

BLOCKMSG

Software for construction and adjustment of the photogrammetric network

BLOCKMSG for Windows 95/98/NT

verision 3.2

Operator's manual

Part 1

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1. Overview

1.1. Introduction

This software allows to combine an already measured block of photographs into unified photogrammetric network and to adjust this network.

During the models combining rough errors are provided. Constant biases are excluded while the bundle adjustment process.

The following list shows the software features:

- A source file may contain the data in irregular order;
- The number of points either on photo or stereopair is unlimited;
- Photos with the different focus distances are proceeded jointly;
- A point's name may contain up to 20 any symbols;
- The number and location of tie points between the stereopairs are arbitrary, i.e. they must conform to the theoretic adequacy to combine the models into a single block. For example, stereopair may have three tie points only, one point per adjacent zone;
- The number of the ground points is unlimited and must guarantee the geodetic orientation of the network; in the case of insufficient of ground points the network is builded with a free coordinate system.

1.2. Basic skills

When you perform basic operations in **BLOCKMSG** you use the standard conventions of **Windows**.

You perform the most of basic operations by clicking or double clicking with **the left mouse button**.

Use **the right mouse click** to close some of dialog boxes.

All results are saved in ASCII format with the word wrapping. It makes possible to send the result to the screen or to the printer.

There are two ways of using **BLOCKMSG**.

1. Using **BLOCKMSG** with **Triada**.

At first, send block data from **Triada** to **BLOCKMSG** using **BlockMSG | Adjust block** command (in **Triada**). **BLOCKMSG** will appear.

Then use commands in the following order:

- [Calculation | Adjustment](#)
- [Result | Create Documents](#)
- [Result | View/Print](#)
- [Block | Close](#)
- [Block | Exit](#)

2. Using **BLOCKMSG** as a separate adjusting software.

The typical order of commands to perform the block adjustment is the following:

- [Block | Open](#)
- [Options](#)
- [Calculation | Construction](#)
- [Calculation | Adjustment](#)
- [Result | Create Documents](#)
- [Result | View/Print](#)
- [Block | Close](#)
- [Block | Exit](#)

2. Using BLOCKMSG

2.1. Main menu

2.1.1. Overview

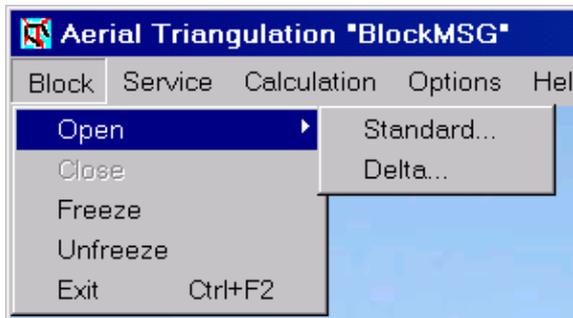
The main menu contains the following menus:



The "[English](#)" menu consists of commands for switching between interface languages. It is necessary to choose the interface language before block processing to obtain the result files in the same language.

The "[Help](#)" menu brings up the "About..." dialog box.

2.1.2. "Block" menu



2.1.2.1. "Open" command

This command brings up the standard **Windows** dialog box for opening files, which allows you to select the name and format of a file with the phototriangulation network data. When you click "**OK**" the program creates a new window and loads the selected file.

Files have been exported from **Triada** must have the *.del extension. All the files will be transformed into the native format after importing. The extension will be changed to *.kmp.

All native **BLOCKMSG** files must have *.kmp extension.

2.1.2.2. "Close" command

This command deletes all temporary files been created during block data proceeding.

Only source files and files with calculation results remain. It is necessary to open the source files again to continue or repeat the block calculations.

The program waits for opening the other block after executing of this command.

2.1.2.3. "Freeze" command

This command is useful to interrupt the block proceeding. All the temporary files of current block will be saved including the program settings. The program starts waiting for the other block after this command.

