
**Application Software
for Field Balancing
VBAL_PRO32M for Windows**

Version 4.01

USER'S GUIDE

PART 2. SOFTWARE OPERATIONS

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ABSTRACT

The second part of the user's guide covers all operations with the VBAL_PRO balancing software from its installation to reporting.

There are also tips on job selection from the program suggestions.

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CONVENTIONS

The VBAL_PRO program intended to use the data input of three types:

- ❑ from the DC-12 (the data collector and analyzer developed by VAST, Russia);
- ❑ from the data acquisition board (LCard) installed in the computer;
- ❑ manually from the keyboard.

The user's guide is targeted to the more convenient way of the data input - from the data collector and analyzer DC-12. The differences from the data acquisition board input are slight and will be described on the way.

The typefaces used:

- ◆ *Commands* (of the instrument screens);
- ◆ **Buttons** (of the instrument);
- ◆ <Keys> (of the computer keyboard).

The main terms used in the guide are defined in the Appendix 2 of Part 2, and in the Appendix 1 of Part 1.

1. INSTALLATION

1.1. SYSTEM REQUIREMENTS

Personal Computer IBM PC/AT or compatible

Pentium processor 16M RAM, 10 Mb on Hard Disk
or more (for the program and the
database, and more for the data-
base development)

Operating System Windows 95/98.

The VBAL_PRO Application Software is supplied on floppy or CD disks. The software is protected by an electronic key which must be attached to the parallel port. The key is supplied with the software.

1.2. INSTALLATION TIPS

To install the program, insert either the VBAL_PRO distribution diskette in your floppy drive or CD into your CD-ROM drive and run SETUP.EXE.

You will be prompted to select the hard drive and directory to install the program. On installation completion there is no need to restart your computer.

2. USER INTERFACE

The user interface includes program controls, on-line help, and reporting (final or intermediate) as the three main parts.

2.1. PROGRAM CONTROLS AND ON-LINE HELP

The VBAL_PRO application software has a standard Windows interface driven with the mouse and keyboard.

The screen is divided into three main parts: The menu bar at the top, the desktop, and the status line at the bottom.

The main means to control the program operation are as follows:

- ❑ menu
- ❑ dialog boxes
- ❑ hot keys

You can see tips on command purpose at the status line while a command is selected from the menu.

The most commands are available by the hot keys that you can find in the menu.

General Tip *To exit any dialog box, just press the <Esc> key that is used instead of the Cancel button.*

At the title bar of the program the selected group and machine you work with is shown if any selected.

The on-line help of the program operations is available with a <F1> key stroke.

2.2. VIEWING AND EDITING BALANCING DOCUMENTATION

To view and edit the balancing reports, you need the Microsoft Word to be installed onto your computer.

If this is the case, the Word document will be created after you pressed the **Report** button at the Calculated Balance Weights dialog. It will contain all the data obtained at the current balancing step (from the initial vibration measurements till balance and correction weights calculations). Aside from this, you may select the *Balancing Report* command from the Main menu any time you need to view the balancing log either on balancing completion or during the balancing process interrupted.

Note All the data on the previous balancing should be deleted while you start the new balancing cycle. The warning on it will be displayed. It is recommended to save reports into the same folder.

3. DATABASE CONFIGURATION

Prior to balance a machine, you need to enter relative machine data into the database, i.e. configure the database.

During the software installation an empty database is created into the subdirectory DBal. To preserve the database from corruption, it is recommended to back up it from time to time. Then you may restore it if the program found errors in the database and warned you about it. Just rename your backup into Dbal and use it. If the database is deleted occasionally and you have no copy of it, you need reinstall the entire software. All the data obtained will be lost.

3.1. CONFIGURATION STRATEGY

The configuration of the machines under balance is made to provide the storage of information and its retrieving during the balancing process as well as the final reporting. To provide quick search for the specific machine, the database is structured in two main levels

- ❑ Machine group;
- ❑ machine.

The machines are grouped by similarities in dimensions, support structure and running speeds.

The machine is a balancing object featured by its name and a number of measurement planes.

To make configuration, use the Configuration menu of the program.

If no hardware key present, commands of the *Configuration* menu is not available.

3.2. CONFIGURATION OF A MACHINE GROUP

You can configure a new group and then edit it using the commands from the Configuration menu: *New Machine Group*, *Change Machine Group*, and *Delete Machine Group*. It is possible to create as many groups as you need.

3.2.1. NEW MACHINE GROUP

The *New Machine Group* command is used to enter the configuration data on the new machine group. For this purpose, the New Machine Group dialog is displayed.

Fig. 3.1
New Machine Group
dialog box

Speed (rpm)	Amplitude (mikm)	Weight (g)
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

To create a new group, enter the machine group name (up to 20 symbols).

The additional information can be entered:

- Comments on the machine (any text information up to 40 symbols length) which will be shown while you work with the group;
- Data on the trial weights (that are either calculated for the machines of the group or obtained on the similar machines).

To cancel the operation, press the **Cancel** button or <Escape>. To confirm the data entered, click **OK**. The group name is necessary requirement, so the error message appears if it is not entered.

The **New Machine** button is used to configure a new machine in the current group on the spot.

The name of the new (or selected) machine group is displayed at the title bar of the program window. It indicates that all operations are made with this group. To change the machine group to work with, use the *Change Machine Group* command.

3.2.2. EDITING THE MACHINE GROUP CONFIGURATION

The *Edit Machine Group* command is used to change configuration data having been entered. It displays the dialog box as follows:

Fig. 3.2
Edit Group dialog

Speed [rpm]	Amplitude [mksm]	Weight [g]
0	0	0
0	0	0
0	0	0
0	0	0
0	0	0

The dialog allows you to change parameters of the selected Machine Group, such as

- Machine Group Name;
- Comments on the Machine Group;
- speed and amplitude values associated with the recommended trial weights.

If the new name duplicates an existing name from the database, the warning appears.

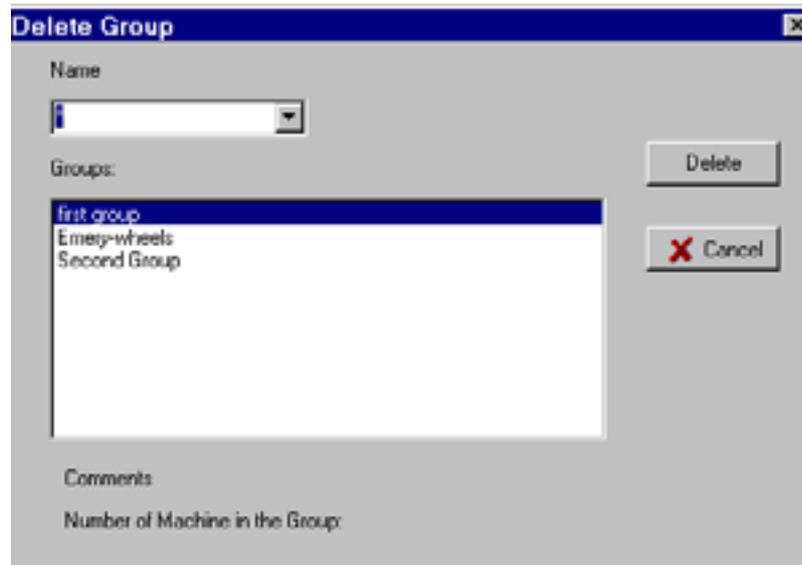
To cancel your edits, click **Cancel** or press <Esc>.

To confirm your edits, click **OK**.

3.2.3. DELETING THE MACHINE GROUP

To delete a machine group, use the *Delete Machine Group* command. It displays the Delete Group dialog box.

Fig. 3.3
Delete Group dialog



Type the name into the active input box. Or just press <Enter> to get the group list and select the needed group from it.

To delete the selected group, click the **Delete** button. After your confirmation the group will be deleted. If the group contains some machines, you have to confirm the deletion of each one. On any stage of deletion you may select the **No** button (or press <Esc>) in the Confirm dialog and keep the remainder of the machines. Then you will be back to the Delete Group dialog box.

Information on the selected group will be displayed at the bottom of the Delete Group dialog.

- comment on the group;
- number of machines in the group.

If there is no machine group selected, it will be the information on the first machine from the list.

To quit the dialog, click **Cancel** or press <Esc>.

3.3. MACHINE CONFIGURATION

The machine configuration can be done using the commands from the Configuration menu: *New Machine*, *Change Machine*, and *Delete Machine*. You may configure as many machines as you need.

A new machine you can create only within a group so you need to preliminarily create a group. The new machine will be included into the selected machine group (which name is shown at the title bar of the program).

3.3.1. NEW MACHINE

To configure a new machine use the New Machine command. It displays the New Machine dialog.

Fig. 3.4
New Machine dialog

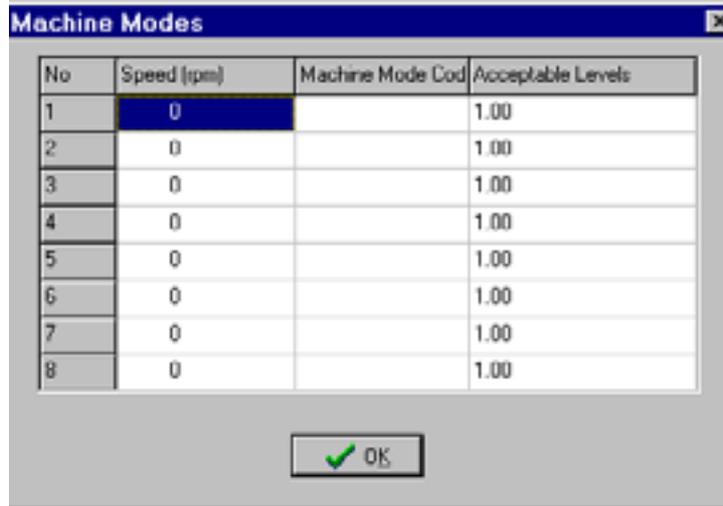
To enter the database a new machine, you need to specify the data as follows:

- **Machine name** (up to 20 symbols) is mandatory and the error message will be displayed if it is not specified;
- **Comments** on the machine (up to 40 symbols) that are displayed for reference while you are working with the machine;
- **Direction Codes** (up to 8 symbols) may be used to easy identify the directions of vibration measurements while balancing (they are used in the dialogs and forms displayed during the balancing process);
- **Maximum Number of Machine Modes** - up to 8;
- **Maximum Number of Balance planes** - up to 16;
- **Number of Measurement Planes** (up to 32). You may change the latter three values using the *Edit Machine* command from the Configuration menu if the balancing of the machine is not yet started. Reserve the more balance planes and modes so that you may select any from them during the balancing.

