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THE STUDY
ON
ESTABLISHING DIGITAL TOPOGRAPHIC MAPS
FOR
BOSNIA AND HERZEGOVINA

FINAL REPORT

Volume III

Manuals

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Aerial Photograph Inspection Manual

Aerial Photograph Inspection Manual

This is the manual for inspection of aerial photos for deciding to retake photos or not.

1. Prepare a quality check table (check table), a template for aerial photo check (template), a scale, and soft color pencils.

2. The check should be done by roll.

3. Check the number of photo, altimeter, and clock coming out in the photo and record the values in the check table.
   If the altitude deviates more than 5% from the planned flight height, the photo is not acceptable.

4. Check the longitudinal tilting and the lateral tilting with the level gauge coming out in the photo. Record the values (usually in grad) in the check table.
   If the photo tilts more than 5 degrees (5.5 g), it is not acceptable.

5. Check clouds by eye. Record the eye-estimated percentage of cloud cover in the check table.
   If clouds cover more than 3% of successive 5 photos or clouds cover the same area of successive 2 photos, these photos are not acceptable.

6. Check shadow of cloud, shadow of ground, halation, clearness, and gray scale by eye. Record the results in the check table.
   If any of these elements is unsatisfactory for photo-interpretation and stereo plotting, the photos are not acceptable.

7. Mark the principal point on each photo, using the fiducial marks on the four sides or on the four corners of the photo. Use soft color pencils for marking the point.

8. Mark these principal points on the existing topographic maps. If the points deviate laterally more than 15% of the flight height from the planned flight course, the photos are not acceptable.

9. Mark the principal point of the adjoining photos (the second photo) on the first photo. Consequently, the first photo gets 2 points.

10. Mark the principal points of the first photo and the third photo on the second photo. Consequently, the second photo gets 3 points.

11. In this manner, mark the principal points of adjoining photos on all the photos. Consequently, each photo, except the first and the last photos of the course, has 3 points.

12. Link the pair of points on the first photo. This line is photo-base (flight direction). Applying the template onto the photo, measure the included angle of this base and fiducial axis of the photo. This angle means the swing of camera. Record the value in the check table.
    If the value is more than 10 degrees, the first photo and/or the second photo should be retaken.

13. In this manner, check the swing of every photo, record the values in the check table, and decide to accept or to retake.

14. Check the overlapping part of the pair of the first and second photos, and mark the part on the first photo or the second photo with a soft color pencil. Applying the template onto the photo, measure the percentage of overlapping and record the value in the check table.
    If the percentage is less than 53% or more than 70%, this pair of photos should be retaken.

15. In this manner, check the percentage of every pair of photos of the course and decide to accept or to retake.

16. In the same manner, check the side-lapping parts of every photo and photos of the adjoining course. Mark the side-lapping part on the photo. Applying the template, measure the percentage.
    If the percentage is less than 20%, check the coverage of photos of the both courses precisely. If there is a blank in coverage, one or the other of the two courses or the both courses should be retaken.

17. When a retaking was done for disqualified photos, check the retaken photos. More than three successive photos should have been taken over the already passed photos.

Summary check

Inspection is performed quickly because photographers are at the airfield waiting for the order to retake photos. Therefore, a skilled inspector can take the following summary way instead of the above 9 – 16, which saves time.

1. Put the first photo on a table and put the second photo on the overlapping part of the first one as precisely as possible. Estimate the percentage of overlapping part by eye. Record the value in the check table.

2. Put the third photo over the lapping part of the second one. Estimate the percentage of overlapping part by eye and record it.

3. In this manner, check all pairs of successive photos of a course by eye.
   If too small or too large overlap is found by eye, check it precisely with template and decide to accept the pair of photos or to retake.

4. In the same manner, check the side-lap between a course and its adjoining courses by eye.
   If too small or too large side-lap is found by eye, check the coverage of photos more precisely and decide to accept or to retake.

Field Identification

and

Field Completion Manual

Field Identification and Field Completion Manual

Aerial Photo-interpretation

Aerial photo-interpretation is a technique to be used at different two stages in topographic mapping. One is the preparatory stage preceding field identification and the other is in digital plotting process.
This manual is for the preparatory stage preceding field identification.

1. Prepare the following materials.
   Specifications on Plotting Data Acquisition
   Double-enlarged prints of the new aerial photos
   Stereoscopes
   Soft color pencils

2. In the same manner as done for aerial photo inspection, mark the principal point on each photo and also mark the principal points of the adjoining 2 photos on the photo for performing stereoscopic viewing with a soft color pencil.

3. In advance of field identification, compare the new aerial photos and existing topographic maps and find out the changes of land use and other topographic features. Put marks at the changed points or areas onto the photos with a soft color pencil.

4. Put a pair of successive photos on a table and orient them using the linked lines between the principal point and the adjoining principal point on the both photos. Fix the photos on the table.

5. Apply a stereoscope over the pair of photos and observe topographic features in three-dimensional image.

6. Viewing the three-dimensional image with a stereoscope, investigate the features precisely that are itemized in the Specifications on Plotting Data Acquisition. Put marks with a soft color pencil on the features that cannot be photo-interpreted.

Preparation

Make the following preparations before conducting field identification.

1. Prepare the following materials.
   Specifications on Plotting Data Acquisition
   Double-enlarged aerial photos or ortho-photos on which the results of photo-interpretation are put
   Soft color pencils, and pens and color ink

2. Referring to source materials of roads, railroads, power lines, pipelines, and other public facilities, put the marks on the photos with a soft color pencil.

3. Based on the above-prepared photos or ortho-photos, make daily and total plans for efficient fieldwork.

Fieldwork

Field identification is done for acquiring the new topographic data carrying the above-prepared aerial photos. All results of the fieldwork should be put on these photos with color ink.

1. Check the features that could not photo-interpreted.

2. Mark the checked or identified features clearly at exact positions on the photos with color ink according to the Specifications on Plotting Data Acquisition.

3. For marking the results on the photos, use the specified symbols with color. Do not use other symbols.

4. Where the road category changes, divide the sections with a tick.

5. Do not mark the following features, which should be photo-interpreted in the process of plotting.
   Footpaths
   Permanent rivers
   Buildings

6. The following vegetations should also be interpreted in the process of plotting, but when these vegetations are clearly identified at the spot, put the symbols at the

position for helping digital plotting.

Pastures
Forests
Afforested areas
Bushes
Isolated trees
Hedges
Afforested belts

7. Referring to the existing topographic maps, check the place names on the spot.

8. Put the checked place names and other annotations on the photos with clear block letters according to the specifications on letters.

9. When it is difficult to put many symbols and annotations in intricate areas such as highly urbanized areas, use polyester film overlay or use guidelines from the position to the marginal or open space of the photo.

Field Completion

After map symbolization, field completion is done for completing the contents of maps. It is the final field check of all features, place names and other annotations that have remained questionable after the processes of digital plotting and map symbolization.

Preparation

1. Prepare the following materials.

Specifications on Plotting Data Acquisition
Specifications on Digital Map Symbols
More than two copies of the symbolized map sheets (One of the copies is used for compiling the final results. One or two copies are for fieldwork.)
The existing map sheets
Double-enlarged photos used for field identification
Pens and color ink

2. Mark all the questionable features and place names on the symbolized map sheets.

3. Based on the above-marked map sheets, make daily and total plans for efficient fieldwork.

Fieldwork

1. Check the features, place names and other annotations that are marked as questionable on the above-marked map sheets.

2. For detailed examples, the following checks should be done.

   1) Check the positions of symbols for those features such as schools, hospitals, factories, religious facilities, cemeteries, and bridges.

   2) Check omissions of features and place names.

   3) Check mistakes in categories of roads and railroads.

   4) Check omissions and mistakes of place names and all annotations.

   5) Check the features to be represented by abbreviations.

   Adopt only big hotels in highly urbanized areas. In less urbanized or rural areas, all hotels and motels should be adopted.

   Do not adopt gas stations in highly urbanized areas. In less urbanized or rural areas, they should be adopted.

   6) Check categories of vegetations while moving by car.

Compilation of Final Results

1. Prepare copies of map sheets for compiling the final results of field completion, and color ink.

2. Transcribe the results marked in the original sheets of field completion exactly into the above copies of map sheets.

3. Use abbreviations "A" for addition, "D" for deletion, and "Cg" for correction.

4. Annotations on marks should be written clearly in block letters.

5. All marks and comments should be put in the marginal space of the sheet, using guidelines from the positions.

6. Referring to the source data, check the existing control points.

7. Referring to the source data provided by the BiH National Boundary Commission, check the national boundaries.

8. Referring to the source data, check the main water pipelines.

9. Referring to the source data, check the electrification of railroad.

10. Check marginal information.

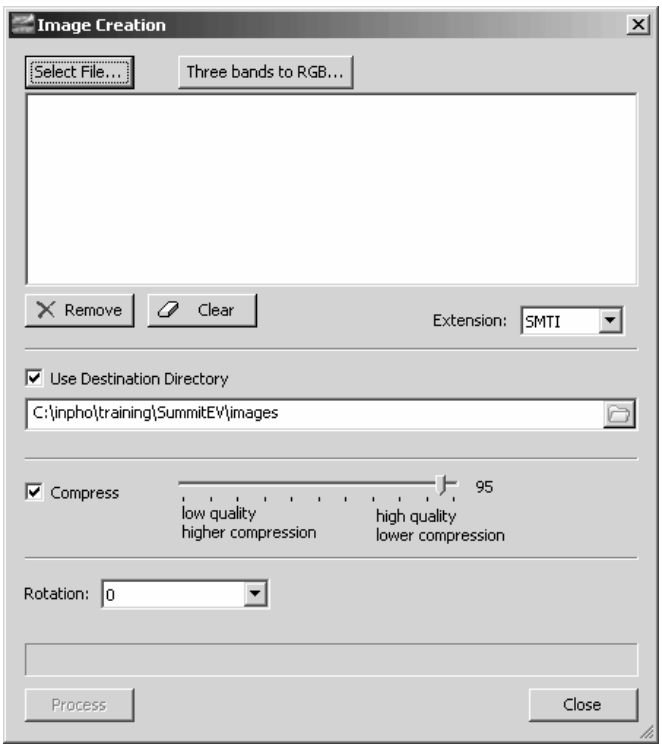
11. Code each annotation in each map sheet (including its marginal information) and make the AI file (Illustrator) for finalizing all annotations.