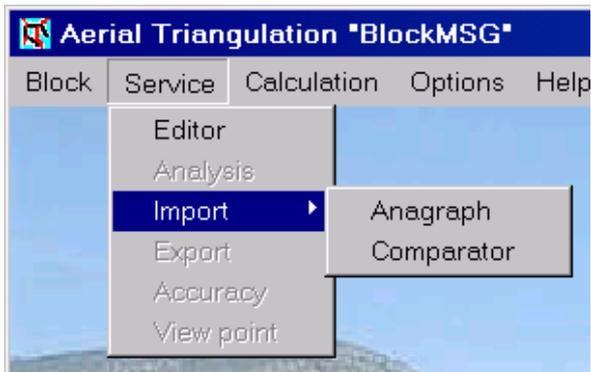
2.1.2.4. "Unfreeze" command

This command brings up the standard **Windows** dialog box for opening files which allows you to select the *.zms file. The program restores the saved settings and is ready to continue the block proceeding than.

2.1.2.5. "Exit" command (Ctrl+F2)

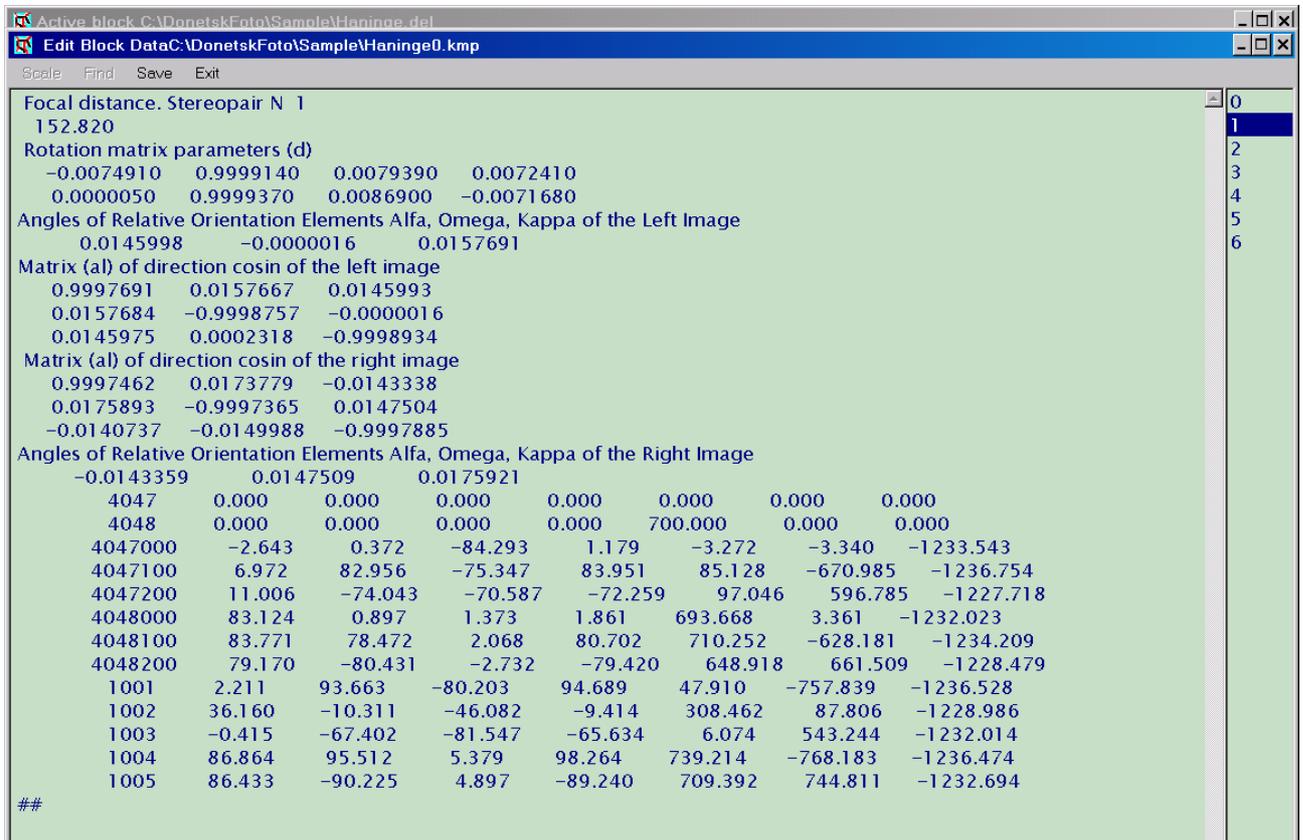
This command saves all settings and closes the application window. So the setting will be restored after the next executing of the software.