Besides that, you may enter additional information with the controls at the bottom of the window. They are as follows:

Modes Displays the Machine Modes dialog

Fig. 3.5
The Machine Mode dialog

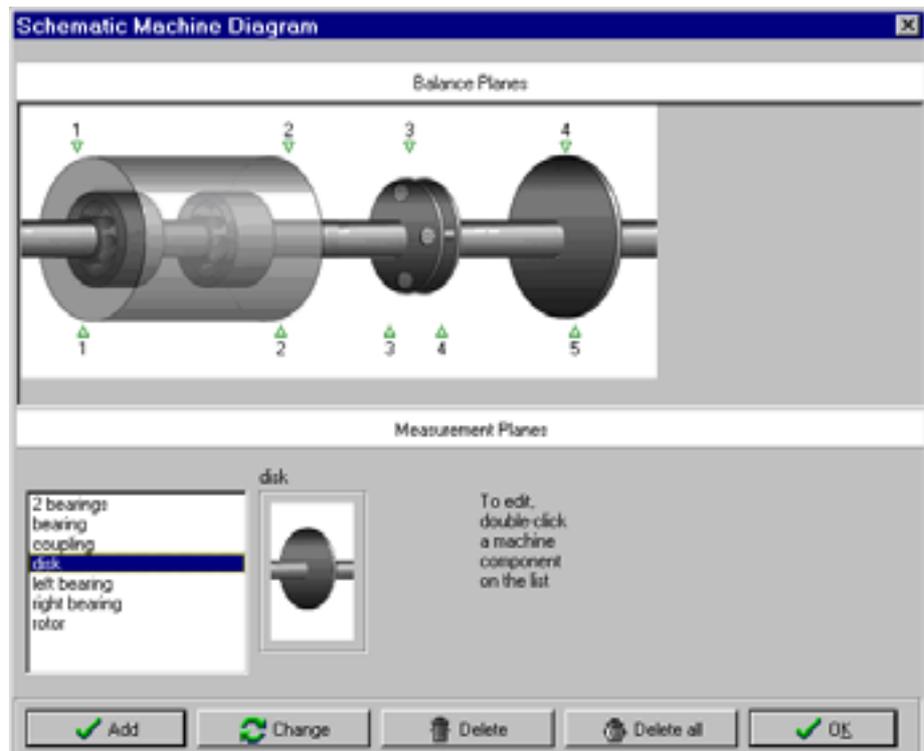


It is optional to enter the modes codes (up to 10 symbols) and the relative levels (the acceptable vibration levels in relative units). After you had entered data, press **OK** to confirm them. To cancel the operation, click the **Cancel** button or press <Esc>.

Schematic

Displays the Schematic Machine Diagram dialog.

Fig. 3.6
Schematic Machine Diagram dialog



The dialog enables you to compose the machine schematic diagram which will be included in the balancing report. If you want to get diagnostics of couplings, you need to indicate them on the diagram so that the measurement planes on the left/right from the coupling correspond the numbers of the actual measurement planes.

The machine diagram is composed from the predefined components listed. While an item is selected on the list its appearance is shown on the right. Use the arrow keys to select an element from the list.

To insert the selected component into the diagram, double-click its name or press the **Add** button. To delete the last component entered, use the **Delete** button. The **Delete All** button is used to clear the diagram.

You can set arrows for a selected component in order to indicate measurement (up arrow) and balance (down arrow) planes. To do it, enter the edit mode by double-clicking the component on the diagram, then double-click the desired location either above or below the component. To remove an arrow, double-click it once again. Ordinal numbers of the points are set automatically from the left to right.

If the schematic diagram is larger than the screen, use the scroll bar to view the rest.

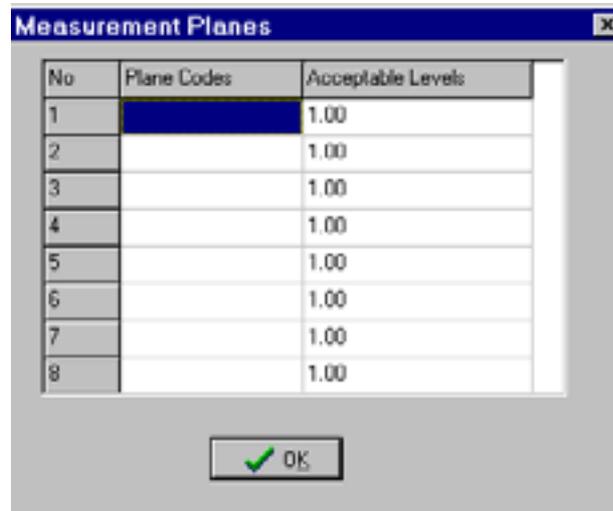
You may also replace any diagram component with another from the list using the **Change** button. First select the component on the diagram with a mouse click (when the red frame around the component is shown), then select the element from the list and press the **Change** button.

To cancel diagram editing, click the **Cancel** button or press <Esc>. You'll will be back to the New Machine dialog.

Planes

Displays the Measurement Planes dialog box.

Fig. 3.7
Measurement Planes
dialog

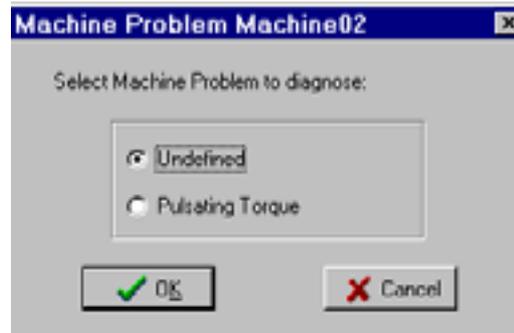


This is optional. You may enter the plane code (up to 8 symbols) and relative levels (acceptable levels in relative units) for each point. To confirm the data entered, press **OK**.

Defect Type

Displays the Machine Problem dialog box.

Fig. 3.8
Machine Problem
dialog



The dialog is used to select a defect to be diagnosed by the software if you will take additional measurements. The diagnostic measurements are similar to the measurements for balancing. They are vibration phase and magnitude at operating speed.

In the version under consideration it is possible to identify the torque pulsing at operating speed. It may be caused by the different problems. For example, it may be dynamic eccentricity of the air gap in an electric machine. See Section 3 for further details. The pulsing torque limits the balancing efficiency.

While the pulsing torque is diagnosed, you need to take one more measurement at each measurement plane in the third (tangential) direction. In another case, the diagnostic results will be error prone.

After you entered all data, press **OK** in the New Machine dialog.

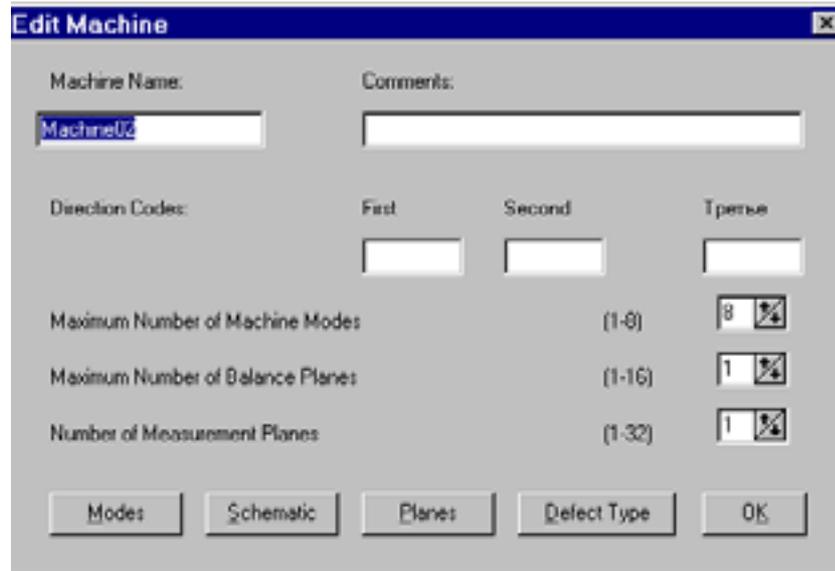
If the value of the Measurement Planes you entered is over the one specified for the program, the error message will be displayed.

The name of the current machine is displayed on the screen at the control bar just after the group name and delimiter "\". All the operations are applied to the current machine. To work with another machine select it with the *Select Machine* command.

3.3.2. EDITING MACHINE PARAMETERS

You may change the parameters of an existing machine using the *Edit Machine* command from the Configuration menu. It displays the Change Parameters dialog box.

Fig. 3.9
The Edit Machine dialog



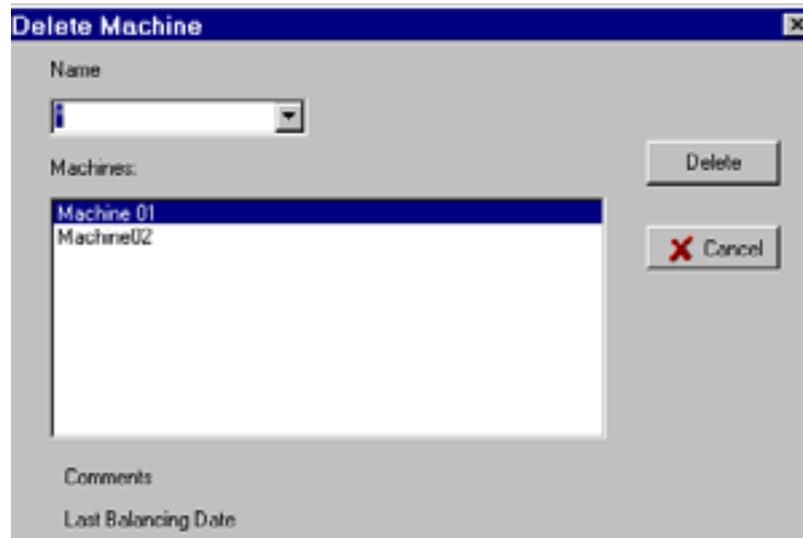
Maximum Number of Machine Modes, Maximum Number of Balance Planes, and Number of Measurement Planes may be changed only if the balancing of the machine is not yet started.

The dialog to edit parameters is the same as the New Machine dialog which has been described in Section 3.3.1.

3.3.3. DELETING THE MACHINE

To delete a machine, use the *Delete Machine* command. It displays the Delete Machine dialog.

Fig. 3.10
Delete Machine dialog



The input line is active at startup and you may enter the machine name. Also you may press <Enter> that brings you to the list of machines, select a machine with the up/down keys, and press <Enter> again since the **Delete** button is selected. After your confirmation the selected machine will be deleted. The comments and the last balancing date on the selected machine are shown at bottom. If no machine selected, they are about the first one.

4. SOFTWARE OPERATIONS

The VBAL_PRO software is used as a part of the measurement and balancing system consisting of either PC and LCard (data acquisition board) installed or a notebook connected to the data collector & analyzer DC-12.

It is possible to use the multichannel measuring system and enter the number of channels as well as their parameters with respect to the relative measurement points. Additionally, you may enter the measurement data with the keyboard that allows you to use any other measurement system.

There are balancing of two types provided by the VBAL_PRO software.

Balancing This is just a general balancing that includes a full balancing cycle. It is used for balancing a new (or repaired) machine in first place. The steps involved in such a balancing are as follows:

- take initial vibration readings;
- place trial weights sequentially at each plane;
- measure vibration response to each mounted trial weight;
- the software should be computed balance weights for each trial weight.

During the full balancing cycle, influence coefficients at each balance plane are calculated and they can be saved to the database.

**Balancing by
Influence Coefficients**

The balancing is performed without any trial weights attached. It can be considered as the second and further stages of the full balancing cycle or the first and the further stages of the shorten balancing cycle for the machines previously balanced by the full balancing cycle with influence coefficients obtained (in any form: either on computer or on paper).

That balancing cycle includes the following:

- Preliminary operations. You select a machine from the database or create the new one to provide calculations for balancing.
- Mount the tachometer and select locations for vibration sensors.
- Take measurements of operating speed and initial vibration.
- Select the type of balancing from the two choices: using trial weights or by the influence coefficients obtained previously.

