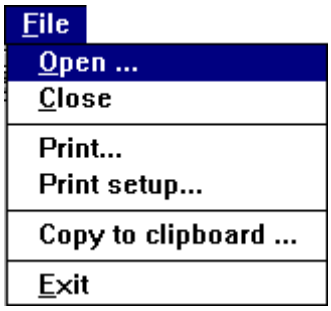
The final item of the chain of ***MDS*** represents the ***Animator*** module. Here you can animate the object according to animation tables, which you have created in previous module. This module supports multiple document (MDI), what means that you can animate more objects, or the only object on various frequencies simultaneously. The main window of the ***Animator*** module appears after starting of this program. After selection of the data file you are asked for required animation table. You can select more tables for ***multifrequency animation*** too. The window with the object appears, the menu changes and a tool bar displays after that.



Menu

The main menu contains following items. **File** enables working with files, opening, closing printing, printing to clipboard and exiting the program. **View** item displays the view dialog in which you can select view angel, zoom and shift. The next item represents **Window**, where you can arrange windows and icons. The list of open objects is displayed here too. The item **Uniform windows** enables the windows uniforming according to the reference one. **Info** item consists of the tables of amplitudes and phases and also of the list of the tables of used animation data. By means of **Setup** item you can set the animator respect to your proper requirements.

File

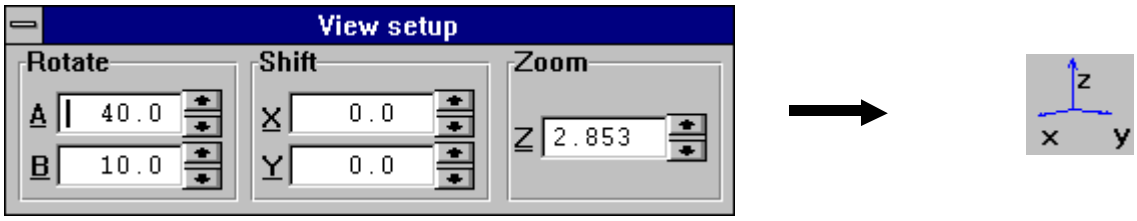


You can select from following possibilities after activation of **File** item in the main menu. **Open** opens a new window with the object and you can also select another animation table. **Close** shuts the active window. **Print** enables printing of the protocol refer to set parameters in ***MDS Panel***. **Print setup** enters the dialog of your printer driver and allows to set print in advance. **Copy to clipboard** makes a copy of the window content into a clipboard. The last item **Exit** closes all windows and terminates ***Animator*** module. All items are located in tool bar below the main menu.

The sequence of the buttons is **Open**, **Close**, **Print** and **Copy to clipboard**.

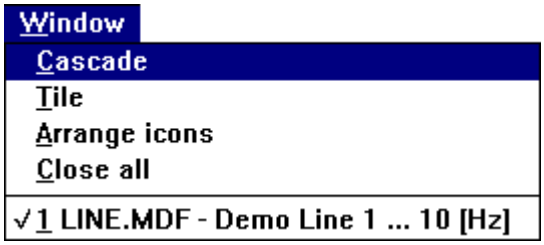
View

After selection of **View** item from the main menu, ***View setup*** dialog, which is identical in all modules, appears.



The values of **A** (alpha) and **B** (beta) are displayed in ***Rotate*** section. The values can be inputted either directly from the keyboard, or by means of arrows buttons next to edit boxes. The axes cross helps in orientation. The items in ***Shift*** section controls move of the object in **X** (horizontal direction) and **Y** (vertical direction) on the screen. Shift step is determined by setup in ***MDS panel***. The last section ***Zoom*** controls increase and decrease of the object. Minimum value is 0.001 and maximum value is 100.

Window



Window item enables following steps. **Cascade** overlaps each window so they are the same size and only the title bar of each underlying window is visible. **Tile** arranges the windows so they cover the entire desktop without overlapping. **Arrange icons** lines the icons of individual documents and **Close all** shuts all windows. Below the separator there are first 10 open windows displayed directly. Further are available by next selection.