2.1.3. "Service" menu



2.1.3.1. "Editor" command

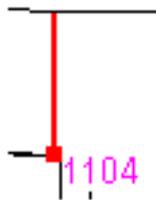
This command brings up the standard **Windows** dialog box for opening files, which allows you to select the *.kmp file with the source data. When you click "OK" the program creates an editor window which is divided into two parts. Left part contains the editable data and right part contains the stereopairs' numbers. **Double click** with the **left mouse button** on the necessary stereopair to obtain an information about this pair. Modified data can be saved with the same name or with the other name of file. The default (*.kmp) file extension will be appended automatically.



2.1.3.2. "Analysis" command

This command brings up the window with the graphical analysis of results of phototriangulation network been created and allows to estimate models' joining errors visually. There is a network scheme in the window. Elements of the scheme are following:

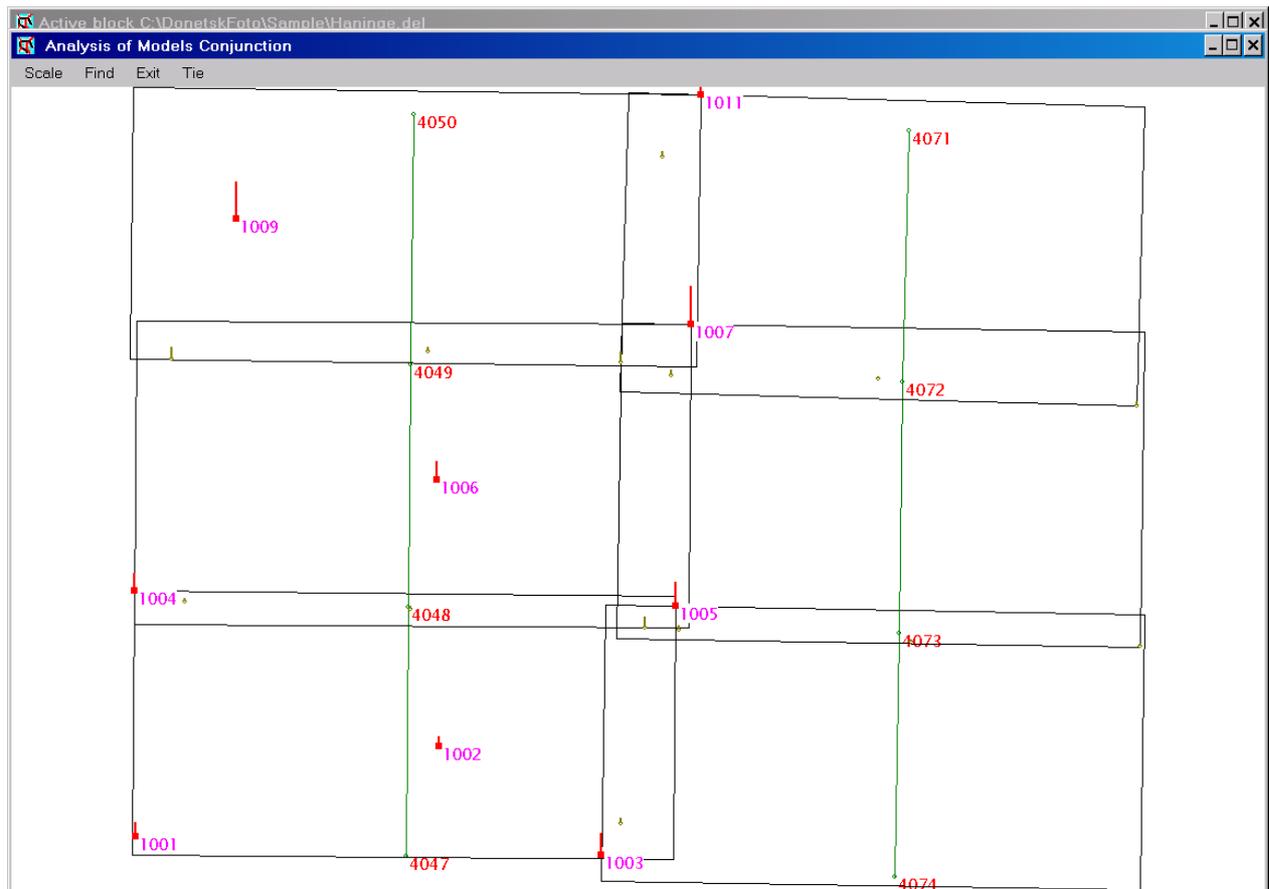
- black rectangles mean stereopair's terrain boundaries;
- - green circles conjoint with lines mean photography bases with the numbers of photography centers;
- - tie point, the vertical line means the residual showed in the relative scale;