- ❑ Mount the first trial weight at the selected balance plane and enter the weight parameters into the program.
- ❑ Measure the vibration response to the trial weight installed. The program automatically calculates its value as well as the mounting angle for the balance weight and estimates the vibration level.
- ❑ Job selection:
 - ❑ continue to mount trial weights;
 - ❑ mount the calculated balance weights and take the Test Measurements of the vibration parameters;
- ❑ After the test measurements are taken, the program automatically calculates correction weights as well as the predicted vibration response.

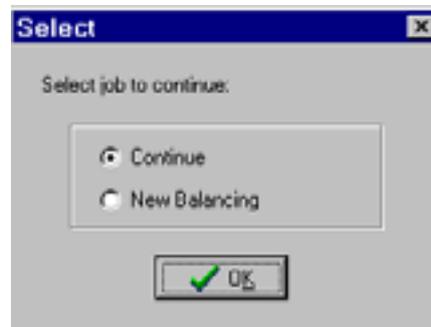
After that you have to select from

- ❑ continue to take test readings while mounting the correction weights;
- ❑ continue to mount the trial weights if there are balance planes unused;
- ❑ finish to balance the machine.

This whole section is devoted to software operations. How to make measurements you may know from Part 1 of the manual.

You may interrupt the balancing process at any stage with the <Escape> key. The program requests for confirmation and saves all the data obtained prior to the break. Next time you start balancing and choose the *Balancing* command, you have to select a job from the list:

Fig. 4.1
The Select Job to
Continue dialog



This dialog allows you to:

- ❑ **Continue** - to continue the interrupted balancing on the same step.
- ❑ **New Balancing** - to start the new balancing cycle - in this case the data obtained and not saved to the database will be lost.

4.1. PRELIMINARIES

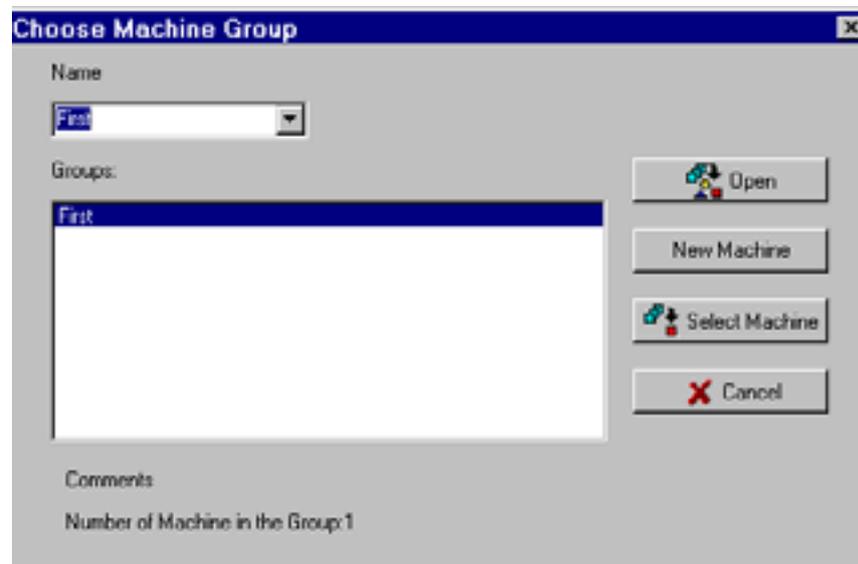
The preliminary operations are performed to set the program ready for balancing and measurements. The steps are as follows:

- select the machine group you need along with a machine to work with (or create a new machine).
- know well the information on the machine;
- print the Measurement Forms if required (using the *Measurement Form* command from the Main menu).

After you had configured groups and machines for the balancing you can use the Main menu to select from them.

Select a machine group with the *Machine Group* command from the Main menu. It calls on the Choose Machine Group dialog box.

Fig. 4.2
The Choose Machine
Group dialog box



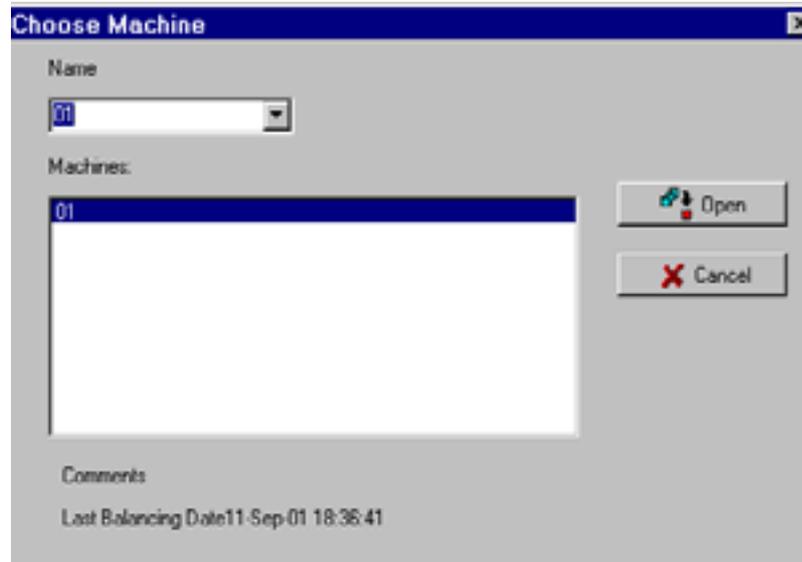
Make your choice from the list of groups by clicking the desired item and then click the **Open** button (or just double-click the desired item).

Note The comments on the selected machine group and the number of machines in the group are displayed at the bottom of the dialog box.

The name of the selected machine group will be shown at the title bar of the window. All the operations are performed with the selected machine group.

At the Choose Machine Group dialog, you may quickly select a machine to work with by pressing the **Select Machine** button. It displays the same dialog you may get by the *Select Machine* command from the Main menu.

Fig. 4.3
The Choose Machine
dialog



The dialog is very similar to the Choose Machine Group dialog. The comments on the selected machine and the last balancing date are shown at the bottom.

If no machine group previously selected, the program brings you to Choose Machine Group dialog to make selection. After that you will be back to the Choose Machine dialog box.

The name of the selected machine will be shown at the title bar of the window just after the machine group name delimited with the back slash. All the operations are performed with the current machine.

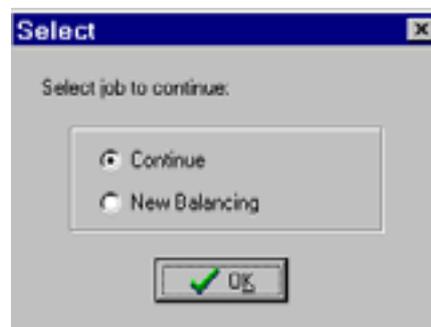
4.2. MEASUREMENTS OF THE INITIAL VIBRATION PARAMETERS

To start balancing, choose the *Balancing* command from the Main menu.

Note The command is unavailable if the group and machine is not chosen.

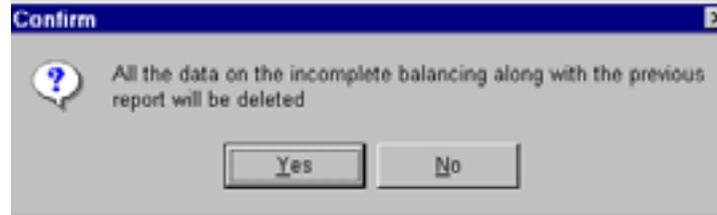
It displays the Select Job to Continue dialog.

Fig. 4.4
The Select Job to
Continue dialog



If there is a break in the previous balancing cycle, you may proceed with it by selecting the *Continue*. The *New Balancing* command starts the new balancing cycle and requests your confirmation on the previous data deletion if any obtained.

Fig. 4.5
Warning on data deletion

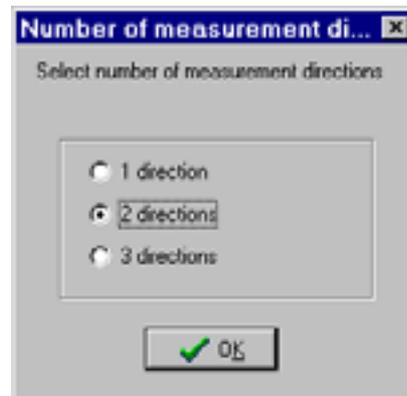


It says that with the new balancing all the data on the previous balancing cycle will be deleted. If you want to store the previous data, select **No** and do it.

Note The balancing reports which have been created with the Microsoft Word you can view, edit, and save using the Balancing Report command from the Main menu. Use it if you need to save the previous information prior to the new balancing.

The **Yes** button displays the Select Directions dialog.

Fig. 4.6
Select Directions dialog



In the VBAL_PRO software it is possible to select the number of the measurement directions - from one to three. Notice that you must take readings in three directions (in two radial directions and additionally in an tangential direction) in order to diagnose the pulsing torque. If the measurements in the third direction won't be taken, select the *Edit Machine* command from the Configuration menu and call off the pulsing torque diagnostics using the **Defect Type** button of the dialog displayed. The first and second directions are used for weight calculation. They are usually vertical and horizontal directions.

If you have selected the one direction only, then the Select from Directions dialog will be displayed after you clicked the **OK** button.

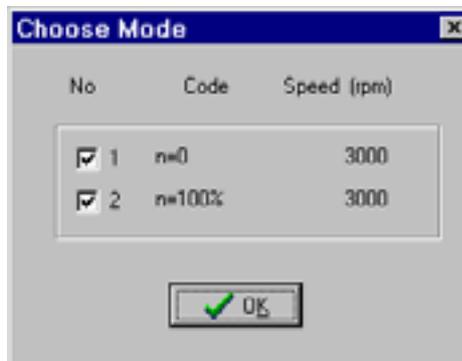
Fig. 4.7
Select from Directions
dialog



Select one of the two measurement directions for balance and correction weight calculation and press the **OK** button.

If the maximum number of modes are greater than one, the dialog will be displayed to select the number of modes used in the balancing.

Fig. 4.8
Choose Mode



You may change the number of modes (up to 8) using the *Edit Machine* command from the Configuration menu if the current machine has not been yet balanced at all. After that select the *Balancing* command again.

The Setups while Measuring dialog will be displayed after you have selected the number of measurement directions.

Fig. 4.9
Setups while Measur-
ing dialog

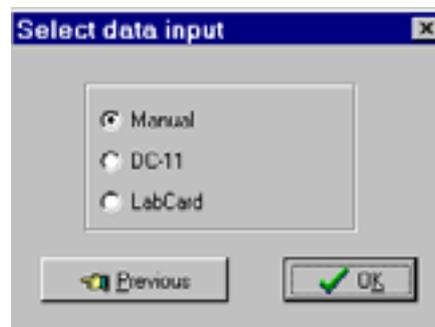


The dialog enables you to make the following settings.

- Amplitude Units** - select what you need from the wide range of choices;
- Speed** - units of operating speed;
- Detector**- the type of amplitude representation (RMS is for root mean square, Peak is for magnitude, Peak-Peak is for peak-to-peak);
- Weight** - units of mass;
- Angle** - direction of angle reference for weight mounting (in or against the direction of rotation).

After your made selections and click **OK**, the Select Data Input dialog will be displayed.

Fig. 4.10
Select Data Input



The software provides capabilities of measurement data input using the data acquisition board (LCard), data collector & analyzer DC-12 as well as the keyboard (in the latter case you may collect data with any instrument).