Aerial Triangulation Manual

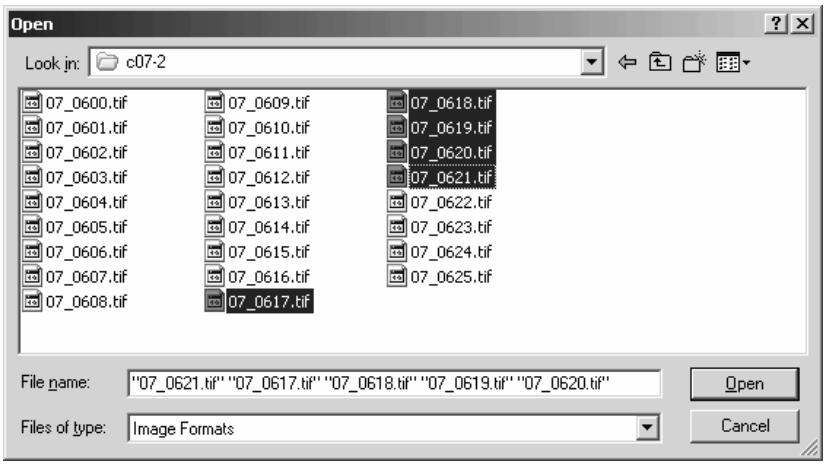
Manual(Summit Evolution)

- **Create the SUMMIT EVOLUTION Image Files**

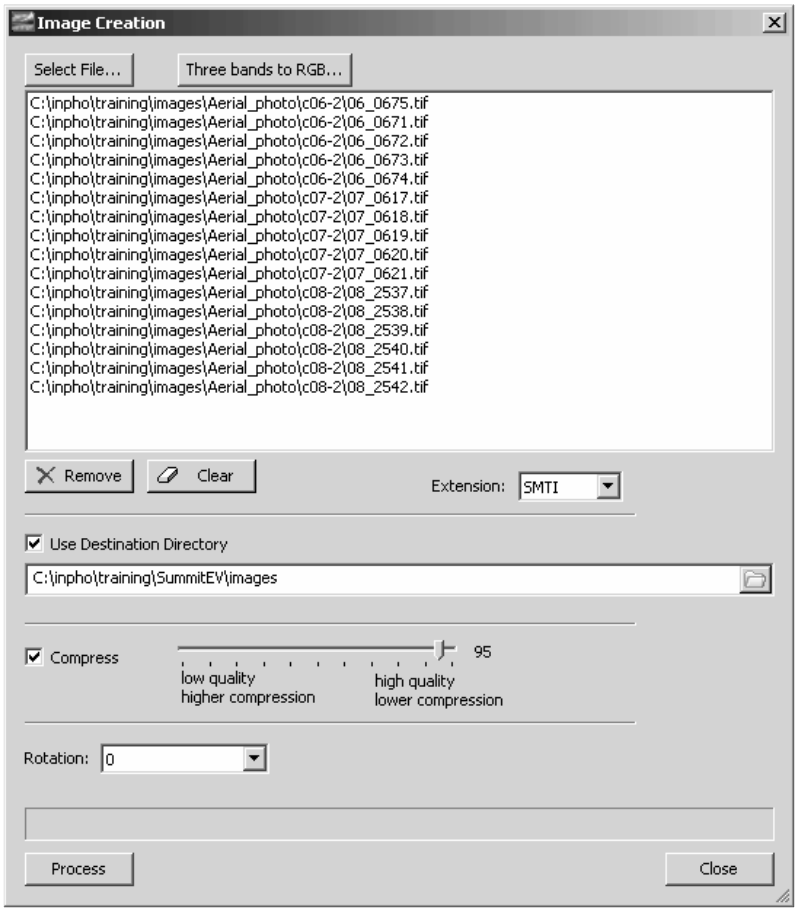
1. Select the **Create Summit Images** icon.



2. Click on the **Selection File** button. Select one or more files to be translated into the .smti format, then selected **Open**.



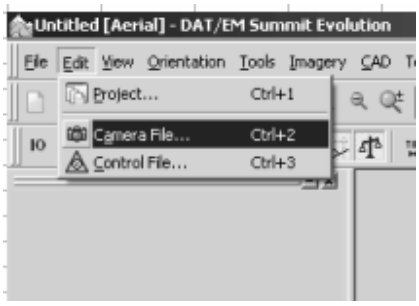
3. Select a destination directory
4. To compress a file, check on **Compress** and choose a compress setting.



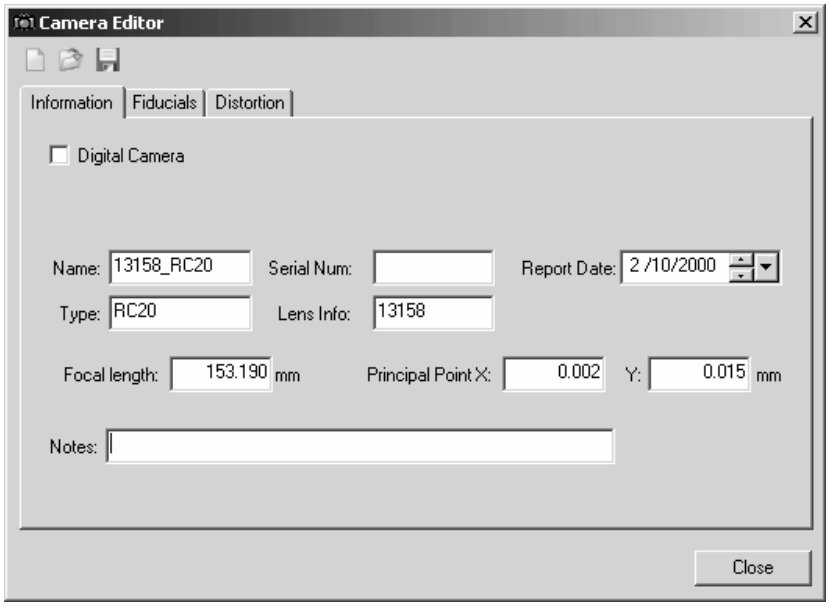
5. Set a **Rotation** angle.
6. Press **Process** button.

- **Camera Definition Files**

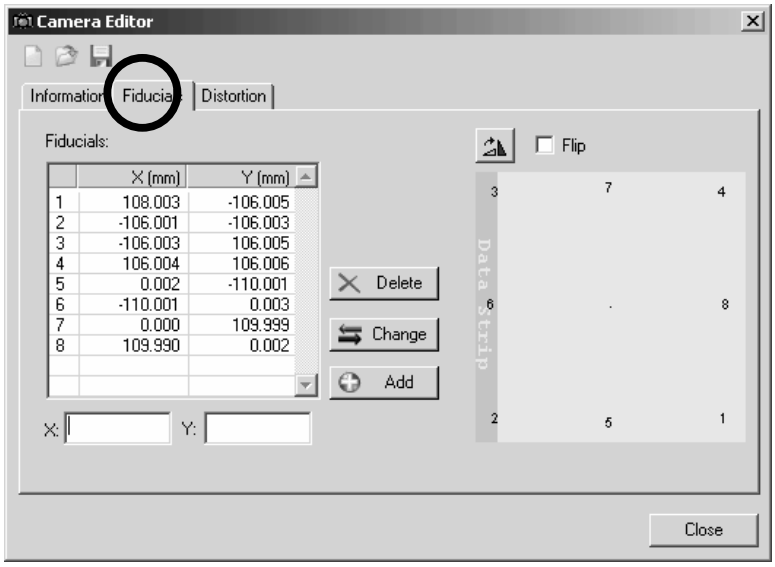
1. Select the **Edit camera file** icon.



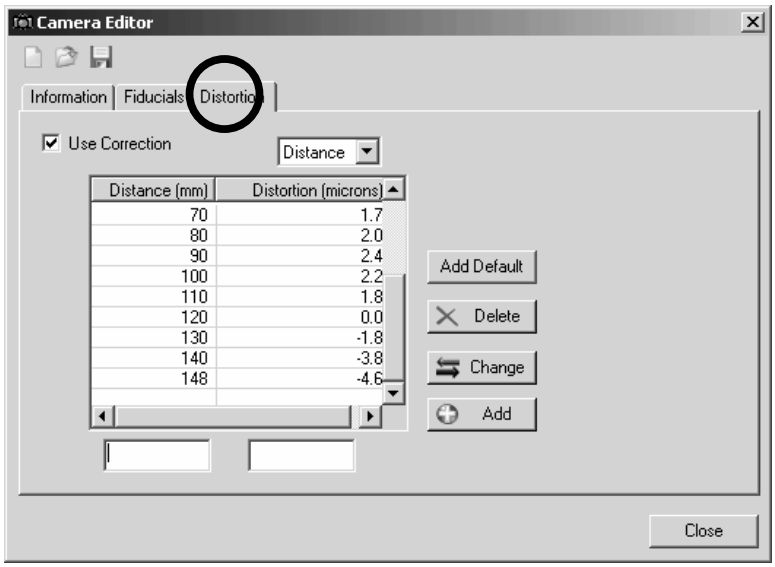
2. Enter the **Focal length**.
3. Enter the coordinates of the **Principal Point**.



4. Select the **Fiducials** tab on the Camera Editor box. Enter the fidutial mark coordinates.



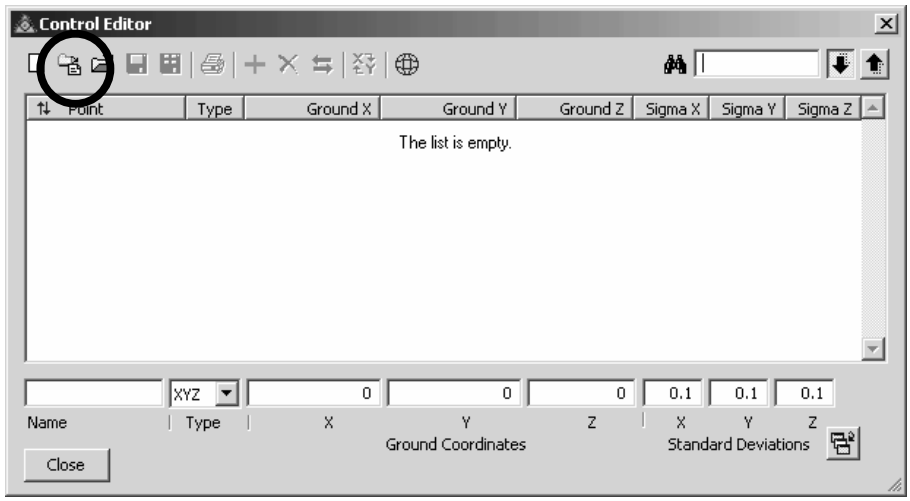
5. Select the **Distortion** tab on the Camera Editor box. Enter the distortion information given on the camera report.



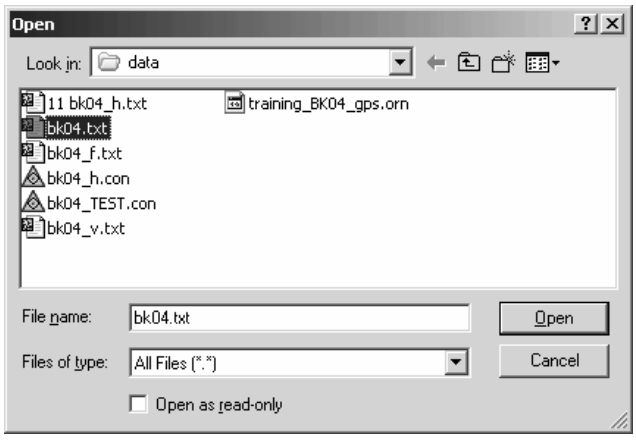
6. Save the camera file.