- ground point, the vertical line means residual showed in the relative scale; red color means compilation point, crimson color means horizontal point; green color means vertical point.



- photography centre which is the network ground point.



Main menu of the analysis of models conjunction window.

<Scale>:

- <Scale/Zoom In F4>** - increase the scale by 1.1;
- <Scale/Zoom Out F3>** - decrease the scale by 1.1;
- <Scale/ 1 : 1 >** - fit in window;

<Find>:

<Find/point> - the mouse pointer will be changed to  after this command. Click with the **left mouse button** on the necessary point on the scheme. This will bring up a window with the analysis of the deviations of the closest tie point. Bottom part of the window contains the following data:

- number of the closest tie point to the current point;
- numbers of stereopairs were used for the point's measurements;
- next three columns are the point's coordinate deviations on each stereopair relatively to their adjusted value in meters;
- next two columns are the point's coordinates on the left photo of the corresponding stereopair, they are used for the point identification which is multiple measured on the same stereopair.

Double click with the **left mouse button** on the stereopair's number to show the source data of

this pair from the *.kmp file at the top of the window and the mouse pointer will be moved automatically to the line which contains measurements of the current point.

You can modify this data and then save changes to existing file or specify any other file for saving.

The network scheme shows the maximum deviation for current point. An additional window contains the scheme of the measured points' locations on the stereopair's photographs. Double click with the left mouse button to maximize the window.

Analysis of deviations on the point1009

Focal distance. Stereopair N 3
152.820

Rotation matrix parameters (d)
0.0095990 0.9999150 0.0087050 -0.0012010
0.0000020 0.9998200 0.0180910 -0.0057410

Angles of Relative Orientation Elements Alfa, Omega, Kappa of the Left Image
-0.0025678 0.0000001 0.0173878

Matrix (a) of direction cosin of the left image
0.9998455 0.0173869 -0.0025678
0.0173870 -0.9998488 0.0000001
-0.0025674 -0.0000447 -0.9999967

Matrix (a) of direction cosin of the right image
0.9992795 0.0361759 -0.0114787
0.0359492 -0.9991657 -0.0193777
-0.0121701 0.0189511 -0.9997463

Angles of Relative Orientation Elements Alfa, Omega, Kappa of the Right Image
-0.0114811 -0.0193789 0.0359637

4049	0.000	0.000	0.000	0.000	0.000	0.000	0.000	0.000
4050	0.000	0.000	0.000	0.000	700.000	0.000	0.000	0.000
4049000	3.168	-5.814	-81.344	-11.728	21.618	47.442	-1235.542	
4049100	-2.232	83.082	-88.189	75.656	-9.443	-665.336	-1223.405	
4049200	1.341	-72.437	-82.873	-78.671	-2.507	583.946	-1231.734	
4050000	84.698	8.251	-0.656	3.780	681.611	-54.708	-1235.397	
4050100	84.097	98.343	-3.088	92.576	687.829	-780.164	-1232.592	
4050200	73.125	-84.248	-10.438	-89.673	576.308	691.561	-1237.461	
1007	15.280	-96.042	-68.584	-102.454	106.681	777.328	-1233.920	
1009	47.205	61.883	-39.256	56.044	384.040	-489.686	-1226.710	
1011	94.490	-96.305	11.677	-101.706	750.021	794.862	-1242.271	