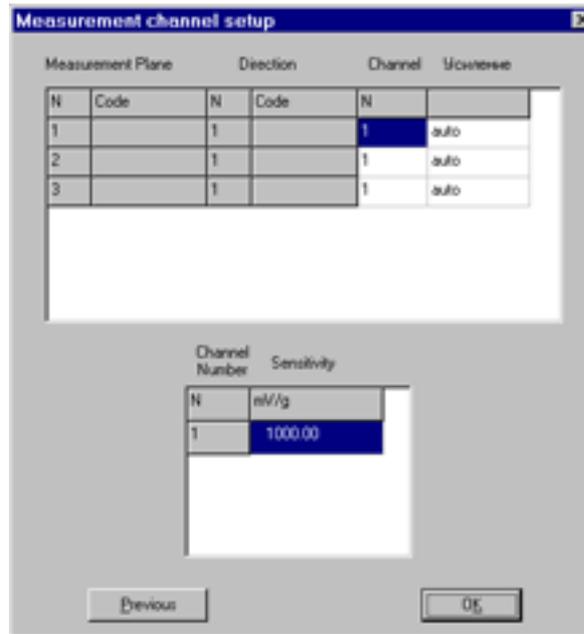
Select the desired measurement input and click **OK**.

Note You may use all the types of data input during the same cycle of balancing.

4.2.1. DATA ACQUISITION USING DC-12 OR LCARD

If you had selected data input from the DC-12 or LCard, the Measurement Channel Setup dialog will be displayed.

Fig. 4.11
The Measurement
Channel Setup dialog



It provides associations between measurement channels and measurement points. You may use one channel to acquire measurement data at a number of points. With DC-12, the channels from 1 to 16 may be used. With LCard, the channels from 0 to 8 may be used and the zero channel is for charge input. When you try to indicate a channel beyond the range, the message appears.

Enter sensitivity values (in mV/G) for all used measurement channels. The values are automatically stored and used for the other machines. By default the sensitivity of a previously unused channel is set to 1000 mV/G. You may change it any time. Also you may change the channel number by pressing the **Previous** button to get to the Measurement Channel Setup dialog. Then enter the sensitivity for an added channel in this dialog.

The **OK** button confirms your choices and brings you to one of the screens:

- ❑ Data Collector Setup (in the case of using the DC-12;
- ❑ or straightly to the Balancing - Initial Level dialog (in the case of using LCard).

In the case of the DC-12, make selections in the Data Collector Setup dialog.

Fig. 4.12
Data Collector Setup

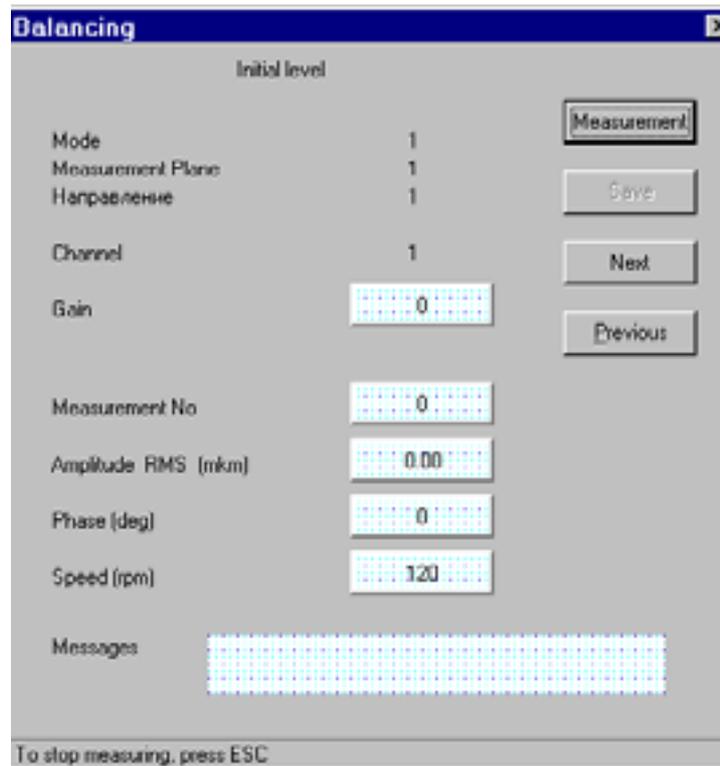


Select a port connected to the DC-12 and the baud rate the same as they are set in the DC-12. To open the communication session, follow the instructions of the dialog.

Attention! *Before start a communication session make certain that the DC-12 is not set to automatic switch-off timing. If no check made, you may be surprised at device behavior.*

After the connection is established, press the **OK** button and you get to the Balancing - Initial Level dialog.

Fig. 4.13
Balancing - Initial
Level dialog



In this dialog, a balance step may be shown from the listed below.

- ❑ **Initial Level;**
- ❑ **Vibration Response on trial weight at plane #;**
- ❑ **Test Measurements.**

Also the measurement point parameters are shown:

- ❑ **Machine Mode** - number of the operating mode under which the readings are taken. The code entered during the machine configuration will be shown in parentheses.
- ❑ **Measurement Plane** - number of a measurement plane. The code entered during the machine configuration will be shown in parentheses.
- ❑ **Direction** - measurement direction. The code entered during the machine configuration will be shown in parentheses.
- ❑ **Channel**- number of a measurement channel for a multichannel measurement system.

While measuring the next current data will be shown on the screen:

- ❑ **Measurement No** - number of averages made;
- ❑ **Amplitude PEAK**- averaged vibration amplitude at operating speed, expressed in selected units;
- ❑ **Phase** - averaged vibration phase at operating speed;
- ❑ **Speed** - current operating speed of the machine;

There is also a line for messages on measurement process.

The messages in the case of a smooth measurement process are as follows:

- ❑ **Preparing to measure;**
- ❑ **Measuring...;**
- ❑ **Measurement completed;**
- ❑ **Measurement is interrupted by the operator** (if <Esc> is pressed during the measurements).

The first three readings are not taken into account, and the previous measurement data for the given point will be displayed. It allows to view the measurement data for the second attempt. If it is the first reading, the zeros will be displayed.

If the reference signal is unstable during the measurement, one of the messages may appear:

- ❑ **No signal from tacho** (it is recommended to check for tacho powering and if it is on then change the tacho position).
- ❑ **Bad synchronization.** (the message caused by the random noise from the tachometer. Change tacho position or enhance contrast of the tacho mark.
- ❑ **Rotation frequency is out of the range.** Change the machine speed.

The readings taken is not averaged when such messages appear.

There are also messages on the sensor signal as follows:

- ❑ **Overload** - overload of the input circuitry of the preamplifier card.
- ❑ **Low measurement accuracy. Possible random noise.** The signal is unstable. The probable cause is that the measuring value is too close to the device noise or to the machine overall level.
- ❑ **External noise** (i.e. harmonic noise). The possible harmonic noise from the external sources, for example, a machine with the similar operating speed.

Besides, the messages may appear on the broken connection to the LCard or to the DC-12.

The controls of the dialog for measuring are listed below.

- Measure** starts vibration measurements. The measurements finish automatically on completion or after 30 averages made (that is in the range of 8 to 30 averages). The measurement process can be interrupted manually by pressing <Esc>.
- Save** records measurement data to the computer.
- Next** brings you to the next dialog, for instance, to measure at the next point.
- Previous** drives you to the previous dialog.

The last two buttons may be used for viewing measurement data and repeating the measurements.

After each measurement step is completed (first step is measurements of Initial Level), the table of the measurement data is displayed.

To repeat the measurements or check them, use the **Previous** button that displays the dialog to measure the first point. Use the **Next/Previous** button to switch between the measurement dialogs. The

saved data will be shown on the screen and the measurement may be repeated.

4.2.2. MANUAL MEASUREMENT DATA INPUT

If you had selected the manual input of the measurement data, the Initial Level dialog will be displayed.

Fig. 4.14
The dialog for manual
input

Measurement Planes		Acceptable Levels	1 направление		2 направление	
N (Код)	Отклонен.	Amplitude	Phase	Amplitude	Phase	
1	1	0.00	0	0.00	0	
2	1	0.00	0	0.00	0	
3	1	0.00	0	0.00	0	

It is used to enter the value of the rough machine speed for each of the selected modes as well as measurement data.

With the **Previous** button you may change setups of the units (in the Setups while Measuring dialog) including the units of operating speed. After you changed the units of speed the speed value entered previously will be saved and translated automatically into the new units.

For the Keyboard Input mode, the table has to be filled in with the keyboard. After you press **OK**, it is displayed once again for visual check of data entered. If the data is out of the range set for the program, it will be changed to the line of question marks ('?????'), and you must try to enter the data again.

The ranges set for the program are as follows:

Displacement Amplitude 0.01 mkm through 1000 mm

Velocity Amplitude 0.01 mm/s through 1000 m/s

<i>Acceleration Amplitude</i>	0.01 cm/s ² through 1000 m/s ²
<i>Phase (Angle)</i>	-180 through 360 degree
<i>Mass</i>	-9999 through 99999 g
<i>Operating Speed</i>	0.01 through 1500 Hz

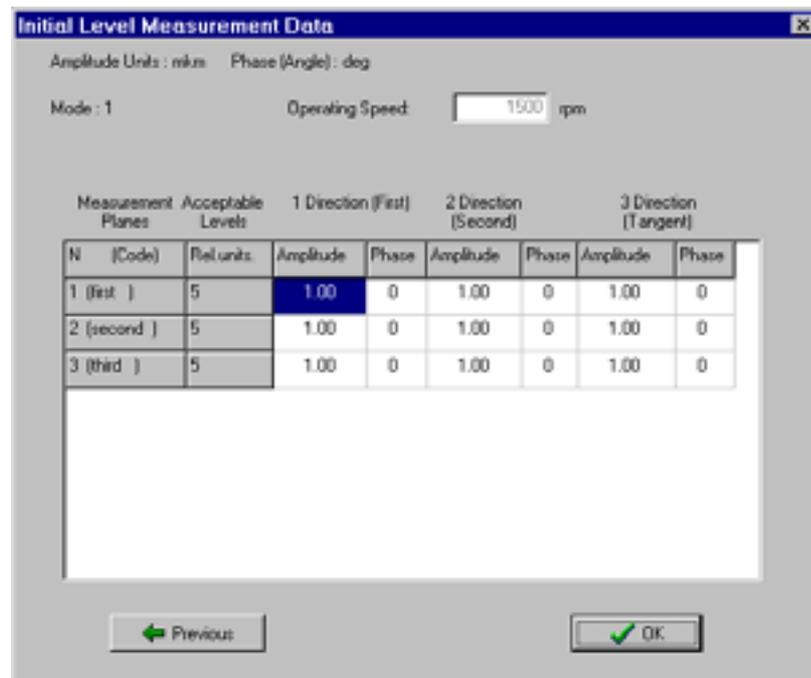
Select the units in the way the value will be fitted to the input line. To change the measurement units, go to the Setups while Measuring using the **Previous** button.

If the number of measurement planes is over 8, pressing the **OK** displays the next dialog with the data for the 9th through 16th measurement planes and so on. To get back to the previous dialog, use the **Previous** button. (In this case the entered data will be saved.)

4.2.3. VIEWING MEASUREMENT RESULTS. DIAGNOSTICS OF SUPPORT STRUCTURE AND FOUNDATION

After you made measurements or entered measurement data of the initial level with the keyboard, the table of measurement results will be displayed.

Fig. 4.15
The dialog with initial measurement results



All measurement results are displayed. To get to the first dialog of the measurement input, use the **Previous** button.