- **Control Point Files**

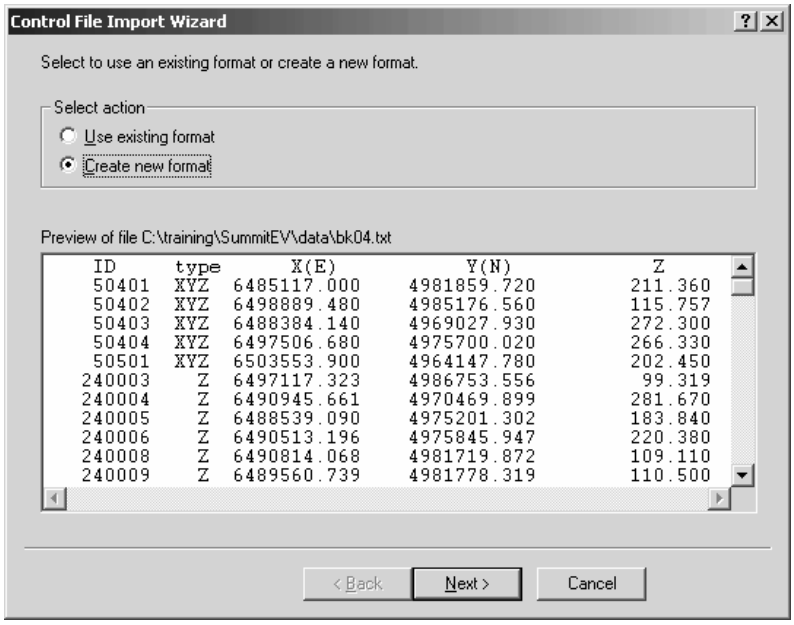
1. Select the **Edit Control File** icon.
2. To import an unknown-format file, select the **Import a control file** icon.



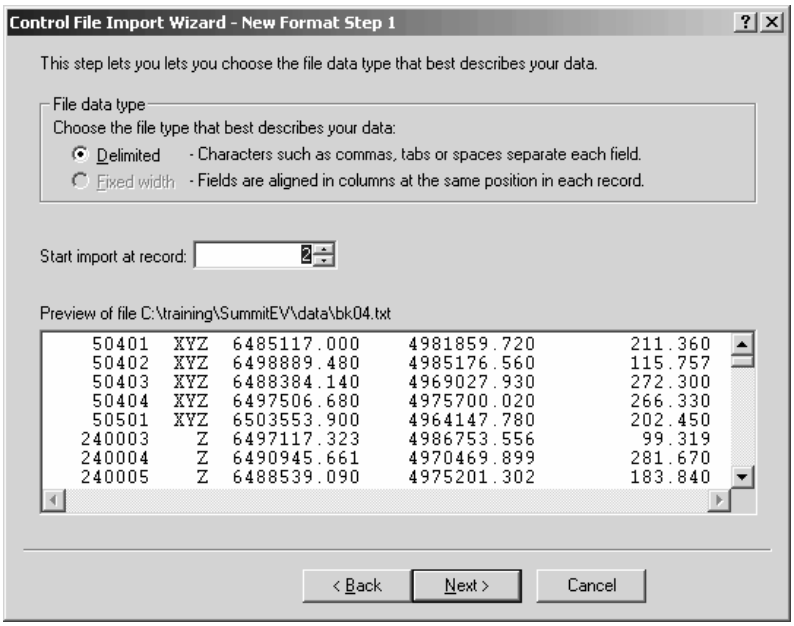
3. Select the location and name of the unknown-format control file.



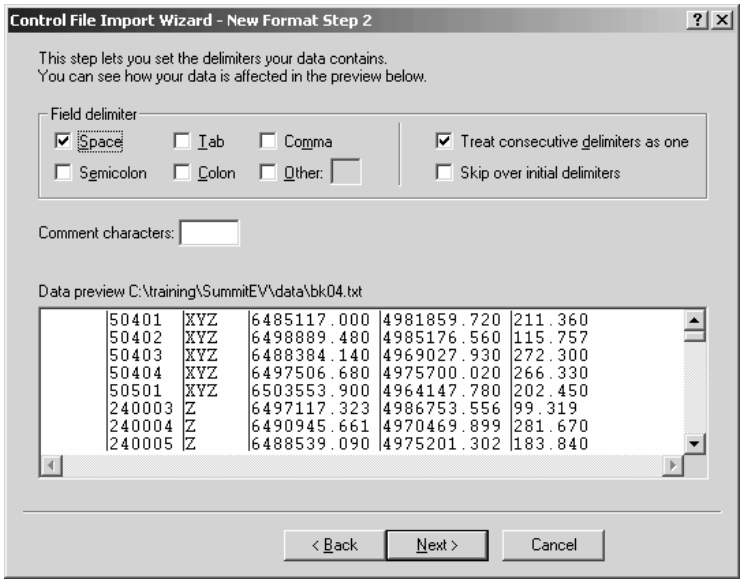
4. If the file's format has already been defined in the Import Control Wizard, select **Use existing format**. To define a new format, select **Create new format**.



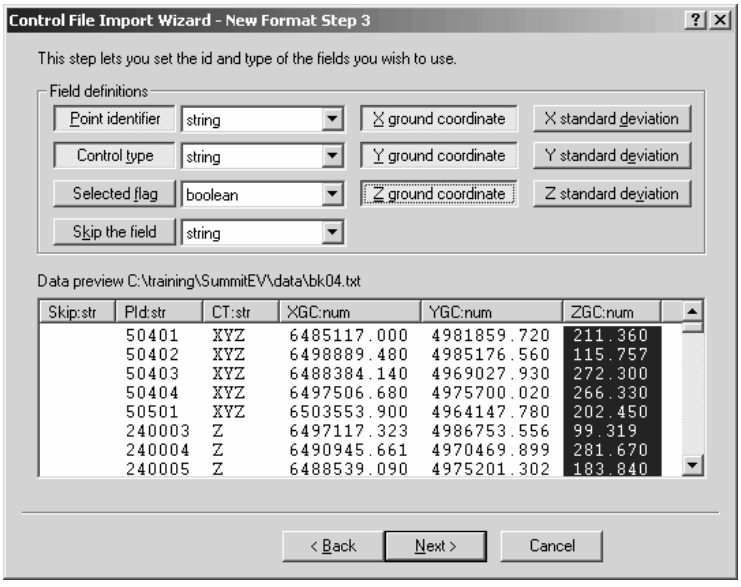
5. If **Create new format** was selected, the New Format Step 1 dialog box appears. Set the starting record number and select **Next**.



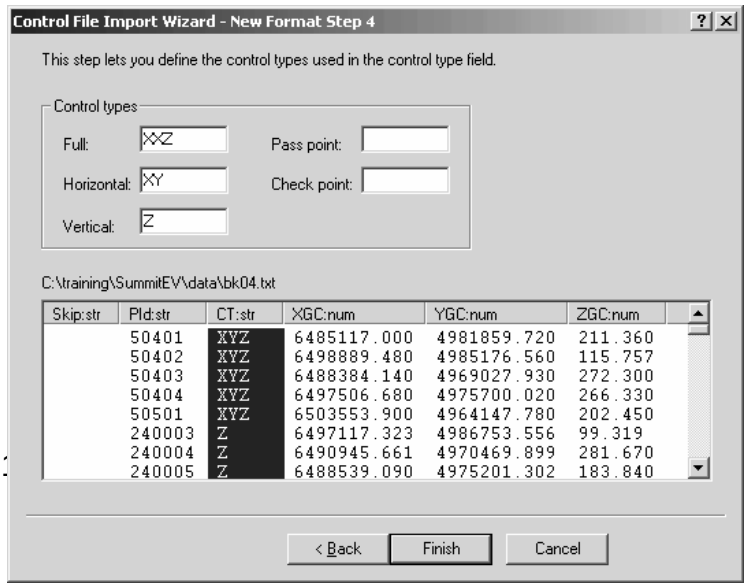
6. The New Format Step 2 dialog box appears, Make settings that describe the file's format. The result of a setting will be shown immediately in the file list. If it looks incorrect, then try a different setting. Select **Next** when finished.



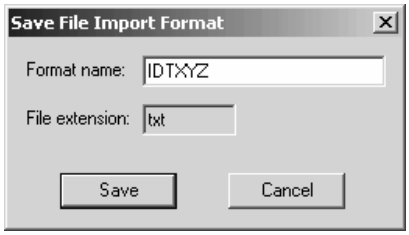
7. The New Format Step 3 dialog box appears. Comment lines are no longer shown. The first data field column is highlighted. All the labels at the top of all the columns show "Skip:str" as a default. For the highlighted column, select a **Field definition**s button and description that best describes the field. Then click each of the next columns and select **Field definition**s and descriptions for them.

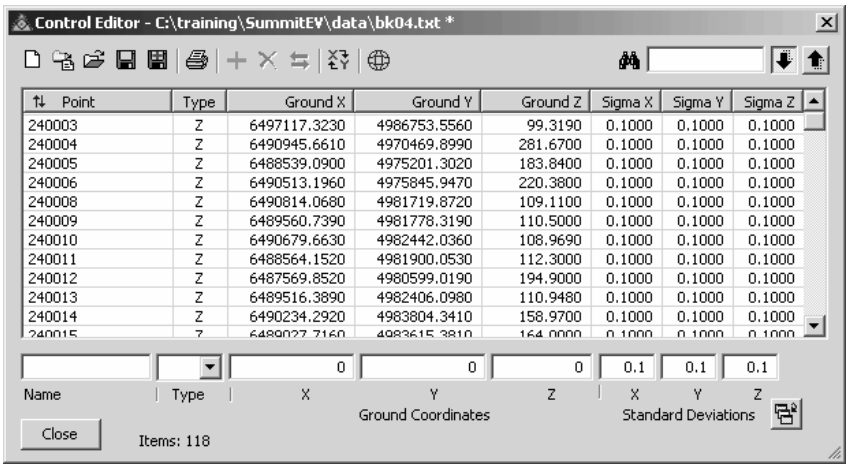


8. Select **Next** again to activate the New Format Step 4 dialog box. Enter the characters that represent horizontal-vertical, horizontal, vertical, pass point, and check point control points.



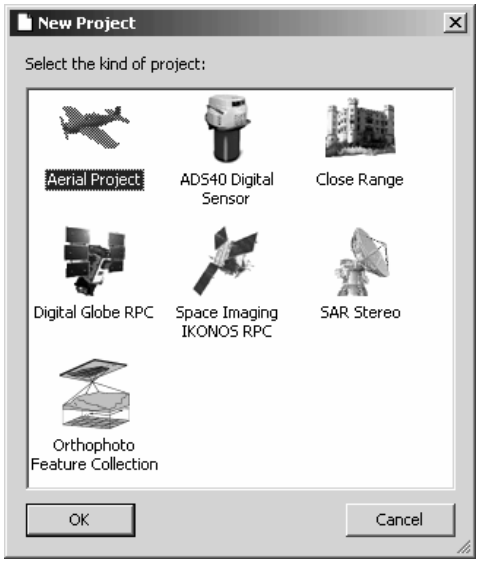
9. Select **Finish** when done. A dialog box appears asking for a name for the new format.