##

1009 3 -1.202 0.517 0.506 47.205 61.883

<Find/frame> - the mouse pointer will be changed to  after this command. Move the mouse pointer to a necessary rectangle area on the network scheme, hold down the left mouse button and select the area with the points which are necessary for the coordinate deviations analysis. Releasing of the mouse button brings up the information window. See above about contents of this window.

Use the **right mouse button** to close the information window.

<Exit> - closes the window of analysis of models conjunction.

<Tie> - Check this menu item to view the coordinate deviations of tie and ground points. After clicking on this menu item the following menu items will appear:

<Control> and <Plan>. It means visualization of planar coordinates of network control points. When you click on the <Plan> the following menu items will appear:

<Control> and <Heights> - it means that heights deviations of the control points showed on the scheme.

2.1.3.3. "Import" command

Use this command to read file with the data measured on photographs using Stereogram or Stereocomparator and to transform them into native format (*.kmp file).

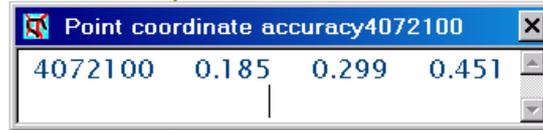
2.1.3.4. "Export" command

Use this command to calculate coordinates of point's images on photographs and to obtain the *.kmp file with source data using the adjusted values of geometric elements of network. Theoretically, all corrections will be equal to zero when you process this file. But practically, corrections are nonzero, because of rounding errors during calculation and they are not exceed 1 mkm.

2.1.3.5. "Accuracy" command

This command brings up the window for analysis of coordinates of terrain points accuracy, obtained after phototriangulation network adjusting. It makes possible to estimate visually deviations of ground points extension(?). The network scheme representation is same to the scheme described in the "Analysis" section. Select a point or few points on network scheme to see the information about them in the following order: point's number and mean square errors m_x, m_y, m_z of coordinates of terrain points X, Y, Z . This data is placed into an additional window.

Mean square errors of coordinates are calculated using the least-squares method. Program assigns a unit of weight error μ equal to value which calculated using results of block adjustment.