The acceptable level in relative units is the product of values for the given machine mode and the given measurement plane. You may change them prior to calculation using the Setting the Acceptable Levels for the Modes dialog or the *Edit Machine* command.

After your confirmation on the proper measurement results with the **OK** button, the program searches for the defects. If no defects identified, you will be prompted to select the balancing type. If the defects are identified, the message appears on it - 'Resonance or looseness in static machine parts' along with the defect localization relative to the supports.

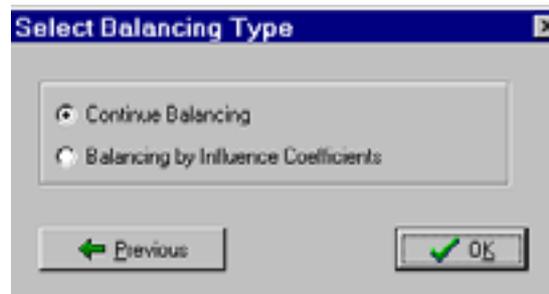
In the case of several fault supports, the more probable is loose foundation.

That defect allows balancing to be made, so you may press the **Continue** button. Using the **Repeat** button you may get back to the first dialog of the Initial Vibration Measurements and repeat the measurements.

4.3. VIBRATION MEASUREMENTS WITH THE TRIAL WEIGHTS ATTACHED

After measurement data on the initial level is obtained the Select Balancing Type dialog box will be displayed.

Fig. 4.16
Select Balancing Type
dialog



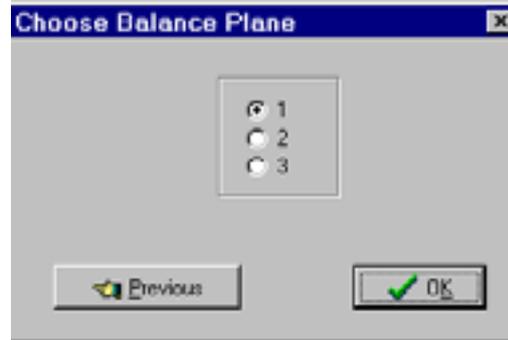
As mentioned above, the VBAL_PRO for Windows software provides balancing of two types: with the trial weight mounting and by known influence coefficients. The dialog enables you to select between them.

Note If no data yet present, the option of balancing by known influence coefficients is dimmed.

The balancing by influence coefficients is discussed in Section 4.5. The common way is to continue balance with mounting trial weights.

In this case the Choose Balance Plane dialog will be displayed after pressing **OK**.

Fig. 4.17
Choose Balance Plane
dialog



Indicate the balance plane at which the trial weight will be placed and press the **OK** button. After that mount the trial weight at the chosen plane. The parameters of the trial weights have to be entered the next dialog box.

Fig. 4.18
Dialog to enter the
trial weight parameters



The following parameters are shown:

- ❑ **Balance Plane Number;**
- ❑ **Angle Reading Direction** - indicated by you previously (in/ against the direction of rotation)

Enter parameters of the trial weight:

- ❑ **Weight** in grams;
- ❑ **Angle** in degrees.

Specify the type of the trial weight mounting: with the previous trial weight left in place or removed. For instance, you may left the first weight and remove the second or vice versa.

Besides that there are buttons to call the subprograms facilitating weight calculation.

- ❑ **Weight Estimation** - helps you to make rough estimation of the trial weights by the machine parameters (see Section 5.2).
- ❑ **Addition** - helps you to sum weights placed at the same plane (see Section 5.3)
- ❑ **Splitting** - helps you to distribute a weight into locations (see Section 5.4).

After the calculations is over you will be back to the dialog.

After pressing **OK**, you go to the measurement acquisition with instrument (see Section 4.2.1, or, for the manual input, Section 4.2.3) and measurement input.

If during viewing the measurement results you want to change the trial weight parameters, click the **Previous** button several times. You will be back to the Trial Weight Parameters dialog. After you changed the trial weight parameters, the measurement data need not to be acquired again or re-entered.

Then the program analyzes the measurement results.

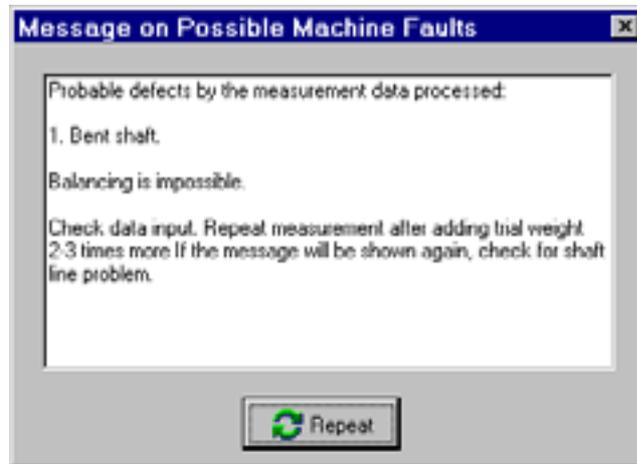
If the data obtained with the first trial weight doesn't allow to make calculation, the program analyzes the schematic diagram of the machine under balancing if you composed it during the machine configuration. Detecting the coupling, the program looks for possible coupling defects (misalignment or bending). In the case of defect detection, the message 'Misalignment in couplings between...' appears with indication of measurement planes between which the fault coupling is located.

Follow the instructions displayed. The **Repeat** button brings you back to the dialog for trial weight parameters input.

If no faults in couplings detected but calculation is impossible, the error message appears - 'Probable bent shaft. The calculation is impossible'.

Follow the instructions from that dialog to enable weight calculation. The **Repeat** buttons bring you back to the Trial Weight Parameters dialog.

Fig. 4.19
The message on possible faults



If you increases the trial weight and the error message appears again, misalignment is the more probable case. Stop balancing and correct the problem.

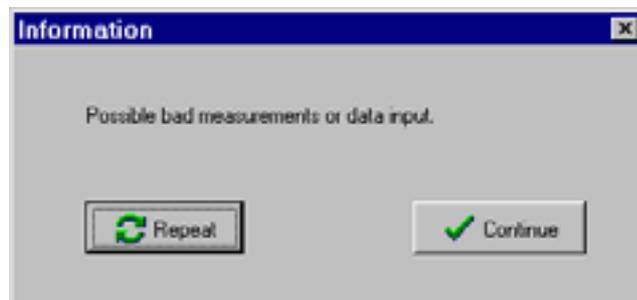
If the analysis of the measurement results after the second, third and so on trial weight mounting indicates that the calculation is impossible, the message appears as follows:

*"Too small trial weight.
Impossible to calculate the balance weights.
Repeat the measurement after the trial weight
increment two-three times.
If the message will be shown again,
check for shaft line problem."*

Follow the instructions to enable calculation.
The **Repeat** button brings you to the trial weight input.

If the analysis of the measurement results indicates that the trial weight calculation is possible, the program go to the check for measurement and input errors. If they are found, the warning appears on it - 'Possible bad measurements or data input'.

Fig. 4.20
Warning on possible errors in measurement data



Note that the message may appear even though measurement are correct. Then it indicates that the machine has different mechanical properties in the different measurement directions. The **Repeat** button bring you back to the Trial Weight Parameters dialog. The **Continue** button allows you to continue analyzing the measurements.

If you indicated the Pulsing torque diagnostics in the machine configuration, the program performs such diagnostics. If no defect found, the program continue to analyze the measurement results.

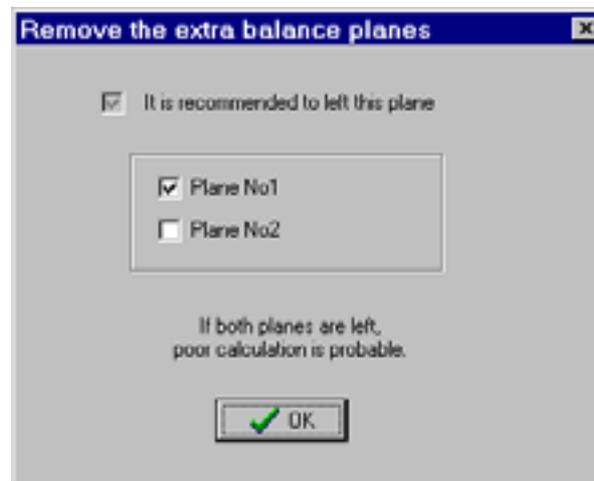
If pulsing torque is detected, the dialog will be displayed with information about it.

The pulsing torque may greatly affect balancing efficiency.

At the message dialog, the **Repeat** button bring you back to the Trial Weight Parameters dialog. The **Continue** button allows you to continue analyzing measurements results.

If the measurements are taken for two or more trial weights, the program estimates their influence at different planes. If it is the same, the dialog is displayed indicating the two planes to remove one of them as the extra plane.

Fig. 4.21
The dialog for removing extra planes



Select a plane to be left with its check box on. You may left the both planes but that will cause poor calculation of the proper balancing weights. Besides that, it may cause balancing weights increment due to their mutual compensation. It is recommended to left one of the planes, for example, more accessible. If no planes selected, the error message appears - 'No plane selected'.

After you confirmed your choice of a plane by the **OK** button, the program calculates the balance weights.

If the measurements have been taken for two or more machine modes, dialog 'Predicted levels by modes and directions' appears.

The dialog contains table with the predicted values for each measurement plane and each machine mode (they are calculated as the maximum vibration magnitude at all the measurement points) if the calculated balance weight will be installed.

You may use only the **OK** button to quit (go through) the dialog.

The table contains calculated vibration responses to the calculated weights mounted. Additionally, the levels for each machine and measurement direction are computed. On the base of the data obtained, it is possible to change influence of each mode upon the calculation. So if a calculated level is insufficient, you may decrease the influence of a mode by increasing relative levels for it. This increases the level for the selected mode, and decreases for the remainder. The *Change Vibration Requirements* command displays dialog 'Setting the Acceptable Levels for the Modes'.

After edits made the computation of vibration levels will be repeated. The cycle may be repeated as many times as you need.

If there is no need to change vibration levels, you may select 'Continue Job' and press **OK**.

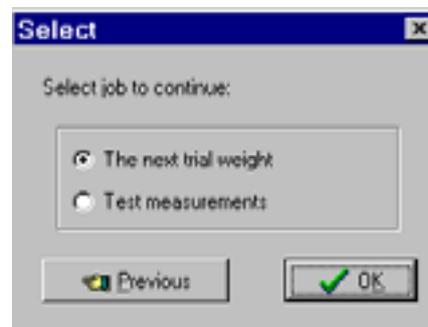
If the program have been informed that one or more trial weight is left in place, the table will contain additional three sections:

- ❑ **Trial Weights left in place;**
- ❑ **Additional Balance Weights** - the balance weights have to be placed if the trial weights are left in place;
- ❑ **Balance Weight Sum** - the balance weights have to be placed if the trial weights are removed.

If all the trial weights have been marked as 'Off place', the table will contain only that third section named Weights.

Note especially the Estimated Vibration value. The next job selection is based on it as well as on the vibration level at the previous step. Remember that these values are maximum from the data at all measurement points.

Fig. 4.22
The Select Job to
Continue dialog



If the calculated vibration magnitude exceeds the required, select the **Next Trial Weight** option and start mounting the next trial weight. The command displays the Choose Balance Plane dialog.

If the calculated amplitude is roughly equal to or less than the required, stop to place trial weights, install the calculated balance weights and go to the **Test Measurements**.