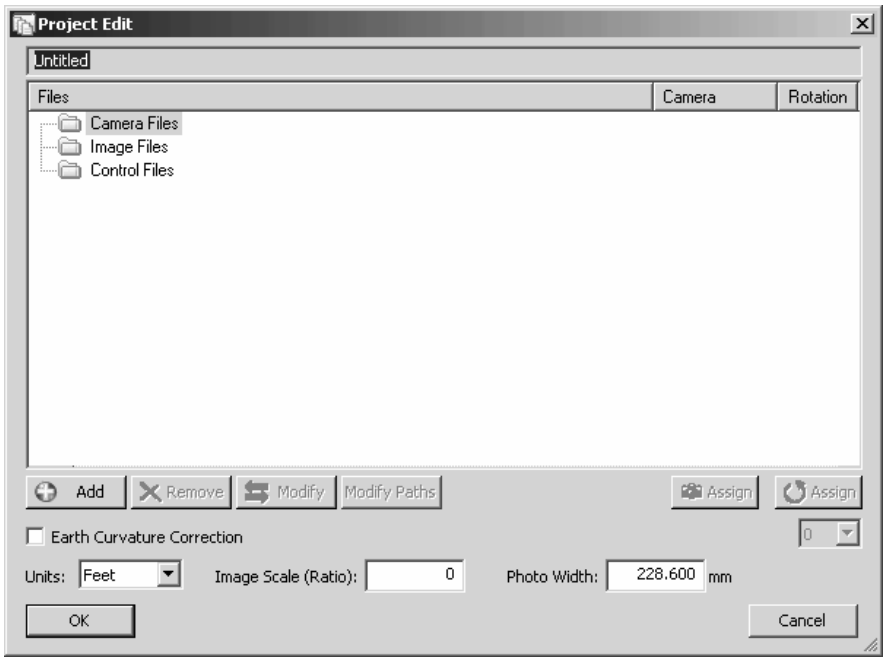




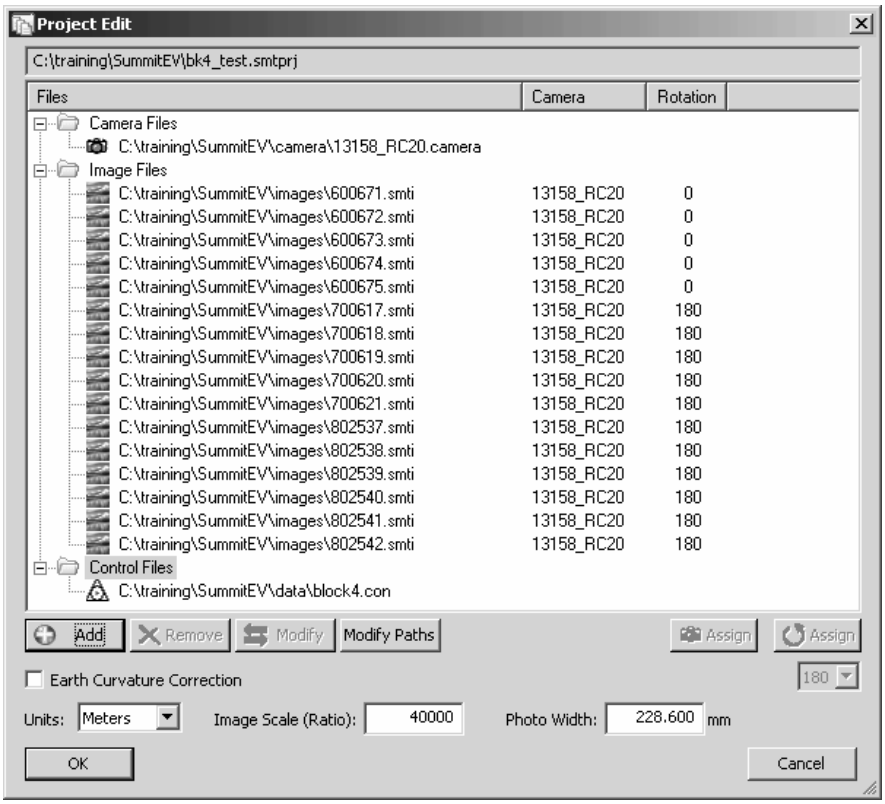
- **Create a New Summit Project**

1. Select the **New Project** icon. Then choose **Aerial Project**.



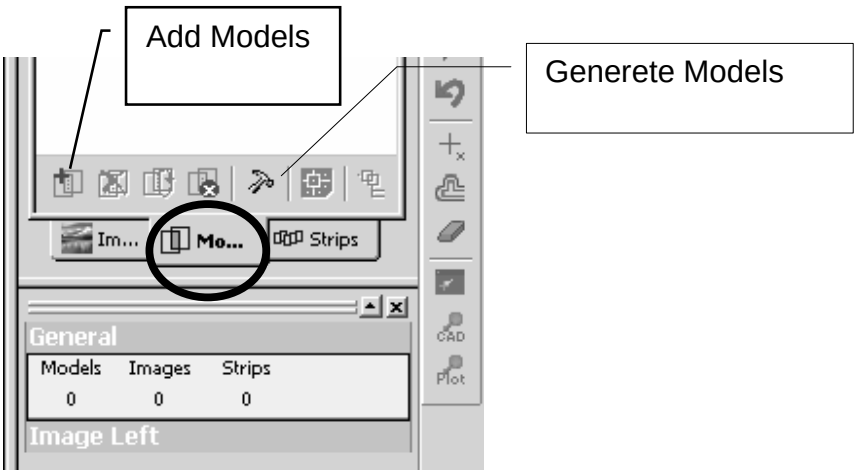


2. Select the **Camera Files** folder and press **Add** to assign the camera file.
3. Select the **Image Files** folder and press **Add** to select all images files to be loaded into the project.
4. Select the **Control Files** folder and press **Add** to assign the control points files.
5. Activate **Earth Curvature Correction**.
6. Specify the correct **Units**, **Image Scale Ratio**, **Photo Width** .
7. Select the **OK** button and save project with File.



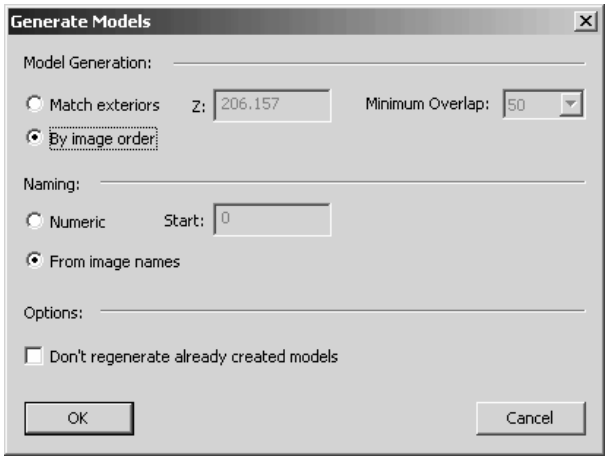
- **Group Images Into Models**

Grouping the images into models is required for both Automatic Relative Orientation (Auto RO) and for exporting to and running a third-party aerotriangulation software.



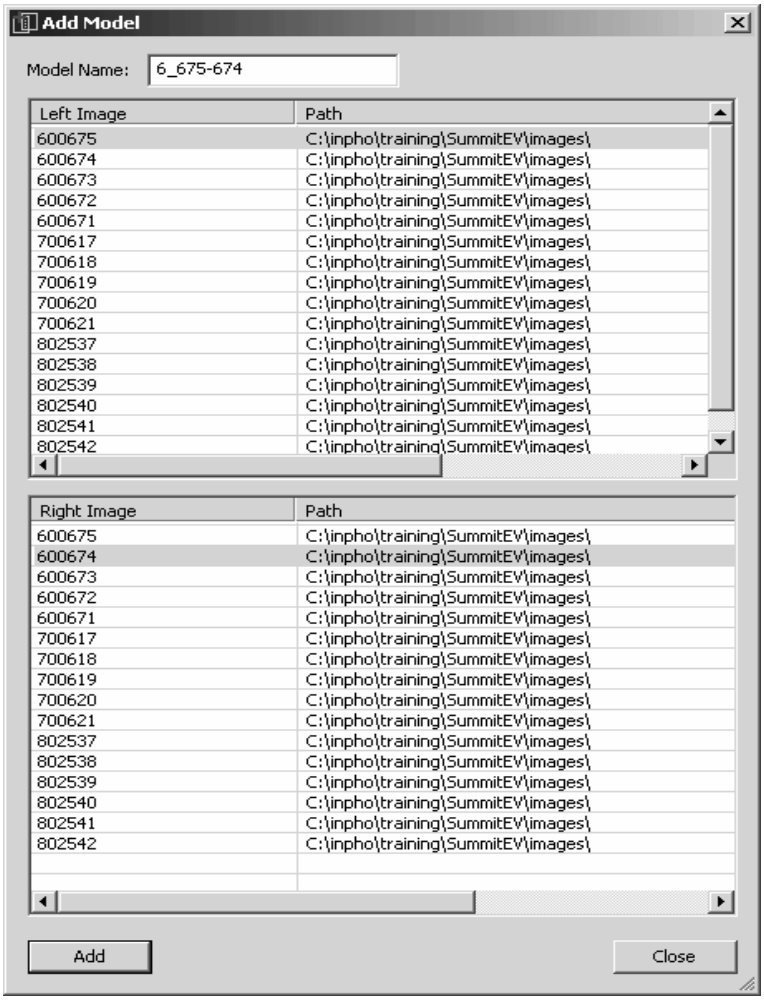
To automatically pair images into models:

1. Select the **Generate Models** icon.
2. Select generation by image order.
3. Naming from image names.
4. Select **OK** to generate the models.

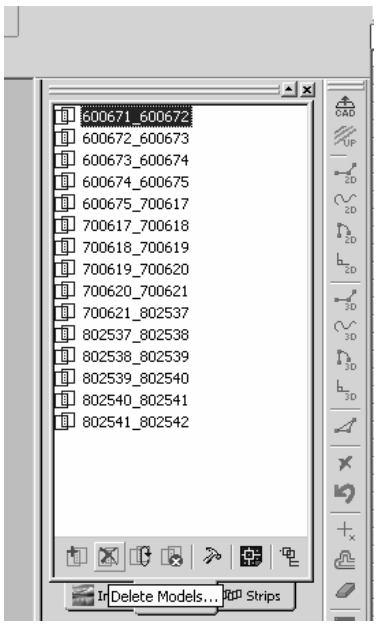


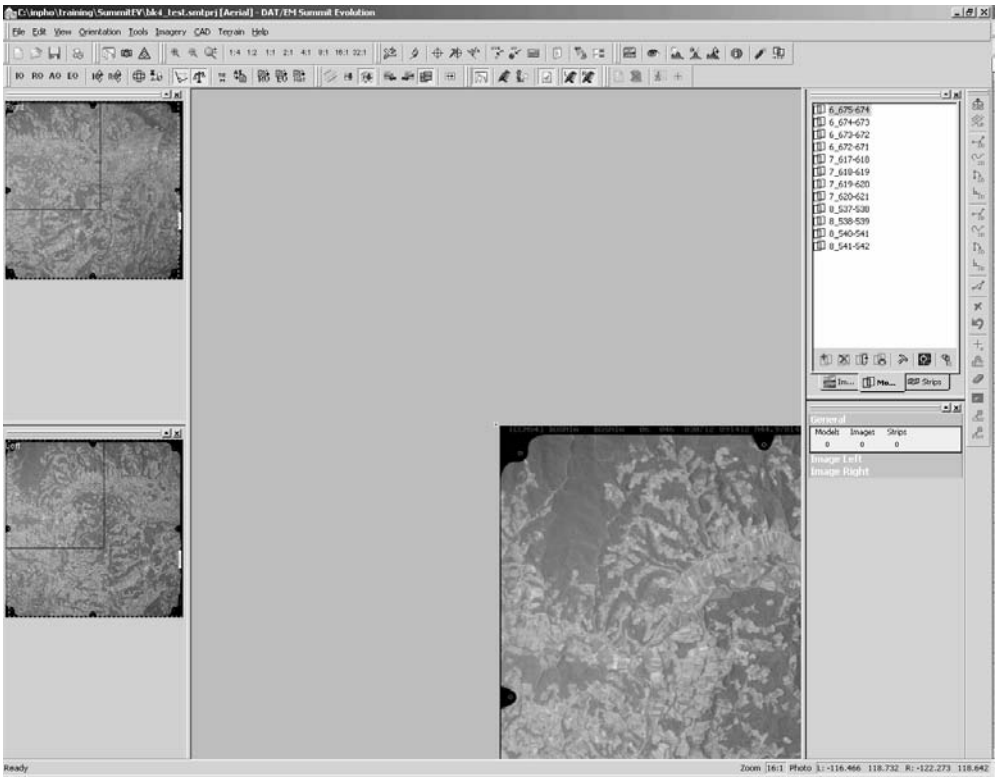
To manually specify model pairs:

1. Select the **Add Model** icon
2. In the Add Model box, enter a name for the model; select a left image and a right image.
3. Select **OK** button.