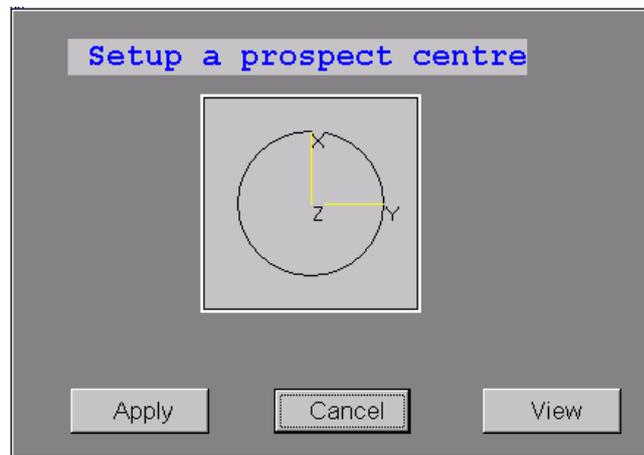


Point Number	m_x	m_y	m_z
4072100	0.185	0.299	0.451

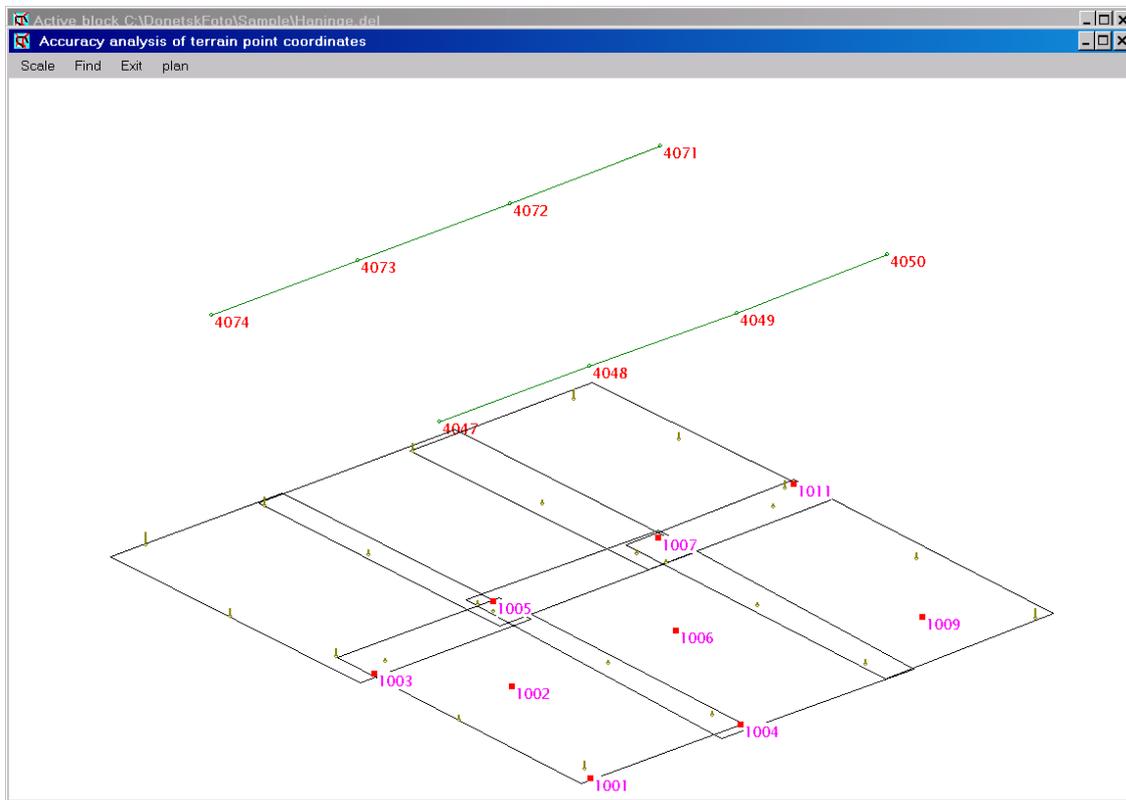
Use the **right mouse button click** to close the window.

2.1.3.5. "View point" command

This command is useful to set the prospect centre to obtain more obvious presentation of the network. By default the prospect centre is placed on Z axis in infinity, i.e. as a result we obtain orthogonal terrain projection onto horizontal plan. There is a special window for prospect centre setting. The central circle of this window contains direction and layout of axes projection of geodetic coordinates onto picture plane. Hold down the **left or right mouse button** and move the mouse pointer to set a prospect centre.



Double click with the left mouse button to close this window, the next double click will restore it.



As a result we obtain a 3D and more visually scheme.

2.1.4. "Calculation" menu

2.1.4.1. "Construction" command

This command is available after the block has been opened. This command joins a separate models into a unified block. Calculations are accompanied with the visualization of the proceeding process in the separate window. This window shows processed points dynamically on the network scheme. There is a progress of the iteration process on the status bar.