4.4. TEST MEASUREMENTS

After you have selected the Test Measurements option, the Enter Actual Weight Parameters dialog will be displayed.

Fig. 4.23
The Enter Actual
Weight Parameters
dialog

N	Trial weights left in place	Actual Mounting Weights	
		Weight (g)	Angle (deg)
1	OFF PLACE	0.00	0
2	OFF PLACE	0.00	0
3	LEFT IN PLACE	0.00	0

Enter this dialog the actual (not the calculated ones) parameters of the balance weights installed. They may be different from the calculated and they are used for checking removed/left trial weights and for Balancing Report. For each weight you have to indicate the trial weight status. To do it, select from the drop-down menu an option:

- On** - the trial weight is left in place before mounting balance weight;
- Off** - the trial weight is removed before mounting balance weight.

By default line 'Trial Weights Left in Place' is filled in with regard to trial weights status. Note that if extra planes have been dismissed, they cannot be used for balancing weights in this table.

The **Previous** button brings you back to the Job Selection dialog that allows you to enter the next trial weight with the Next Trial Weight command.

Confirm your data on actual weights parameters by pressing the **OK** button.

First the program tries to search for the user's error during the trial and balance weights mounting. For this purpose, it computes vibration responses to the weights indicated. If they are greater than

the initial levels, the program assumes erroneous input of weights parameters or bad intention.

If the errors are detected, the error message dialog will be displayed: 'Possible errors in trial weights position'.

If the configuration shown doesn't correspond to the actual one, edit it using the drop-down list of choices available. Click the arrow down button to select the actual trial weight state (in place or removed) and the direction of the weight angle increment (in or against direction of rotation). The data will be corrected and the repeated trial runs are not needed.

If the VBAL_PRO for Windows program found probable errors during the balance (correction) weight mounting, the dialog appears: 'Possible errors in correction weights position'.

You have to indicate whether or not were errors in angle increment direction. The table contains the data that the user entered. If the configuration shown doesn't correspond to the actual one, edit it using the drop-down list of choices available. Use the **OK** button to confirm your choice, the software re-calculate vibration responses and check once more for errors.

If the errors are found (the weights attached differ very much from the calculated), dialog 'The balancing is recommended' will be displayed.

It allows you

- ❑ **Continue** - continue the current balancing up to completion with the balancing report.
- ❑ **Previous** - get back to the previous dialogs to correct the mounting weights parameters.
- ❑ **Menu** - go to the Main menu to start the new balancing cycle.

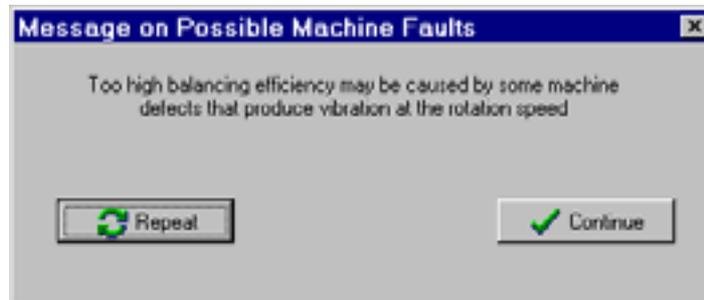
After the check for errors are completed, the Test Measurements dialog will be displayed.

How to work with the dialogs for measurements/manual input are discussed in detail in Sections 4.2.1, 4.2.2, and 4.2.3.

After the test measurements are taken and their results displayed, the program go to analyze them.

If the vibration level by the test measurements are much less than the calculated one, it reveals possible faults generating vibration at the operating speed. Then the dialog with information on it will be displayed.

Fig. 4.24
Message on possible
faults



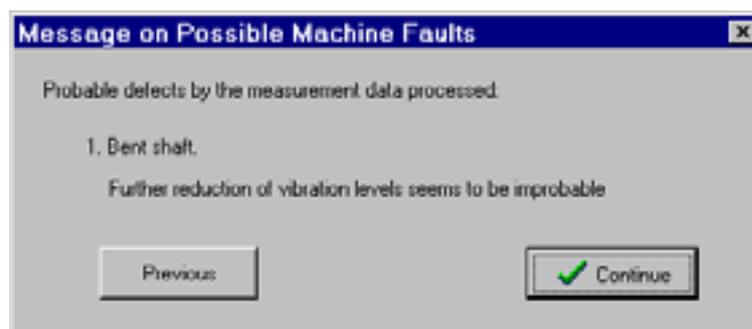
The vibration magnitude depends on machine loading and drops down in response to the load reduction during balancing. The case may be defects of flexible coupling, electric circuitry in electric machines and so further. Such a defect cannot hinder balancing, but it is recommended to estimate its type and depth with the dedicated diagnostic software.

The **Continue** button allows you to proceed with the balancing. The **Repeat** button gets you back to the Test measurements.

If the measured vibration value is more than the calculated one, the program assumes that the errors are made in the trial/balance weights mounting. The parameters are adjusted with the procedure similar to the described.

The further defect to be diagnosed on this stage is bent shaft (in couplings). The message on it appears if the test measurement significantly exceeds the calculated value.

Fig. 4.25
Message on possible
bent shaft



The **Continue** button lets you proceed with the balancing. The **Previous** button gets you back to the previous dialog to check for the weight mounting.

If it is possible to locate fault by the measurement data obtained, the dialog appears with fault localization. Indicated are the planes between which the fault coupling is located.

The **Continue** button lets you proceed with the balancing. The **Previous** button gets you back to the previous dialogs to check for the weight mounting.

If the program found the probable errors in measurements or data input, the relative warnings appear.

The **Repeat** button take you back to the Test Measurements. The **Continue** button lets you proceed with the measurement analysis.

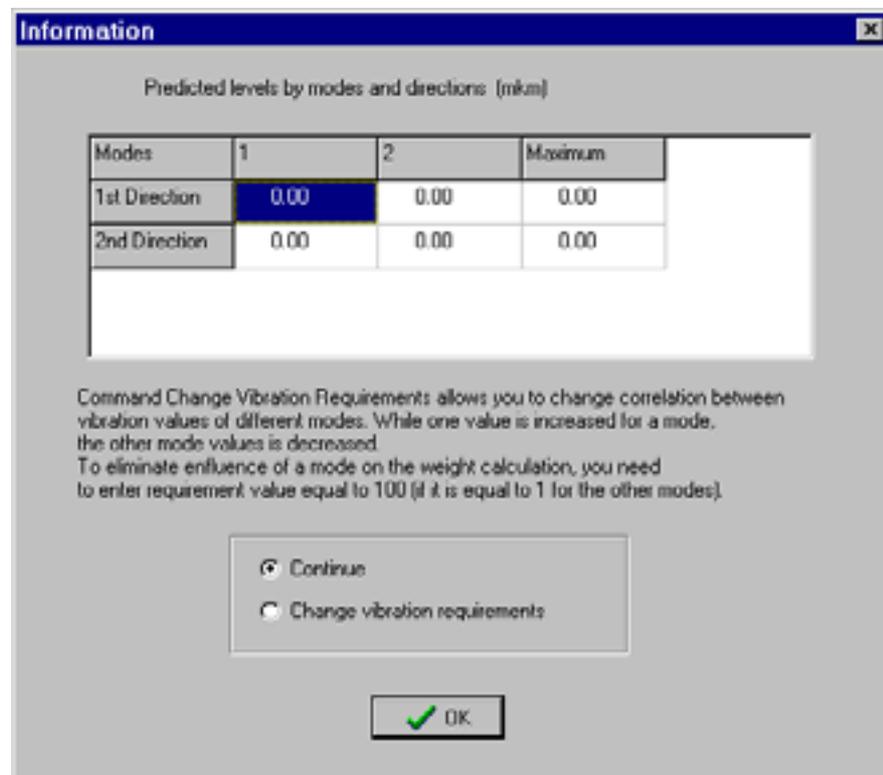
If the option of Pulsing torque diagnostics has been selected during the machine configuration, the program makes such diagnostics. If the defect is not present, the program continue to analyze measurement results.

In the case of pulsing torque indication, the relative dialog will be displayed.

The **Repeat** button take you back to the Test Measurements. The **Continue** button lets you proceed with the measurement analysis.

If the measurements have been taken for two or more machine modes, dialog 'Predicted levels by modes and directions' appears.

Fig. 4.26
The dialog 'Predicted levels by modes and directions'



The table contains results of vibration levels computation while the calculated weights are mounted. Additionally the levels for each machine level and measurement direction are calculated. On the base of the data obtained, it is possible to change influence of each mode upon calculation. So if the calculated level is insufficient, you may decrease the influence of the mode by increasing relative levels for it. This increases level at the selected mode, and decreases at the remainder. The *Change Vibration Requirements* option displays

dialog 'Setting the Acceptable Levels for the Modes' if you press the **OK** button with the selection.

After edits made the computation of vibration levels will be repeated. The cycle may be repeated as many times as you need.

If no need to change vibration levels, you may select 'Continue Job' and press **OK**.

After measurements the program go to the correction weights calculation.

The program computes parameters (mass and mounting angle) of correction weights that have to be mounted in order to enhance balancing efficiency.

The Calculated Correction Weights dialog contains also values of Estimated vibration and Test Measurement. The comparison of these values (maximum at all measurement points) helps to select the next job to do. So if the values are close to each other, mounting correction weights is useless and the balancing have to be completed or the new balancing cycle started.

If the estimated vibration is acceptable or much less than the last test measurement, place correction weights and take **Test Measurements**.

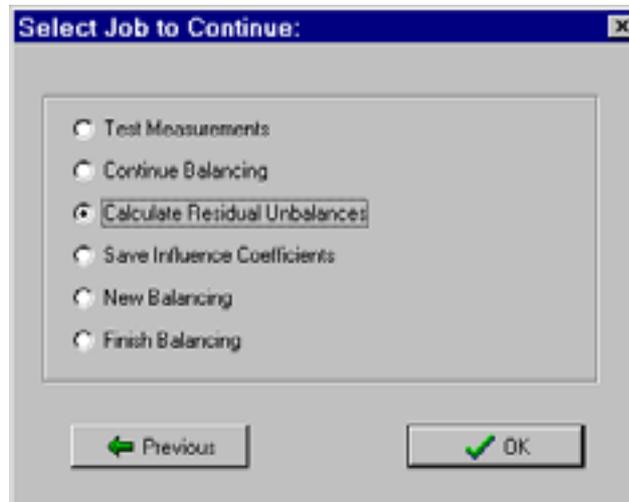
If the estimated vibration is more than the acceptable, the Continue Balancing command will be available and it is recommended to use it and continue mounting trial weights at remaining balance planes. The program asks for confirmation.

The **Previous** button brings you back to the Job Selection dialog.

The **OK** button displays the Choose Balance Plane dialog. Select one of the available planes and click **OK**. The **Previous** button is dimmed in this dialog. The next operations are the same as in standard balancing.

If the calculated vibration is very close to the last measured and the Continue Balancing option is not available, it is recommended to start **New Balancing**. The command displays the measurement results of the initial level. As the initial level, the last test measurements are used.

Fig. 4.27
Select Job to Continue
dialog



If the required result is obtained or the vibration level cannot be reduced further, the balancing has to be finished. On completion you may use the following commands from the dialog under consideration.