Uniform windows

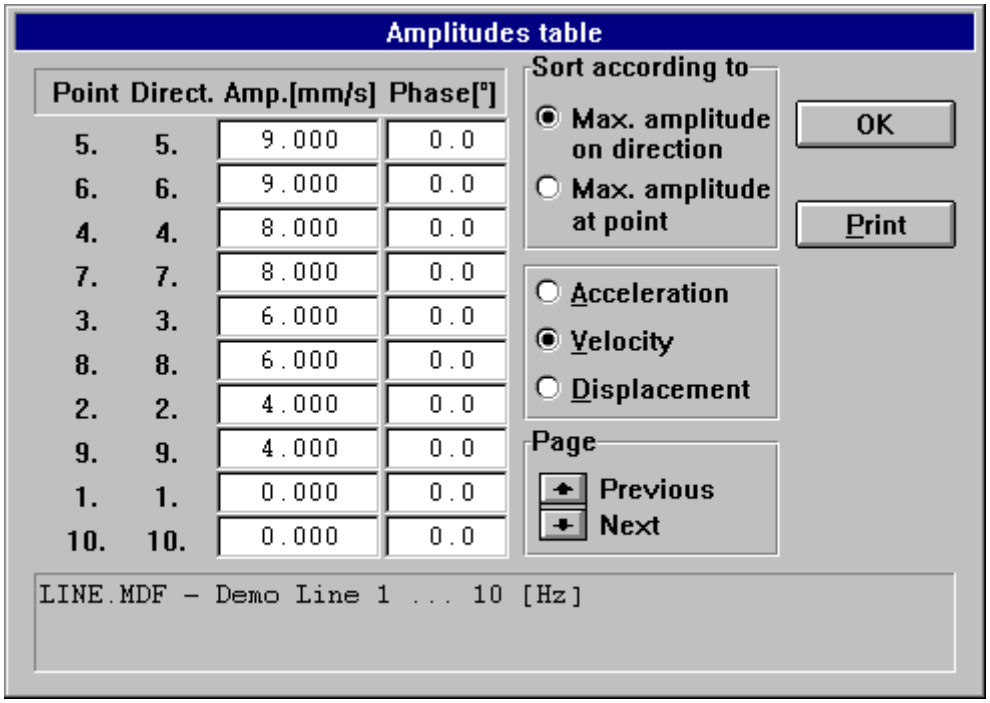
By means of this item you can set parameters of all windows in accordance to reference window. This choice makes sense only when more windows are opened.

Info

The main menu item **Info** displays the submenu with following items.

Used data reveals informative dialog with animation tables used during animation. The main meaning of this function is a simplification of orientation when more windows with multifrequency animation are opened.

Amplitudes table item opens ***Amplitudes table*** dialog**.**
You can locate here, which point or which direction has the highest amplitude. Sorting according to such criteria you can select in ***Sort according to*** section. Switching over quantities is the same as in the previous module. The table can be printed as a protocol by means of **Print** button.



Setup

The main menu item **Setup** enables to set parameters for **Display** or for **Animation**.

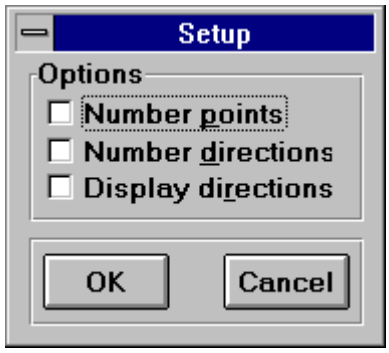
Display setup

Setup dialog appears after selection of **Display** item.
Here you can select from following options.

Number points - switching on, off numbering of the object points.