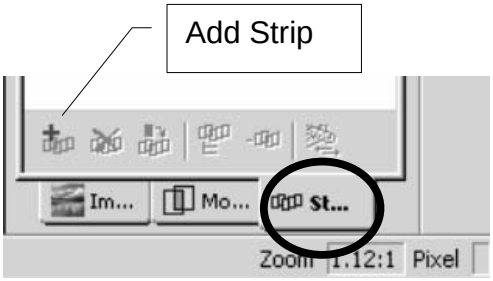
To open a both model images at any time, click on a model name in the Project Window.





- **Group Models Into Strips**

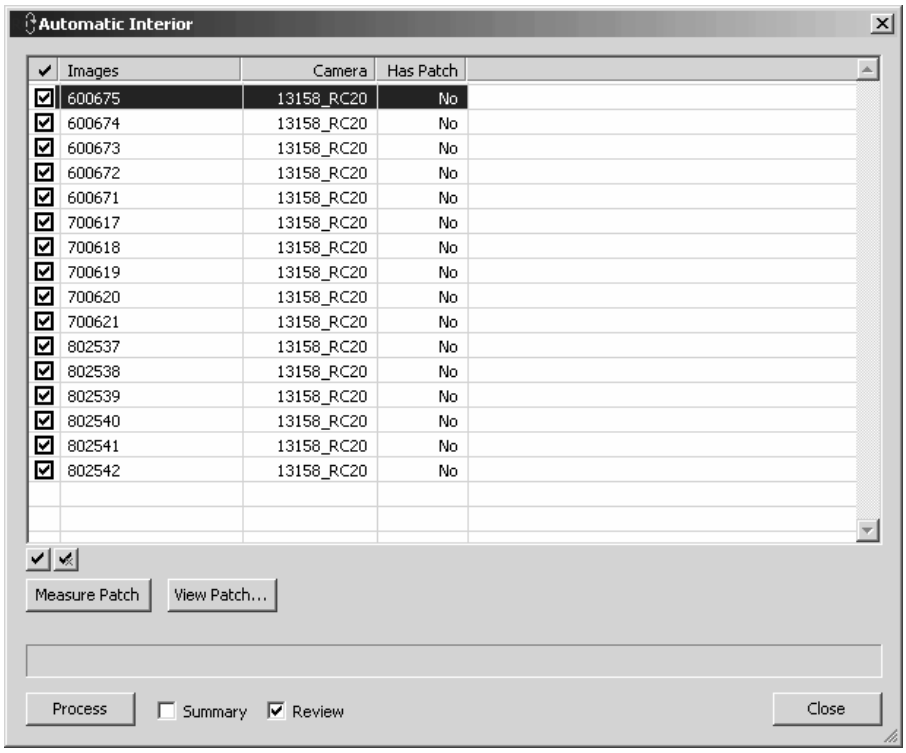
Models are grouped into strips, to easily navigate through the project for a manual aerotriangulation (AT).



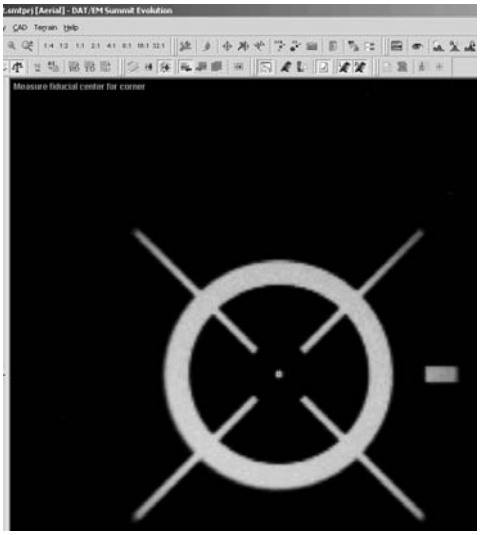
1. Select the **Add Strip** icon to open the strips dialogue.
2. Enter a name for the strip, select all models to be grouped into the strip
3. Select **OK** button to save the strip.
4. Repeat adding strips until all the project's models have been included in a strip.

- **Interior Orientation**

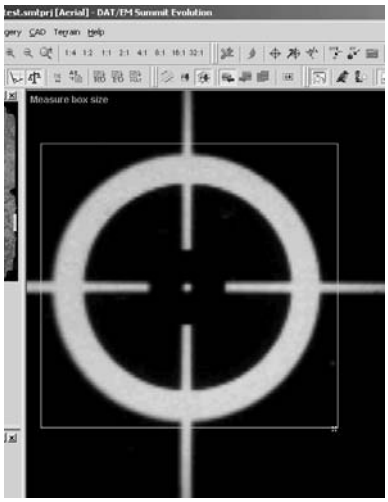
1. Select the automatic **IO** icon to launch the **Automatic Interior** dialogue.
2. Check on the images to process for interior orientation.



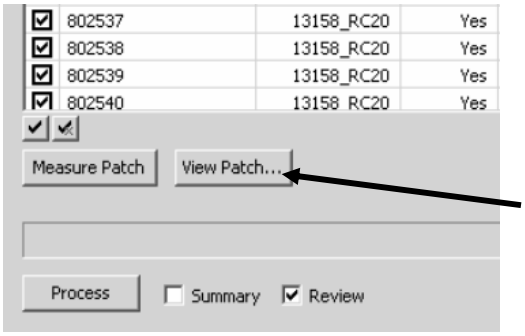
3. Select Measure Patch.
   - Measure the center of the corner fiducial mark.
   - Measure the size of the fiducial mark.

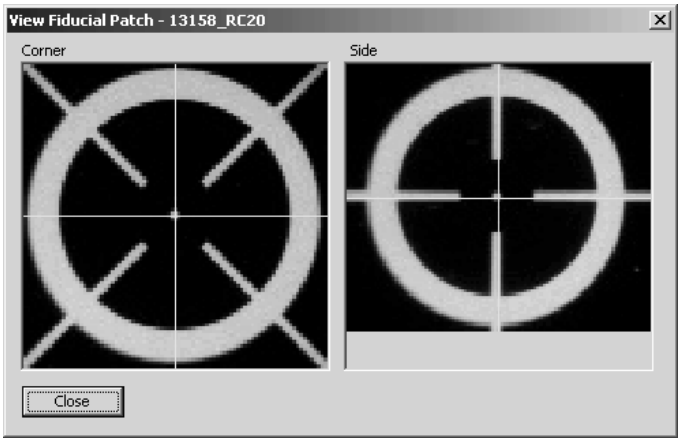


- Repeat those steps for a center fiducial mark.



4. View Patch to check the measured template.



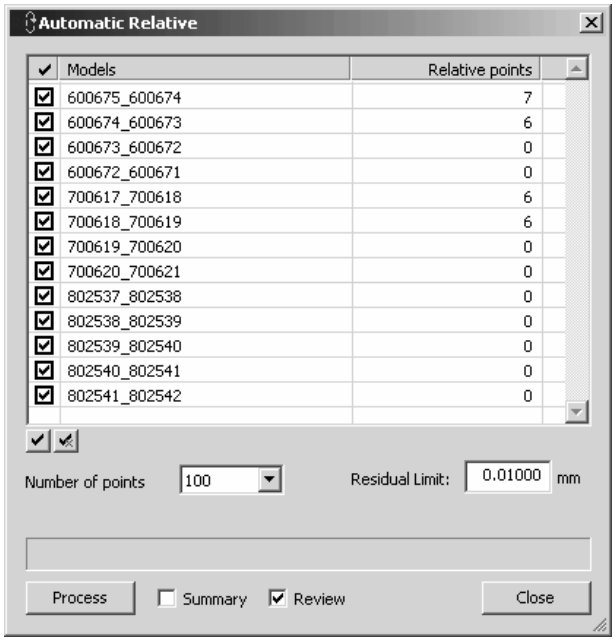


5. Select the **Process** button to start the measurement.
6. In the summary report, the RMS values should at least be 1/3(1/2) of the pixel size accurate.
7. If the processing was successful, images with a complete interior orientation show **IO** next to their image name on the **Images** tab.

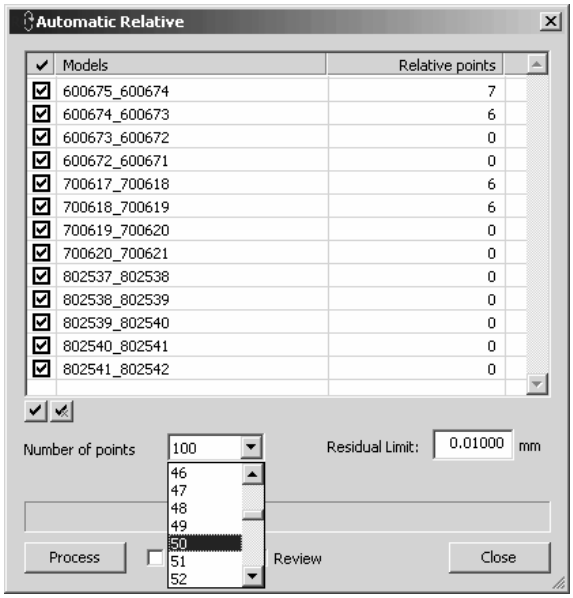
- **Relative Orientation**

(Automatic Method)

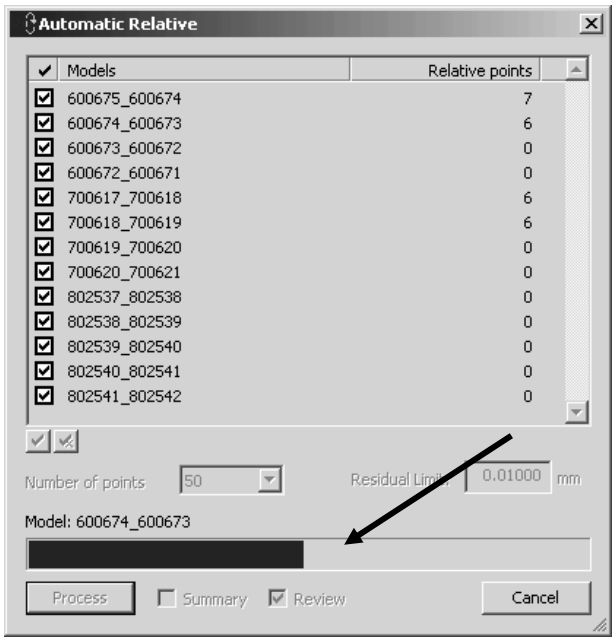
1. Select the **automatic Relative (RO)** icon to launch the dialogue.
2. Have all models activated for processing.



3. Select 75 points per photo and set the residual limit to 1/3 pixel size.
4. Select the **Process** button to start the automatic relative orientation process.