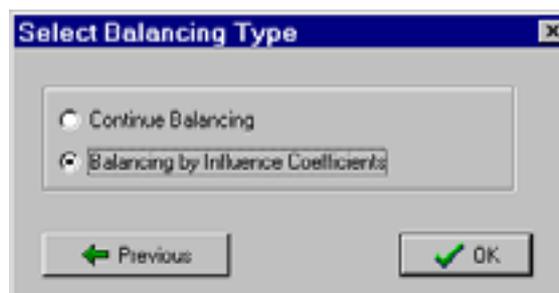
- ❑ **Calculate Residual Unbalances**- runs a utility to estimate results reached by unbalance units. On completion you will be back. You may use this utility during balancing.
- ❑ **Write Influence Coefficients** - records the influence coefficients calculated in balancing to the database. It makes sense for the pure balancing not for the balancing by influence coefficients. On completion you will be back to the dialog.
- ❑ **Finish Job** concludes the balancing process although you may proceed with it while the new balancing cycle is not yet started using the *Balancing* command and then the *Continue* command from the Select Job to Continue dialog. Use the *Balancing Report* command from the Main menu to issue a report with the Microsoft Word.

4.5. BALANCING BY INFLUENCE COEFFICIENTS

This type of balancing is applied when there are results of the previous successful balancing that is known influence coefficients.

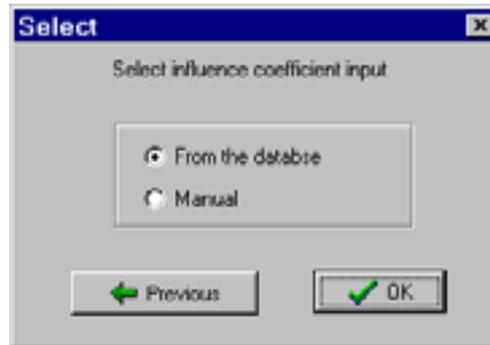
You will be prompted to select this type of job after initial level measurements made with the dialog as follows.

Fig. 4.28
Select Balancing Type
dialog



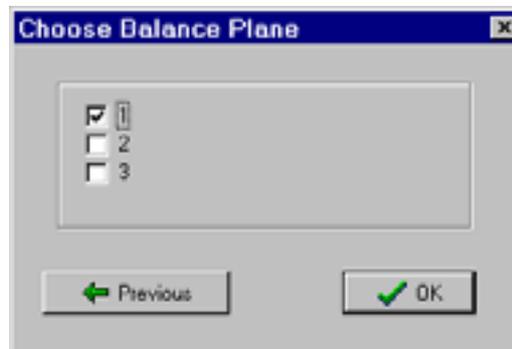
Select the type and click **OK**. It will display the Select Input dialog.

Fig. 4.29
The dialog to select influence coefficient input



If the influence coefficients have been saved to the database, use the *From the Database* option. If not, this option is not available and you have to select the Manual input for known influence coefficients. The **OK** button brings you to the Choose Balance Plane dialog.

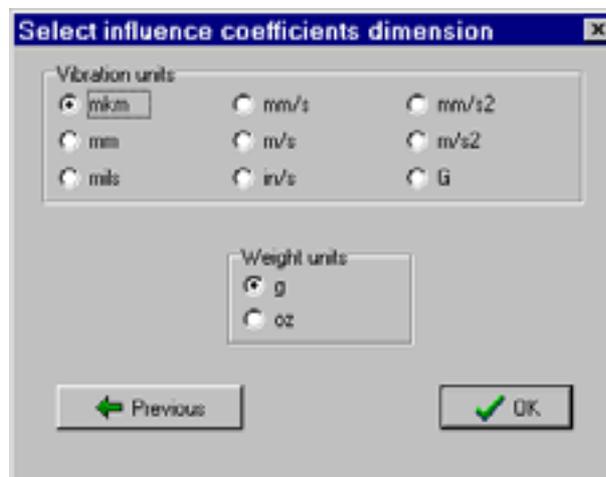
Fig. 4.30
The dialog to choose balance planes



Select planes for balancing by known influence coefficients. To mark a plane with the tick, click its check box. If no plane selected, an error message appears and the balancing cannot be continued.

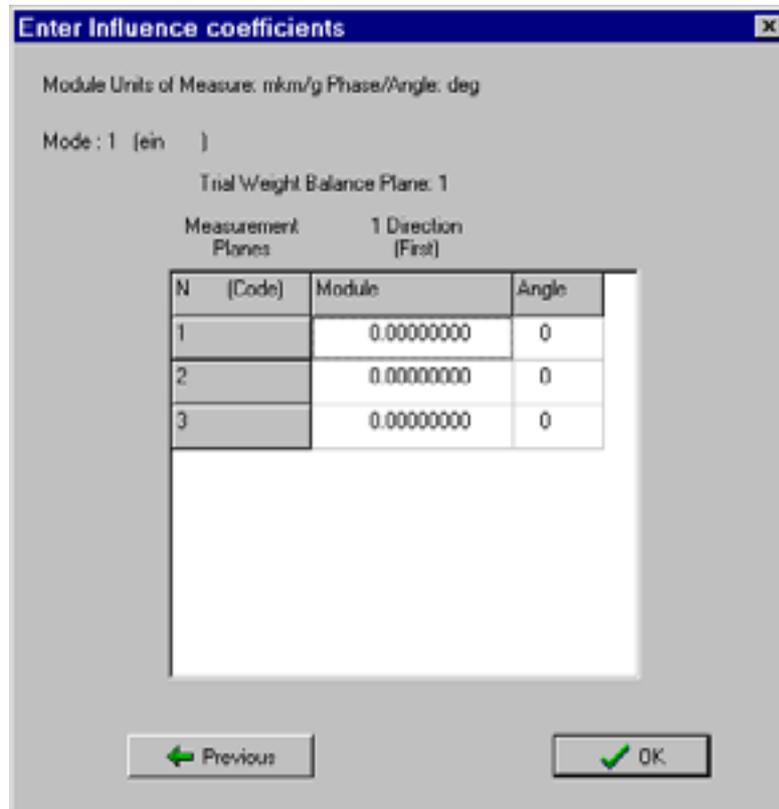
Click **OK** to confirm your selection and the Select Influence Coefficient Units dialog will be displayed.

Fig. 4.31
The dialog to select influence coefficient units



Set the units that have been used for the given influence coefficients. The Enter Influence Coefficients dialog will be displayed.

Fig. 4.32
The dialog to enter influence coefficients



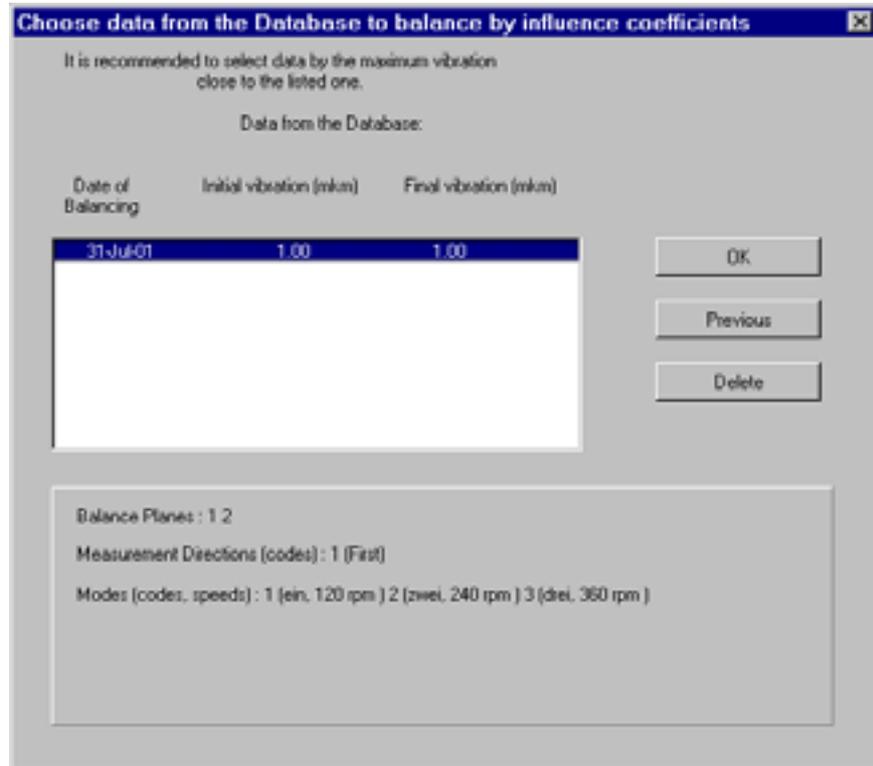
Enter this dialog the values of influence coefficients (their magnitudes and angles). The number of dialogs to enter coefficients is equal to the number of the selected planes. The current plane number is shown at the corresponding field.

The **OK** button brings you to the next dialog.

After you press **OK** in the last input dialog, all the entered coefficients will be displayed on the screen. Check them and click the **Previous** button if you need correct them. Confirm input data with **OK**. It starts a computation of the correction weights.

If you have selected input from the database, the dialog will be displayed to select a data set.

Fig. 4.33
The dialog to select a
data set from the
database



Select the data that are more adequate to the machine current state. As a rule it is made by the maximal initial level. You may delete the data that are out-of-date (for example, after an overhaul).

After clicking the **OK** button, correction weights will be calculated for all the planes used and the results will be displayed.

Note that you may change the vibration requirements for each mode to enhance the balancing efficiency for modes.

Pressing **OK** displays the Select Job to Continue dialog.

The only choice is available - *Test Measurement*, so press the **OK** button. The further operations have been described in Section 4.4.

4.6. SAVING INFLUENCE COEFFICIENTS TO THE DATABASE

The Save Influence Coefficients option from the Select Job to Continue dialog is used to enter machine parameters for future use in balancing without trial weights.

It is recommended to save data of each full balancing cycle if the vibration level has been reduced three and more times. The command displays the Information dialog with the data of the current balancing cycle.

A data set on the selected machine may be deleted later during the balancing by influence coefficients in the dialog shown in Figure 4.34. It is recommended to delete data after an overhaul or if they are duplicates.

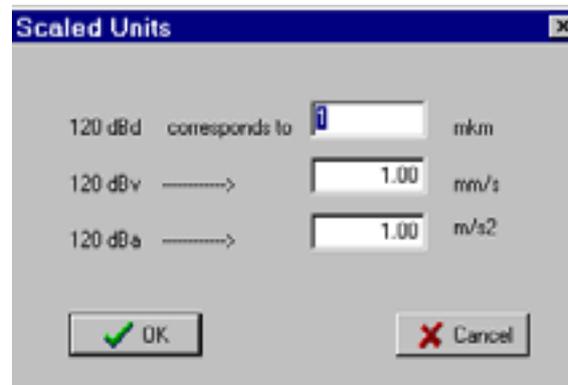
5. PROGRAM TOOLS

The VBAL_PRO software includes a variety of additional subprograms (tools). They help you to enter data in a number of units of measure as well as compare them, estimate trial weights values, add and sum weights at one balance plane. They may be available while needed in balancing and directly from the Options menu.

5.1. UNITS OF MEASURE AND LOGARITHMIC UNITS

In the program there is a capability to preset engineering units for amplitude, phase, mass, machine speed and change them. In addition, you may change units of measure for mounting angle of trial weights as well as for rotor mass (they are used by the subprogram of the trial weight calculation). The settings may be made in the Setup while Measuring dialog (Fig. 4.9) during balancing as well as by the *Logarithmic Units* command from the Options menu. The *Logarithmic Units* command displays the Scaled Units dialog.