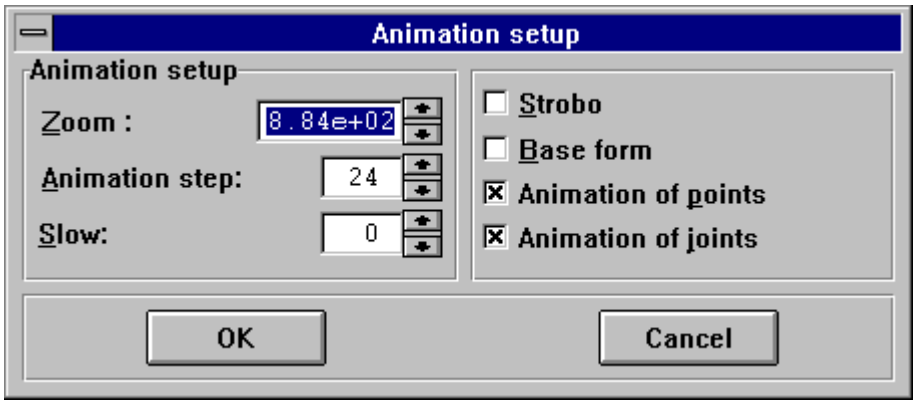
Number directions - switching on, off numbering of directions on individual object points.

Display directions - switching on, off display of measured directions on the object points.



Animation setup

Animation setup dialog appears after selection of **Animation** item.



For setting of fluency, displacement size and speed are following drivers prepared in ***Animation setup*** section.

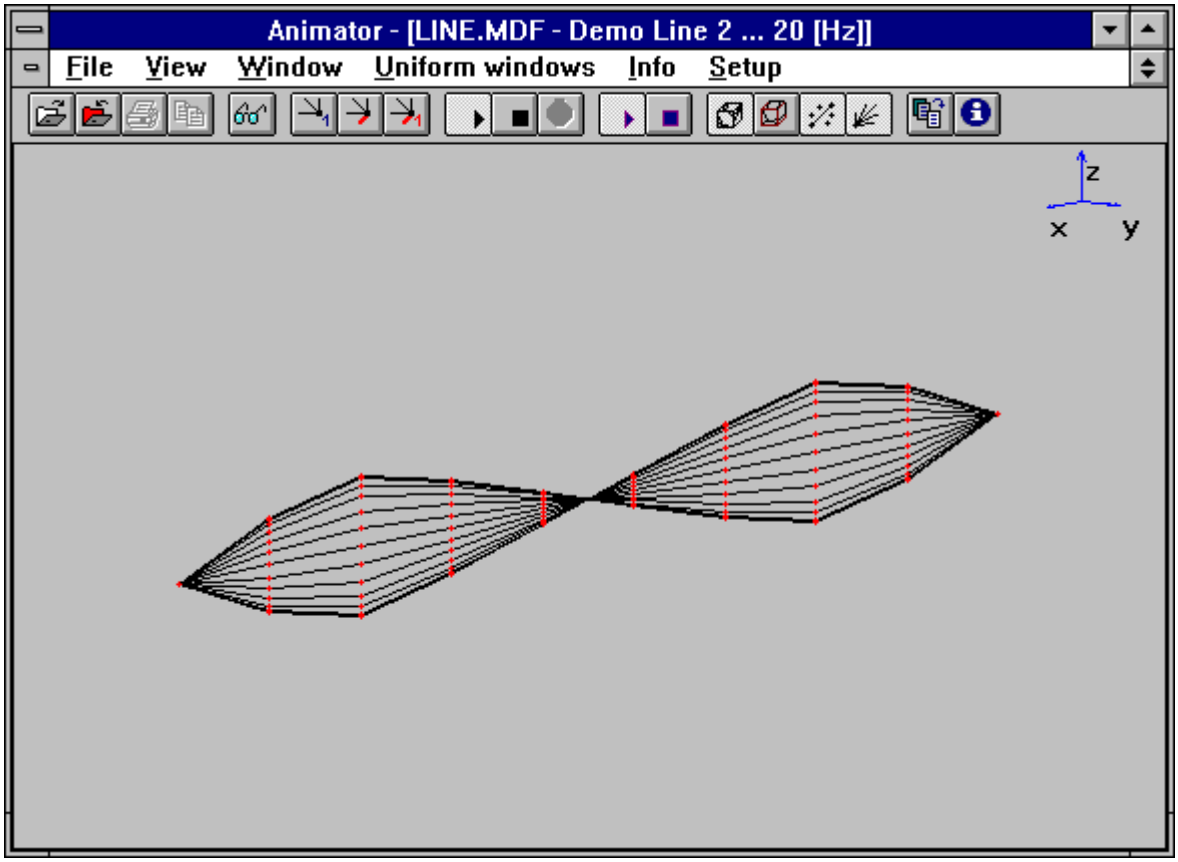
Zoom - serves for setting of Q coefficient for multiplication of amplitude. Every object has different Q value, so that animation would be in a practical scale.