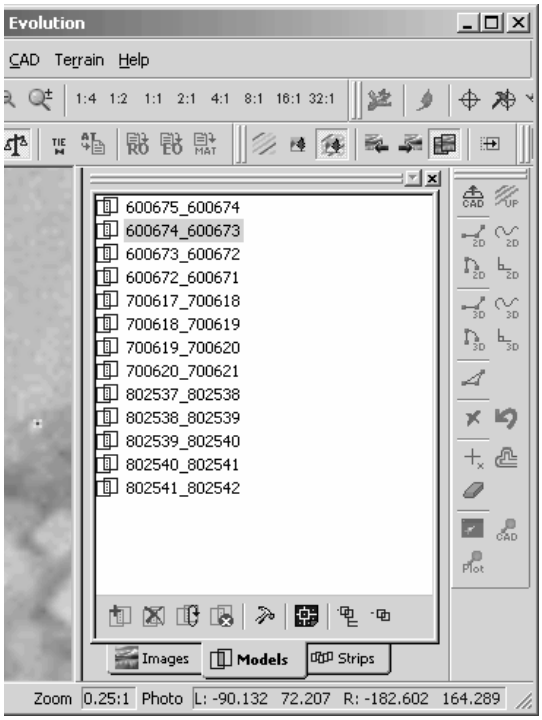
5. A processing message will appear for each checked model:



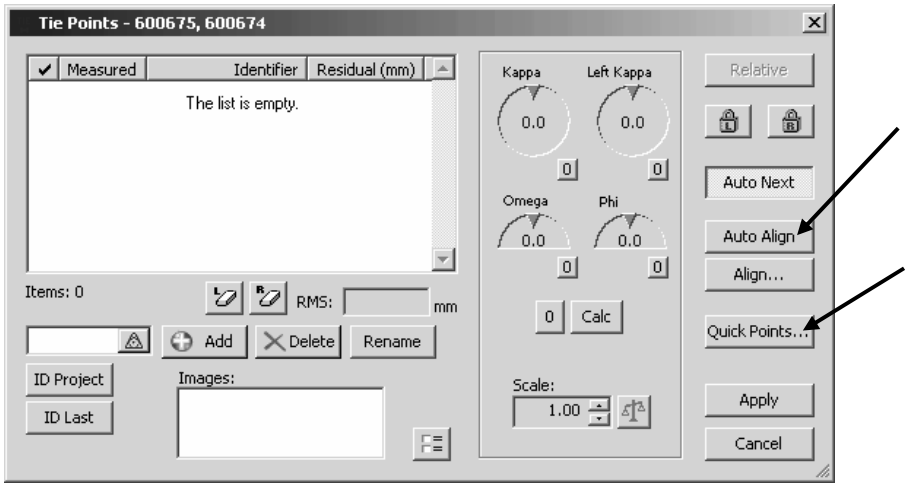
6. The RMS values in the summary file should also correspond to about 1/3 pixel size.

- **Tie point / Control point measurement**

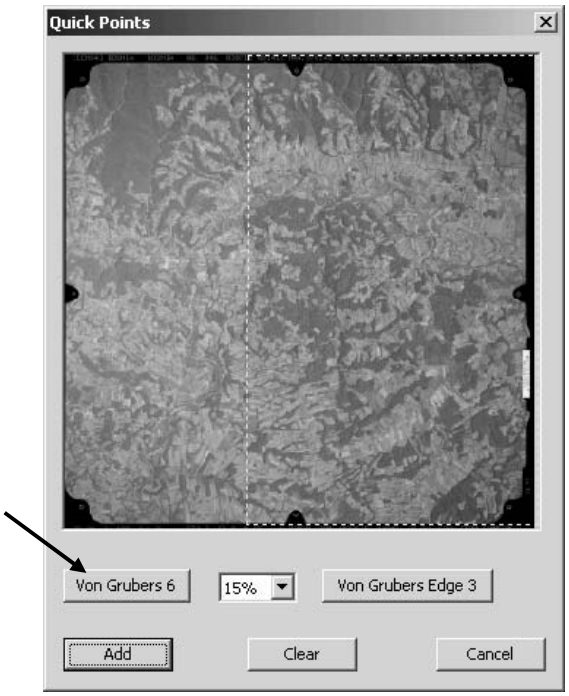
1. Select the first model from the **Models** tab.



2. Select the **Tie** icon to launch the Tie dialogue.
3. Select **Auto Align** to perform a rough alignment of the two images.
4. After Align have been used, select the **Quick Points** button.

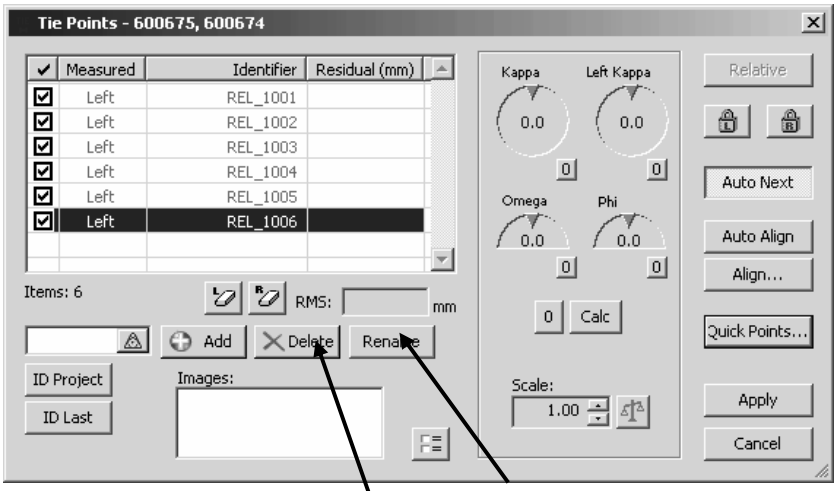


5. Select **Von Grubers 6** to automatically select six evenly spaced locations.

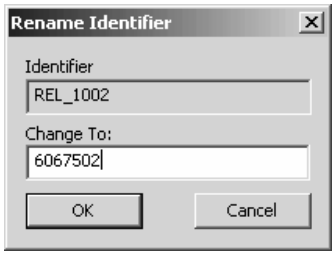


6. When finished choosing points, select the **Add** button.

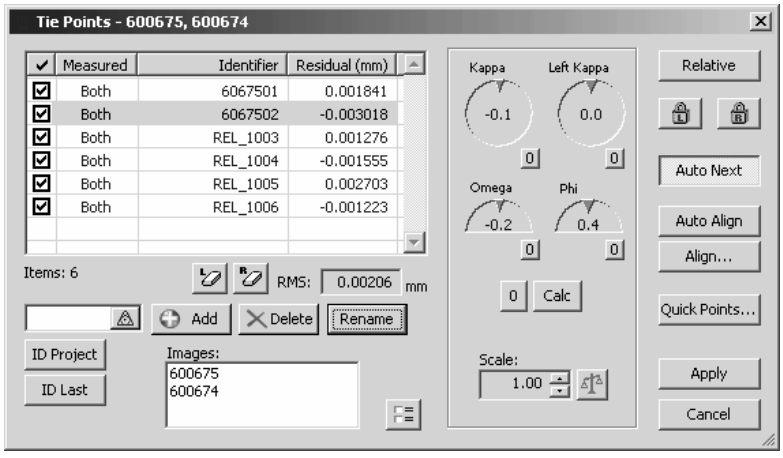
7. Edit the relative points list if necessary.
    a) To delete a point from the list, highlight the point and select the Delete button.



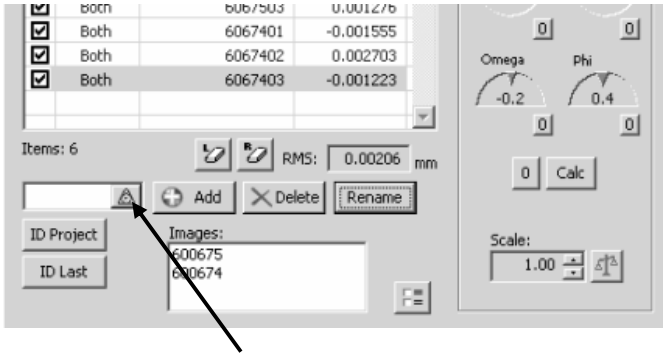
    b) To rename a point on the list, highlight the point and select the Rename button. Enter the new point name in the dialog box that appears.



8. When the list of points is complete, highlight the first point to be digitized.
9. To measure each point in the order it appears on the list, select the Auto Next button. Alternatively, each point may be selected and highlighted individually with the mouse.

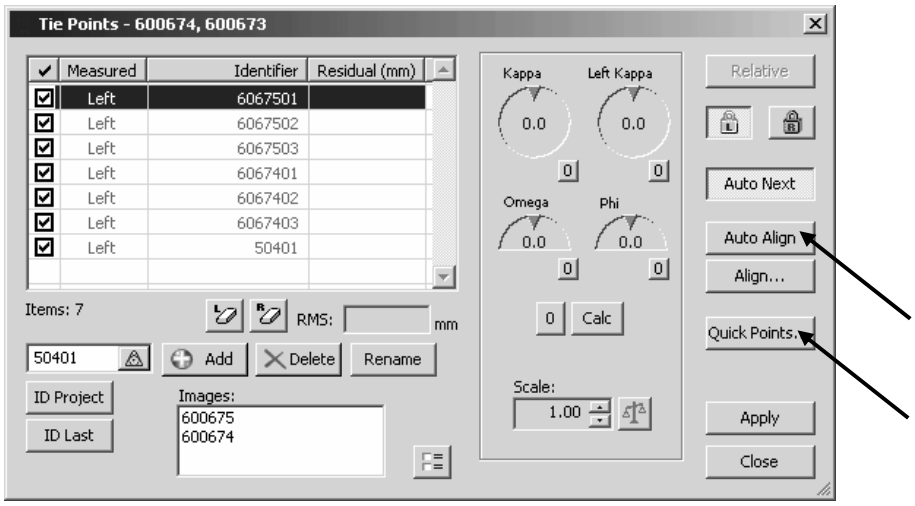


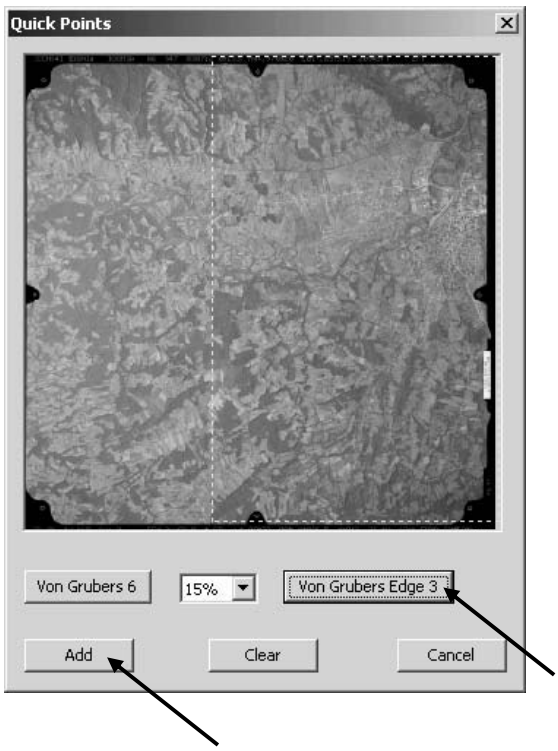
10. If a control points to be measured in a specific model, select its ID from the Control points list.