Fig. 5.1
The Scaled Units
dialog



The dialog enables you to set ratio between relative (logarithmic) and absolute units by entering the absolute values for vibration displacement, velocity or acceleration that corresponds to 120 dB.

5.2. TRIAL WEIGHTS CALCULATION

The Trial Weights Estimation command (or the **Weights Estimation** button in the Trial Weight Parameters dialog - Fig. 4.21) allows to calculate the rough value of a trial weight by known machine parameters.

The calculation is made through the formula as follows:

$$m = \frac{12500 \times X \times M}{R \times f^2},$$

where: m - mass of the trial weight (g),

X - vibration magnitude (m/s²);

M - rotor mass (kg);

R - weight mounting radius (mm);

f - rotational frequency of the rotor (Hz).

To make calculation, you need to fill in the Trial Weights Calculation dialog.

Fig. 5.2
The Trial Weights
Calculation dialog

Trial Weights Calculation

Enter :

Rotor Mass kg

Weight mounting radius mm

Maximum vibration amplitude mkm

Machine Operating Speed rpm

If you have entered a value over the preset boundaries, it will be changed to "?????". If you click **OK** with such a line, the error message containing information on limits appears and you will be back to the line of error.

Preliminary you may change the units of measure in the dialog as follows:

Fig. 5.3
The Measurement
Setup dialog

Measurement Setup

Amplitude Units

mkm mm/s mm/s2

mm m/s m/s2

mils in/s G

dBd dBv dBa

Speed

rpm Hz

Detector

RMS PEAK PEAK-PEAK

Weight

g oz

Mounting radius

mm in

Rotor mass

kg lbs

Set the values to the required and click **OK**.

In the Trial Weights Calculation dialog the values (Rotor Mass, Weight Mounting Radius, and Maximum Vibration Amplitude)

may be either of a rotor from the compound machine or of a averaged rotor. Thus you may calculate either trial weights for each balancing plane or some averaged weight mounted at some averaged radius. The vibration amplitude has to be selected as a maximum for all the measurement points either of entire machine or of the given rotor.

Note that if the dialog is displayed during balancing, the machine speed and vibration amplitude are automatically computed by the data obtained and need not to be entered.

The computed value of the trial weight will be displayed at the Trial Weight Calculation dialog in grams.

Take into consideration that the calculated is a rough value of the trial weight. In the case of the rigid machine mounting and the support structure of great stiffness, the required trial weight may be 2-3 times greater than the calculated. In the case of a machine with damping, the calculated value is close to the actual. In the case of an individual rotor (on the balance machine) the calculated value need to be reduced two times. Therefore the more reliable is the practical values of the trial weights. To record them, there are the Recommended Trial Weights Section in the dialog displayed either by the New Machine Group or Edit Machine Group commands.

5.3. ADDING WEIGHTS

The *Sum Weights* command from the Options menu (or the **Addition** button in the Trial Weight Parameters dialog - Fig. 4.21) allows the mass value equivalent to several ones at one balance plane to be calculated.

The calculation is made for the weights with the same mounting radius.

First the program ask for the number of weights to sum. Then the dialog displayed to enter values of mass and mounting angle.

Fig. 5.4
The Sum Weights dialog for two weights



The units of mass is selected by the user in the Setups While Measuring dialog, the units of mounting angle - in degrees.

Enter your values and press the **Sum** button.

5.4. SPLITTING WEIGHTS

The *Split Weights* command from the Options menu (or the **Splitting** button in the Trial Weight Parameters dialog - Fig. 4.21) allows one weight to be split into several ones which are equivalent to the one by influence. It may be useful if not enough balance planes are available (for example, on fan blades). The angles between balance planes assumed to be the same, and the first balance plane is the zero reference for the mounting angle. The mounting angles considered as the fixed, and the calculated are just the weights. The operation may be also used in the case of weight restrictions for a location.

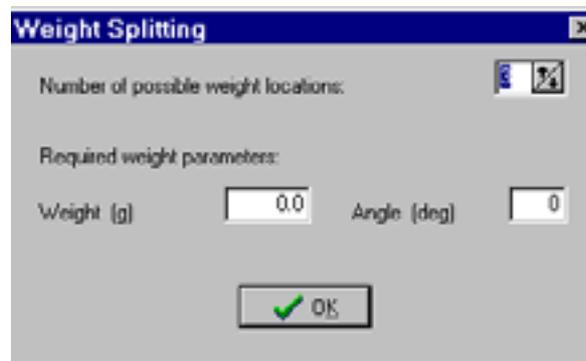
First, the program asks for restrictions on mass for a location.

Fig. 5.5
The request on the maximal allowable weight



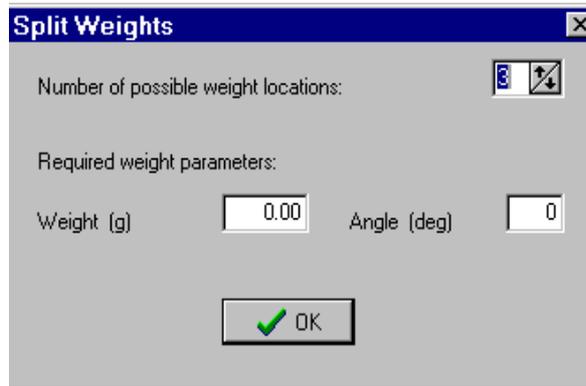
If no restriction, the dialog is displayed to enter the required weight parameters (mass and angle) and the number of possible weight locations.

Fig. 5.6
The dialog to enter the required parameters with no mass restriction



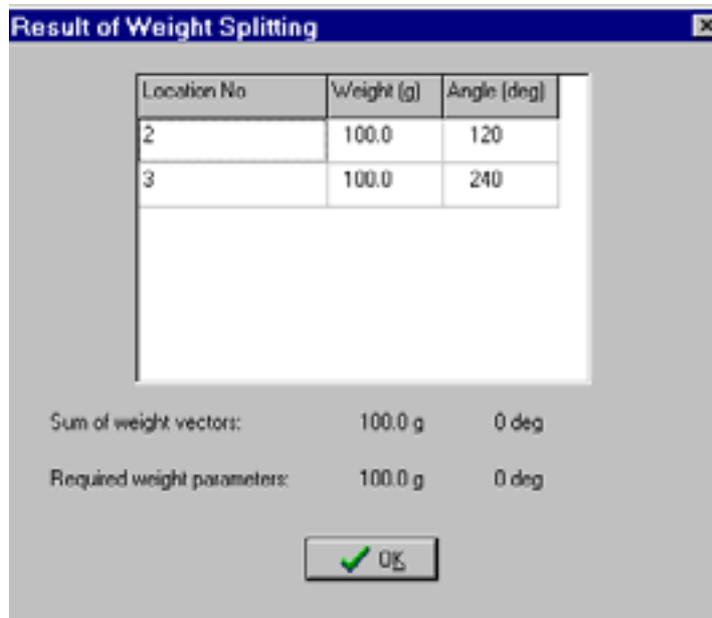
If there are some restrictions on the maximum weight value for a location, you have to enter additionally the maximal allowable value in the dialog as follows:

Fig. 5.7
The dialog to enter the required parameters with mass restrictions



After all the required data are entered, the calculation is made and the results displayed.

Fig. 5.8
Results of Weight Splitting

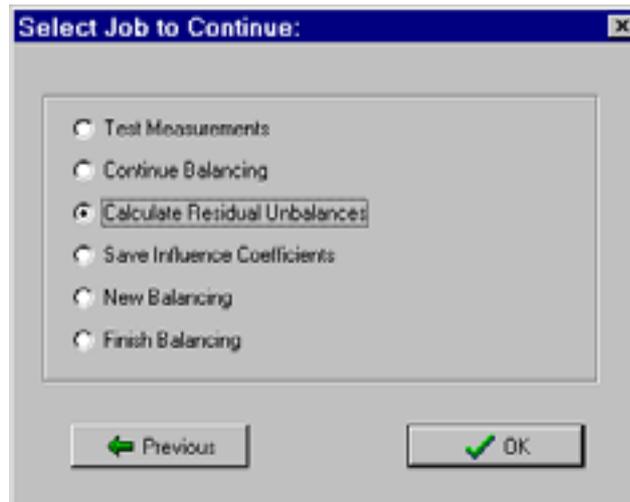


If the restrictions on weights make impossible to get the required mass, the sum of weight vectors differs from the required weight parameters. If the sum of weight vectors is close to the required, you may mount the calculated weights. The balancing efficiency will be less than the maximum. You may also increase the value of the maximum allowed weight for a location and repeat the calculation. The current program version allows up to 8 weights to be installed. The **OK** button brings you to the Split Weight dialog (Fig 5.7).

5.5. CALCULATING RESIDUAL UNBALANCES

To use this option after the test measurement performed, select **Calculate Residual Unbalances** from the Select Job to Continue dialog.

Fig. 5.9
The Select Job to Continue dialog



It first displays the Measurement Setup dialog.

Fig. 5.10
The dialog to select between metric and English units



After you selected metric (mm) or English units for mounting radius, the Calculation of Residual Unbalance dialog will be displayed to enter mounting radius for each balance plane in use.

Fig. 5.11
The dialog to enter
mounting radia

Balancing Planes	Weights Mounting Radius
N	Radius (mm)
2	0

The input sequence is the same as during the trial weight mounting. Click **OK** and the program calculates the residual unbalance values for each balance plane and shows the results. Then you will be back to the Select Job to Continue dialog.

6. MENU DESCRIPTION

6.1. THE MAIN MENU

The Main menu contains the next commands:

Machine Group Selects a machine group to work with from the existing ones.

Machine Selects a machine from the selected machine group.

Measurements Data Entry Form

Creates a standard form to fill in the measurement data obtained.

Balancing Starts a new balancing cycle.

Balancing of Emery-wheels Balancing by the weight distribution. You may purchase it additionally.

Balancing Report Starts MS Word to create, edit and print the Balancing Report that contains all the steps of the completed/not completed balancing of the selected machine.

Exit Closes the program.

6.2. THE CONFIGURATION MENU

The Configuration menu contains command for database management.

New Machine Group Sets up a new machine group and saves it to the database.

Edit Machine Group Allows to edit parameters of the selected machine group.

Delete Machine Group Deletes the selected machine group.

New Machine Sets up a new machine and saves it to the database.

Edit Machine Allows to edit parameters of the selected machine.

Delete Machine Deletes the selected machine (from the current machine group).

Emery-wheels Group It's not available in the current version.

6.3. THE OPTIONS MENU

The Options menu contains additional commands such as the ones for weights calculation, scaling logarithmic units and so on.

Trial Weights Estimation Allows rough calculation of the trial weights by the machine parameters.

Sum Weights	Sums the weights mounted at the same plane and radius in order to substitute them by one at the same radius. The command also may be used to sum/subtract vectors.
Split Weights	Allows to represent a weight as the several ones equivalent to it by influence. It may be useful if the number of balance weights is limited for a balance plane.
Calculator	Displays the simple calculator to perform arithmetic calculations.
Measurement Units	Allows set measurement units including the ones for trial weight calculation.
Logarithmic Units	Scales the logarithmic units for vibration amplitude representation.
LCard Parameters	Allows you to set gain factor of preamplifiers as well as of the data acquisition board installed into computer.

6.4. THE HELP MENU

Contents	Displays the help contents.
About	Displays short information about the program (program name and its version).