Animation step - enables setting of pictures number per one oscillation period. Increasing of this value evokes more fluent but slower animation.

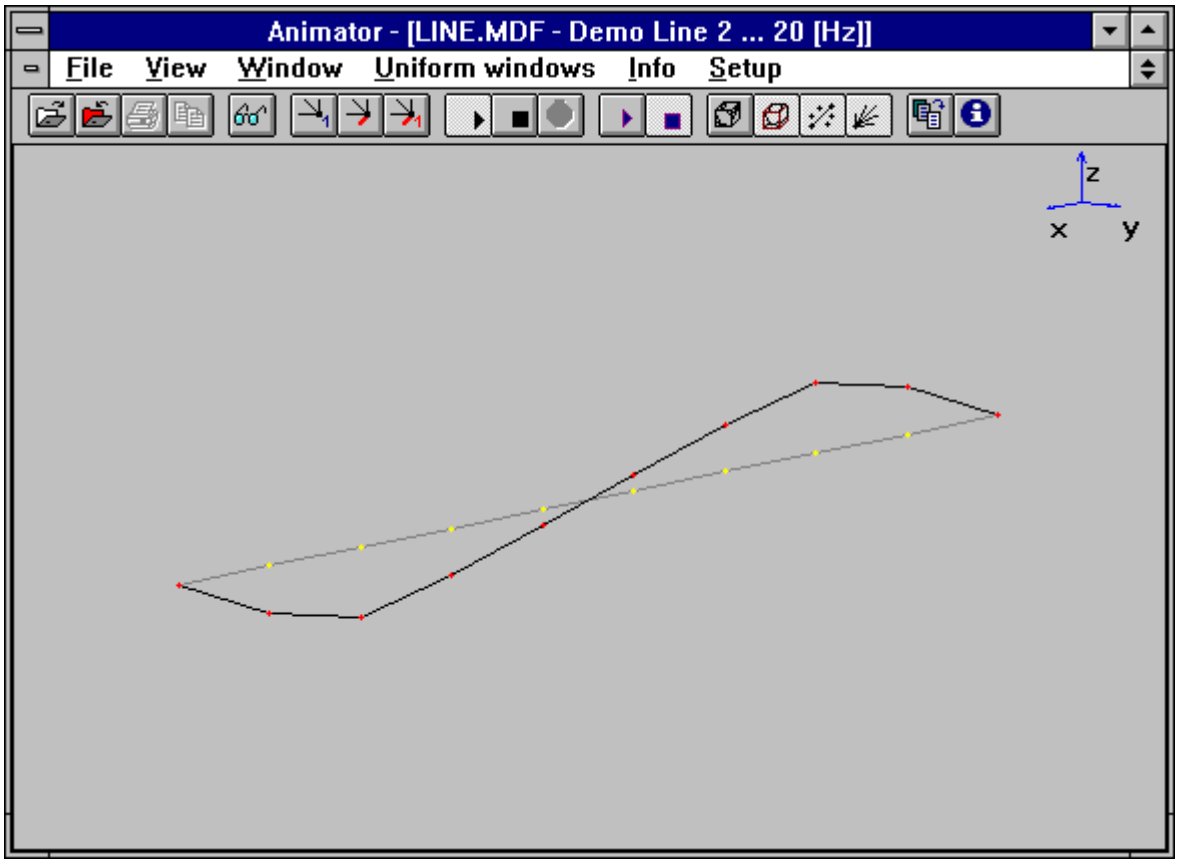
Slow - serves for setting of time-out during animation. The value indicates, how long will the window wait before one animation step is executed.