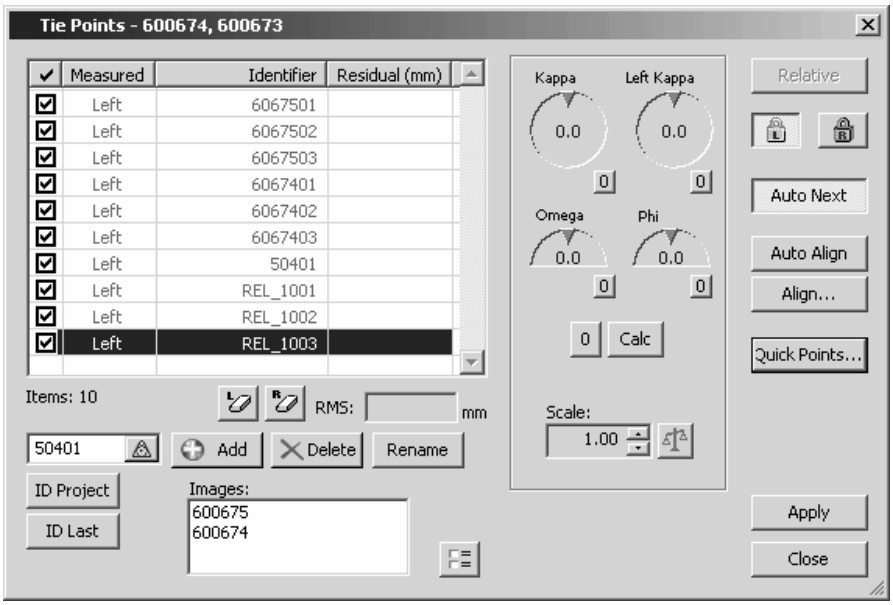


Identifier	Type	Ground X	Ground Y	Ground Z
50401	XYZ	6485117.000	4981859.720	211.360
50402	XYZ	6498889.480	4985176.560	115.757
50403	XYZ	6488384.140	4969027.930	272.300
50404	XYZ	6497506.680	4975700.020	266.330
50501	XYZ	6503553.900	4964147.780	202.450
240003	Z	6497117.323	4986753.556	99.319
240004	Z	6490945.661	4970469.899	281.670
240005	Z	6488539.090	4975201.302	183.840
240006	Z	6490513.196	4975845.947	220.380
240008	Z	6490814.068	4981719.872	109.110

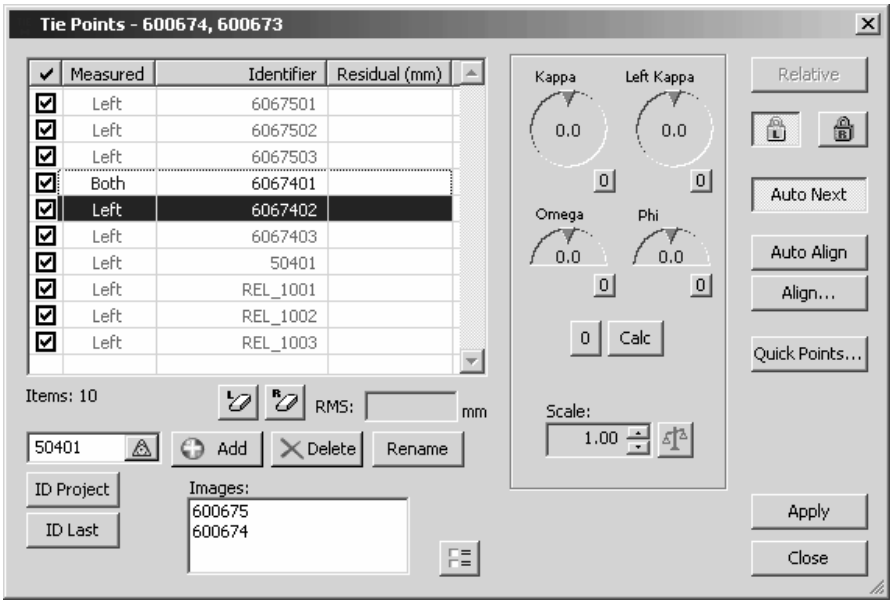
11. Change to the next model in the strip.
12. As already tie point measurements exist from the first model, those tie points can now be measured in this model. Point Ids is pink.



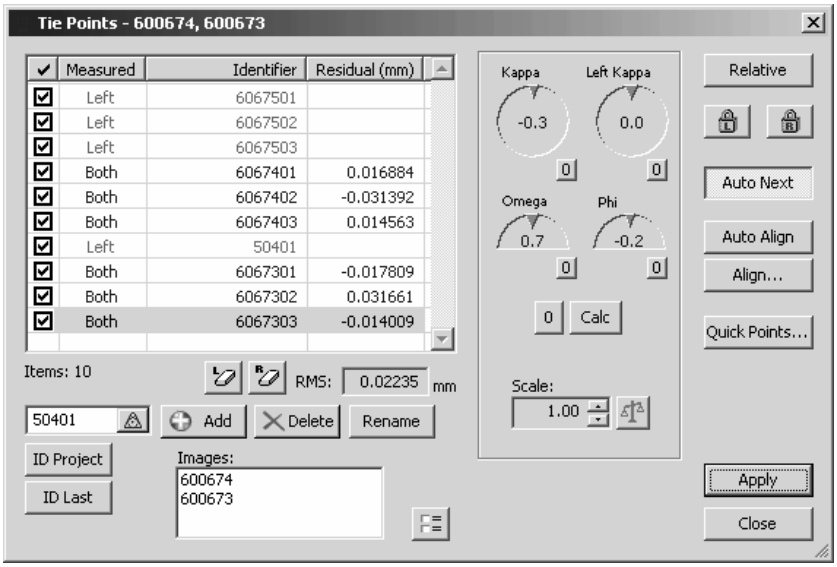




13. Measurement completed for the points already measured in the first model. The images list shows now, that this point is measured in 3 photos.



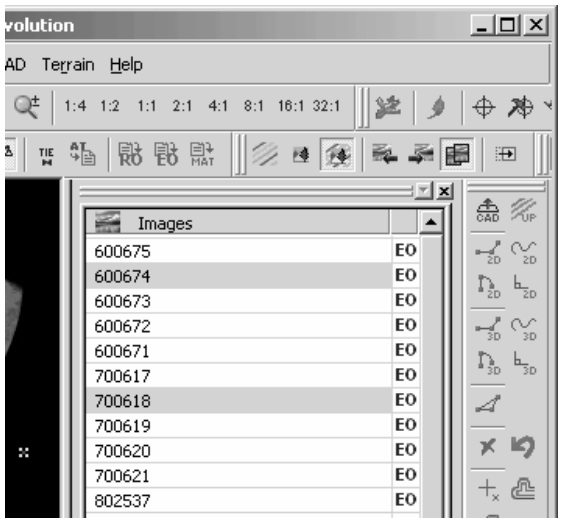
14. Measure the remaining 3 new tie points.



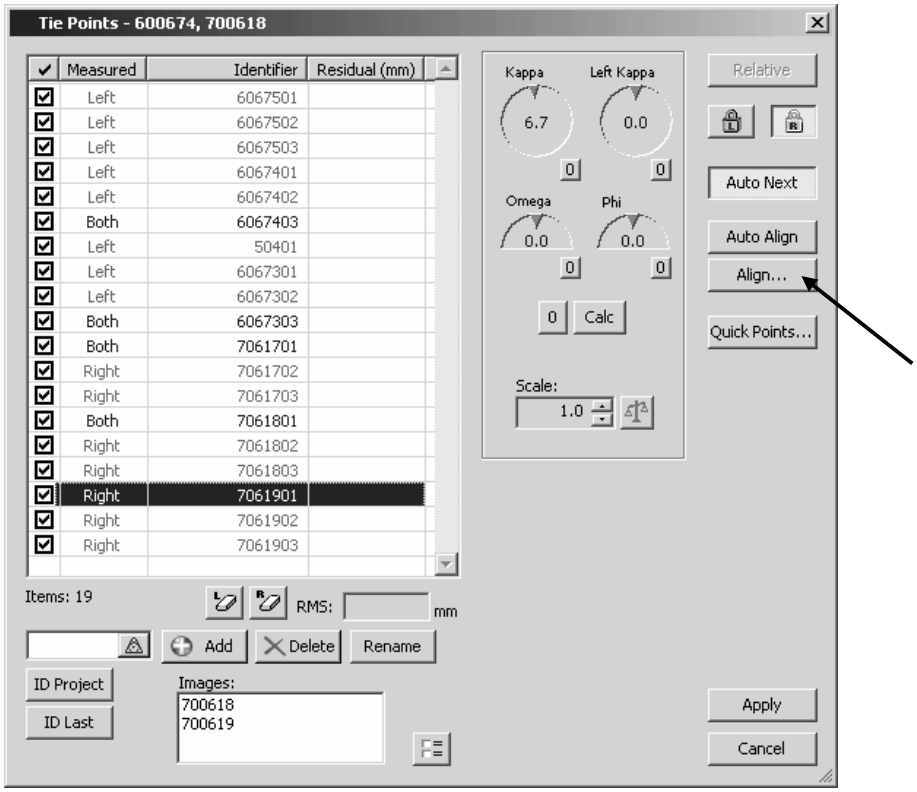
15. Change again the model until the first strip is finished.

(Measure between the strips.)

1. From the **Images** tab, click on the first image, then hold down the <**Ctrl**> key and click on the second image.



2. Again load the Tie dialog box.
3. To align the images in the stereo view, use the Align button.



Exporting to inBlock Adjustment

Importing adjustment results into Summit Evolution

1 TIPIČNA SESIJA

Tipična sesija sadržava slijedeće osnovne korake:

- Podešavanje
- Unošenje podataka
- Računanje
- Analiza rezultata
- Čuvanje rezultata

1.1 Podešavanje

- Dodavanje senzora koji će biti korišteni (Korak1: Camera, Korak2: GPS, Korak3: IMU) bazi podataka o senzorima.
- Korak4: Kreiranje platforme koja sadrži senzore koji će biti korišteni.
- Korak5: Definisanje jedinica projekta (obično će jedinice koje se koriste biti iste za sve projekte; ovo su samo out put units I nezavisne su od jedinica za input podataka)
- Korak6: Definisanje parametara mjerenja za sve tipove opservacija

1.2 Unošenje podataka

- Korak 7: Unošenje osmatranja slika
- Korak8: Unošenje osmatranja kontrolnih tačaka
- Korak 9: UnošenjeGPS/IMU osmatranja

Možda bi ste željeli unijeti podatke o orijentaciji I aproksimacijama ako su dostupni.

1.3 Računanja

- Korak10:
Izračunajte aproksimativne vrijednosti za izravnanje koristeći **'Start Approximations'**
- Korak11:
'Start Block Adjustment'; izračunajte robusno izravnanje.
- Step 12:
'Start Block Adjustment'; izračunajte konačno izravnanje najmanjih uglova.

1.4 Analiza rezultata

Analiza rezultata se može napraviti pomoću dvije metode:

- Korak13: Grafička analiza
- Step 14: Numerička analiza

1.5 Spašavanje rezultata

Rezultati mogu biti spašeni pomoću slijedećih metoda:

- Korak 15: Project file.
- Step 16: Export rezultata.

2 SESIJA NA PRIMJERU

U nastavku će biti prikazan primjer. Podaci uzorka se sastoje od opservacija slika, kontrolnih tačaka I GPS/IMU opservacija

Osmatranje slika

Opservacije slika su sačuvane u fajlu *match_at_30.ob*s. Podaci se sastoje od 3088 Opservacija slika za 31sliku. Jedinice koordinata slika su mikrometri, fokusna dužina korištene kamere je 153.172 mm a standardna devijacija koordinata slika je 5 micrometara.