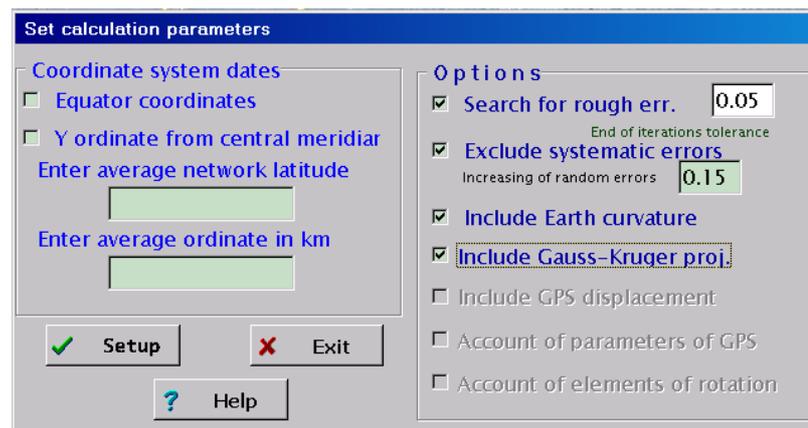
Iteration process takes less time if rough errors in measurements and in phototriangulation network construction were absent. After passing four cycles program makes request if you want to continue the iteration process. It is recommended to cancel the iteration process if iterations took much time. Then you can analyse obtained results, make corrections to source data and repeat calculations again.

2.1.4.2. "Adjustment" command

This command is available after the block has been constructed and can be applied repeatedly for the opened block. It brings up a visualization window which is same with the previous command. After passing four cycles program makes request if you want to continue the iteration process. In addition a necessity of taking into account calculated systematic image distortions will be requested in the case of adjustment with autocalibration, i.e. with elimination of constant biases.

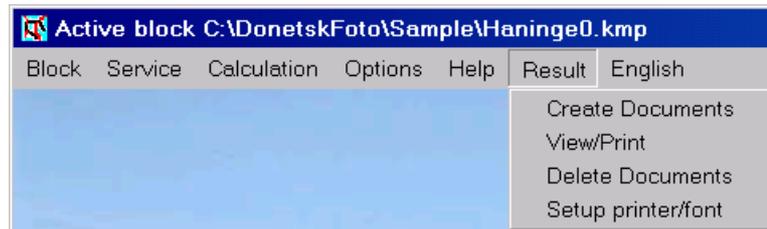
2.1.5. "Options" menu

This section is useful to set parameters and methods of measurements processing. Settings will be saved at application window closing or before processing the following phototriangulation network.



Set the flag in the checkbox near the necessary option to enable this option. Numerical values showed above are recommended. This values determined by practical experience.

2.1.6. "Result" menu



2.1.6.1. "Create Document" command

This command creates ASCII text files using calculation results. This files have the same name with the source file, but different file extension.

Output files list:

<block name>.kmp	source data file;
<block name>#.kmp	file is similar to source and created after block construction. Adjustment is proceeded using the least-squares method, i.e. without searching for rough errors;
<block name>\$.kmp	file is similar to source and created after block construction. Adjustment is proceeded the least-modules method, i.e. with searching for rough errors;
<block name>.knt	catalogue of the control points and their deviations during the block construction;
<block name>.doc	protocol of block construction and adjusting;
<block name>.gau	points coordinates after the independent models joining;
<block name>.out	deviations of coordinates of the tie points on stereopairs using the results of block construction;
<block name>#.001	catalogue of coordinates of terrain ground points;
<block name>#.002	catalogue of the orientation elements of images;
<block name>#.003	catalogue of coordinates of terrain points using the results of the rigorous block adjustment;
<block name>#.004	catalogue of coordinates points of photographs and corrections to them using the results of rigorous block adjustment;
<block name>#.005	catalogue of coordinates of terrain points ordered on increase of point numbers;
<block name>#.006	adjustment elements of absolute orientation of photoes of stereopairs using the results of rigorous adjustment;
<block name>#.knt	catalogue of coordinates of control points and their deviations after block adjustment;
<block name>#.dat	numbers and adjusted coordinates of terrain points.

A symbol "\$" instead of "#" in the name of the file means construction and adjustment of the block using the least-modules method.

Other files are temporary and will be deleted at closing the block.

2.1.6.2. "View/Print" command

This command brings up a window with WYS|WIG interface which allows to show or to print output text files.

2.1.6.3. "Delete Documents" command

This command deletes all output and all temporary files except the source *.kmp file and a file is same to the source file with the "#" or "\$" symbol at the end of its name.

2.1.6.4. "Setup printer/font" command

This command allows to setup printer and font size and font type for printing results. But it is recommended to print results using any other text processor.