In the second section you can find the options for setting of graphical aspects of the animation. You can select from following options.

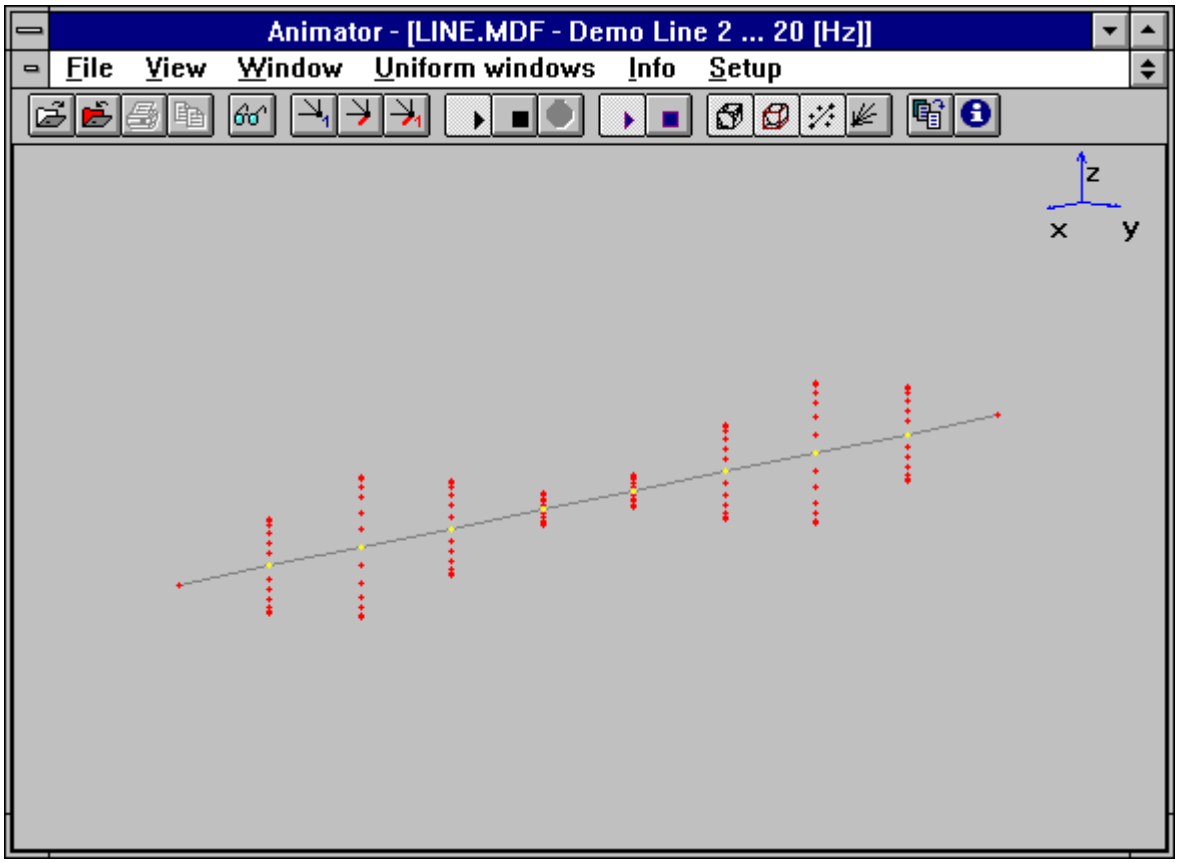
Strobo - after ticking of this check box you can observe so called Static Deflection Shapes. You can detect vibration cause by means of this function in a simple way.



Base form - tick this check box if you want to see initial objects form during animation.



 ***Animation of points*** - this option switches over animation of points of the object.



 ***Animation of joints*** - this option switches over animation of joints connecting individual points.

Suitable combination of these switches enables arbitrary way of animating object plot.

Animation control

Animation can be controlled only from a tool bar by means of five function buttons.

These buttons serves for global start of animation for all windows. Buttons sequence has following meaning ***Start***, ***Stop*** and ***Trace***. When ***Stop*** is selected, you can perform „step by step“ animation by means of clocks icon. Every click will evoke one pulse for animation. If you want to animate continuously, select ***Start*** button. ***Trace*** button will not be available.

If you want to print the object, global animation setup must be in *Stop* position.

Except of global animation control you can switch over individual windows by means of next buttons. The meaning of these buttons is the same as previously.

MDS files

WINDOWS/SYSTEM:

CTL3DV2.DLL	3D Dialogues
WING.DLL	WinG
WINGDE.DLL	WinG
WINGDIB.DRV	WinG
WINGPAL.WND	WinG
DVA.386	WinG
MONSPACB.TTF	Print font
MONSPACB.FOT	Print font

to ***SYSTEM.INI*** section ***[386Enh]*** DEVICE = DVA.386

WINDOWS:

MDS.INI

MDS directory:

MAIN.EXE	MDS Panel
MACHED.EXE	Geometry editor
MACHDEF.EXE	Directions editor
MACHPTK.EXE	MDS data editor
MACHANI.EXE	Animator
PRINTDLL.DLL	Print DLL
CLIP.DLL	Clipboard DLL
M3D.DLL	Main DLL
ADSH01.DLL	Subsidiary DLL
MSDNTB.DLL	Toolbar DLL
ADASH001.FON	Dialogs font

Data files:

Main file:	**MDF**	Main organisation file
Geometry editor:	**PNT**	points file
	JON	directions file
Directions editor:	**MSR**	measurement directions file
MDS data editor:	**MDS**	animation tables files
	P00 - P99	animation tables (max.100)
Data Interface:	**DAT**	data sets file
	D00 - D99	data sets MDS (max.100)
	TPA	data set file for TPA
	T00 - T99	data sets TPA (max.100)

Operational Shapes demo-data

LINE
Experimental metal bar.
The classic example of multi-frequency oscillation.

DEMO 10
The simple scheme of a smoke fan drive in a power station. The points 1, 2, 7 and 8 represent a machine foundation. You can see looseness of a pair of diagonally located bottom ends (feet) of an electric drive.

DEMO 11
The scheme demonstrates a motor and a gearbox of a conveyer belt. Loosened connection of base girders with construction of the machine have been detected by the measurement of MDS.

DEMO 12
The geometrical model of a primary ventilator of a heat station block displays an electric drive, two bearing housings and a fun section above the metal pedestal. The measurement disclosed wrong fastening of the whole machine pedestal into a heat station building floor construction.

DEMO 13
The scheme of the first sleeve bearing pedestal with an oil pump. An excessive vibrations have been caused by a change of clearance of the skis for axial movement of the bearing pedestal.

DEMO 14
A pedestal of a mill fan in a power station block. Loosen bearing stand is evident after measurement of MDS.

DEMO 15
A delivery pump in a water treatment chemical plant. The looseness of the base frame is well visible after measurement.

DEMO 16
A mill fan of a heat station block. Wrong fastening of the whole foundation is the result of high vibration levels.

DEMO 50
Stand for life testing of a car shock absorbers.
The stand is constructed of the frame screwed from U - profiles (points 1 - 23), cross bar (points 24 - 26) and a lower and upper guying of the absorber (points 27 - 26). The stand was replaced with a surface model loaded by space forces. The measurement results demonstrate a dynamic behaviour of the stand on 100 RPM.

DEMO 51
Vibration drum for shaking-out of castings.
The vibration drum consists of the proper drum (point 9 -21) and of three vibration exciters (points 1 - 8 and 22 - 25) which represent rotating out-of-balance weight. By means of MDS procedure the main reasons for very low life of rolling bearings of mechanical exciters (1 - 6 months) and of fatigue damage of the drum have been detected. After elimination of the excessive vibrations, bearings life increase into two years of two-shift working days.

DEMO 52
Sander.
The sander is a part of a belt conveyer which supplies moulding send into the moulding hall. It consists of a supporting frame (point 2 - 12), shaft bearings (points 1, 16, 2, 20) and of a part of a belt conveyer (points 17, 19, 20, 21). Bearings are not connected in a shaft axis, but along the conveyer length. The sander is located on a flexible construction, where high vibration levels was reached because of beats.

DEMO 53
Energy group of a railway locomotive.
The locomotive has two energy groups. Compression ignition engine and generator. The entire object has been replaced by the engine model (points 1 - 11), engine grips (points 15 - 18), generator (points 12 - 14), auxiliary frame (points 19 - 22) and locomotive frame (points 26 - 26). The engine is fixed into an auxiliary frame which is fastened over a rubber springs into the main locomotive frame. The generator is screwed into the engine flange. The measurement showed that the engine and the generator create rigid dynamic unit. The system engine - auxiliary frame - locomotive frame oscillate without problems. The locomotive frame operates as absolutely rigid. The locomotive did not move, the engine rotated in 1800 RPM.

DEMO 54
Flat truck.
The flat truck was replaced by 3D-model which consists of the frame (points 1, 2 - 9), engine (points 2 - 8) gripping points of the cabin (points 30 - 33) and back driving axle (points 34 - 36). The aim of the measurement was to detect, how is a mutual movement of the engine from cabin and back axle. The flat truck moved on cylindrical brake, peripheral velocity of the driving axle wheels was 50 km/h. The measurement on 20 Hz frequency showed, that the cabin moves in opposition respect to the frame. Mutual movement is nearly zero on revolution frequency 34 Hz. Interesting movement you can see on the point 3. It represents an oil drain plug on the oil tank.

DEMO 55
Paper mill.
The paper mill produces raw material for insulating boards. The model consists of several parts: engine (points 1, 2, 17, 18, 23, 24), engine pedestal (points 3 - 6, 25 - 28), mill for milling of paper (points 15, 16, 19, 20, 33 - 36), ventilator which feeds a storage tank of milled paper (points 14, 21, 22, 37 - 39), frame which connects all parts into one unit (points 5 - 7, 27 - 29) and floor which the auxiliary frame is screwed on (points 11 - 13, 30 - 32).
The shaft passes through the mill and the ventilator and it is connected with the electric motor by Periflex coupling (2990 RPM). The movement of bearing housings is represented by points 8, 9 and 10. It is evident considerable damage of bearings, loosen supporting frame on the floor in points 7 and 29 and loosen electric motor on supporting frame in point 2.

Modal Shapes demo-data

MODAL 80
Modal shapes of weaving machine.
The measurement results on the test specimen (1m) of weaving machine harness represent demonstration of a very detailed measurement of modal shapes. The harness is the component produced of aluminium alloy, filled of dumping mass for elimination of vibrations and noise.
The object without dumping filler was constructed in two-dimensional space. The results demonstrate typical deformation course of a simple geometrical model with a small internal dumping in individual natural frequencies. The aim of the measurement was determination of modal frequencies and modal dumping of aluminium alloy harnesses and of composition with various fillers and comparison with foreign product.

MODAL 81
MODAL 82
Modal shapes of circular saw.
The circular wood saw was replaced by the metal plate disk. The reason of the measurement was determination of changes of dynamic property before and after performing of a radial pressing in annulus (points 13 - 24, 25 - 36). The object was constructed in two-dimensional space. The file MODAL 81 demonstrates typical deformation course of a thin plate of circular ring form - the specimen without radial pressing. The file MODAL 82 shows modification of natural frequencies after performing of radial pressing.

MODAL 83
Modal shapes of a stand for life tests of a car shock absorbers.
The sample demonstrates the real instrument. The stand is constructed of the frame screwed from U - profiles (points 1 - 23), cross bar (points 24 - 26) and a lower and upper guying of the absorber (points 27 and 3). The stand was replaced with a surface model loaded by space forces. Measurement results show behaviour of the system with disassembleable joints. The comparison with the measurement of operational deflection shapes on the same object can be considered as very advantageous - see DEMO 50 file.