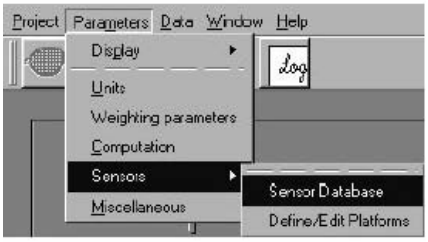
Kontrolne tačke

Mjerenja kontrolnih tačaka su sačuvana u fajlu *match_at_30.ct*p. Podaci se sastoje od 84 (sve)kontrolne tačke. Jedinice kontrolnih tačaka su metri a standardne devijacije kontrolnih tačaka su 0.05 m u x- i y-pravcu i 0.10 m u z-pravcu.

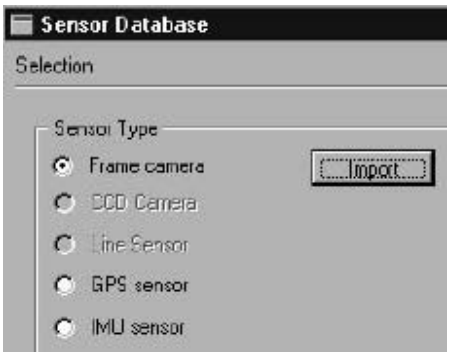
GPS/IMU osmatranja

GPS/IMU opservacije su sačuvane u fajlu *match_at_30.im*u. Podaci sadrže 31 opservaciju (jedna za svaku sliku) bez vremenskih oznaka. Format je **photo, x, y, z, omega,**
phi, kappa. Jedinice za GPS coordinate su metri a jedinice za IMU uglove su stepeni. Znak¨# se koristi kao strip separator is used as strip separator. Standardna devijacija GPS opservacija je 0.04 m, standardna devijacija IMU opsrevacija je 0.002stepena.

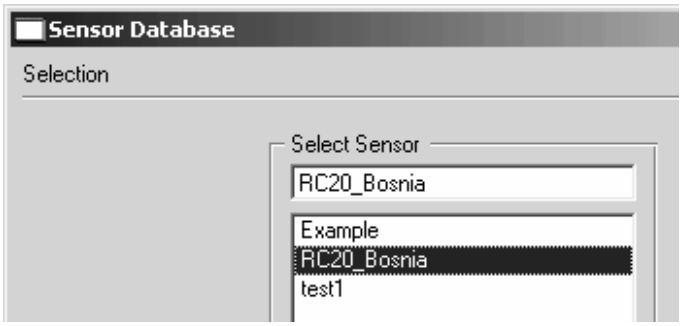
2.1 Korak 1: Dodati kameru senzornoj bazi podataka



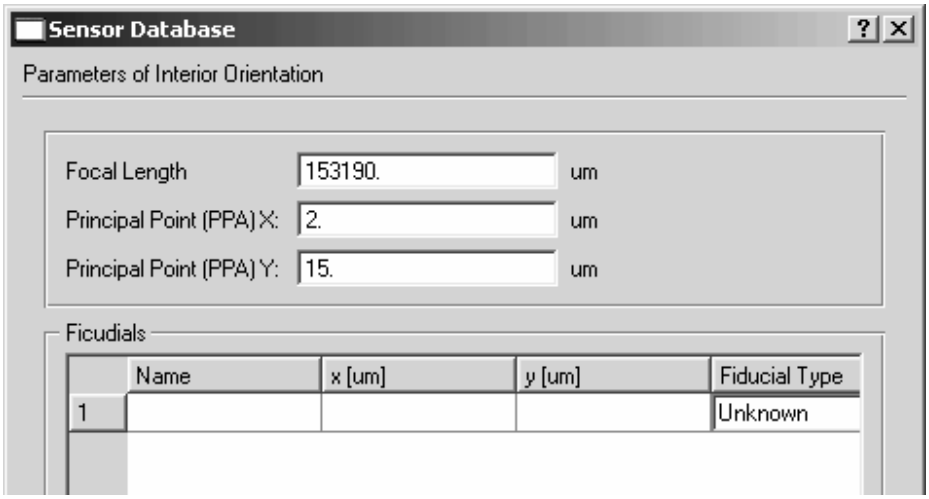
Aktivirajte **'Sensor Database'**čarobnjaka.



Izaberite***Frame camera*** kao tip senzora I pritisnite ***Next>***.

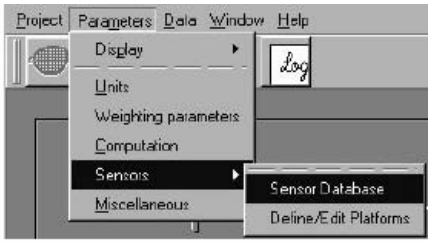


Pritisnite ***Add new sensor*** , unesite ime kamere koje će se pohraniti u senzornu bazu podataka I izaberite ime kamere.

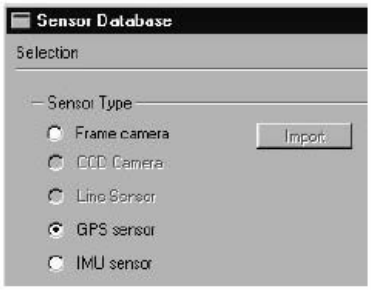


Unesite poznatu fokusnu dužinu kamere. Za ovaj projekat nije potrebno definisati iskrivljenja sočiva jer su podaci na slikama već ispravljeni. fiducial mark koordinate nisu potrebne.

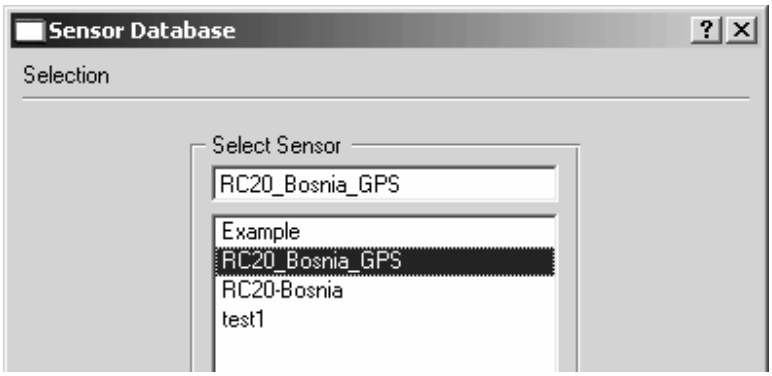
2.2 Korak 2: Dodajte GPS senzor senzornoj bazi podataka



Startujte ***Sensor Database*** čarobnjaka.

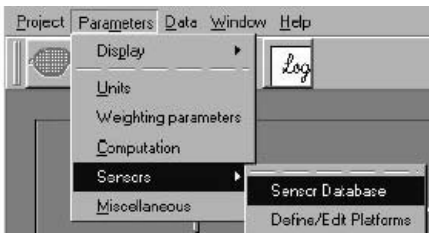


Kao tip senzora izaberite ***GPS sensor*** i pritisnite ***Next>***.

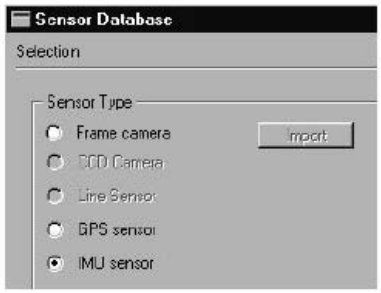


Pritisnite ***Add new sensor***, unesite ime GPS senzora koji će biti pohranjen u senzornu bazu podataka I izaberite ime GPS senzora.

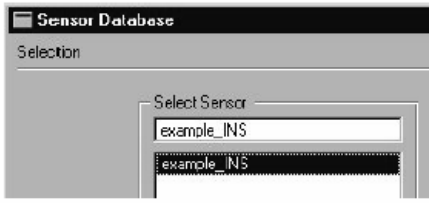
2.3 Korak 3: Dodajte IMU senzor u senzornu bazu podataka



Aktivirajte **'Sensor Database'**čarobnjaka.

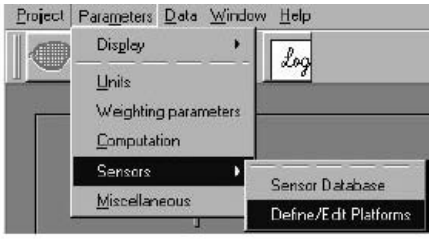


Izaberite ***IMU sensor*** za tip senzora I pritisnite ***Next>***.

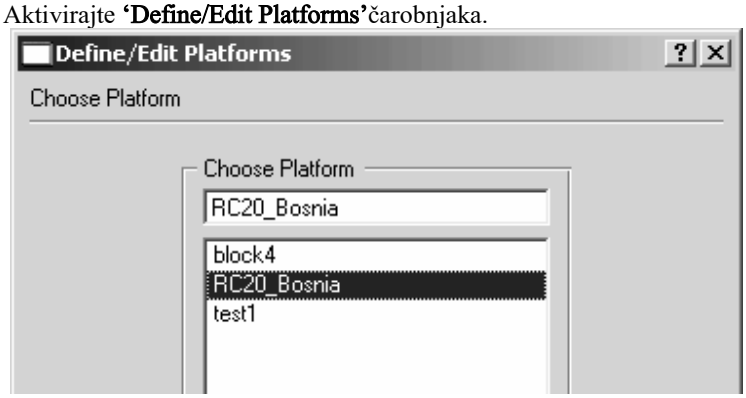


Pritisnite **Add new sensor,** unesite ime IMU senzora koji će biti pohranjen u senzornoj bazi podataka I izaberite ime IMU senzora.

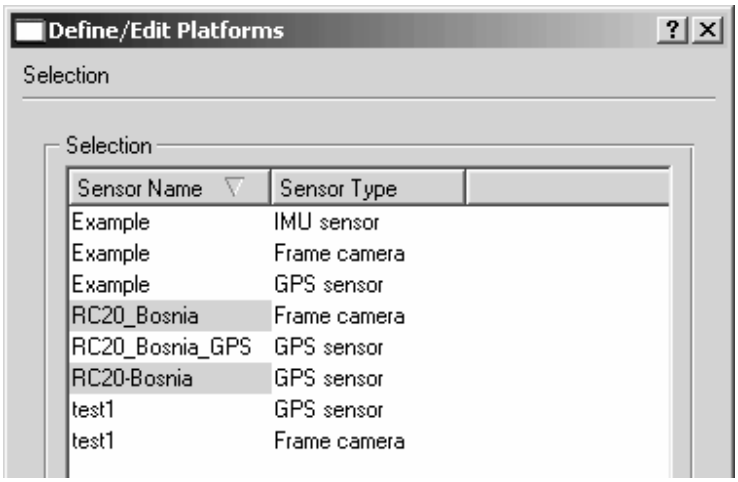
2.4 Step 4: Kreiranje platforme



Aktivirajte **'Define/Edit Platforms'**čarobnjaka.

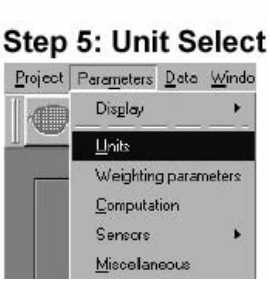


Dodajte ime platforme bazi podataka o platformi I izaberite ime platforme. Pritisnite ***Add new platfor***m, unesite ime platforme, pritisnite ***Next>***

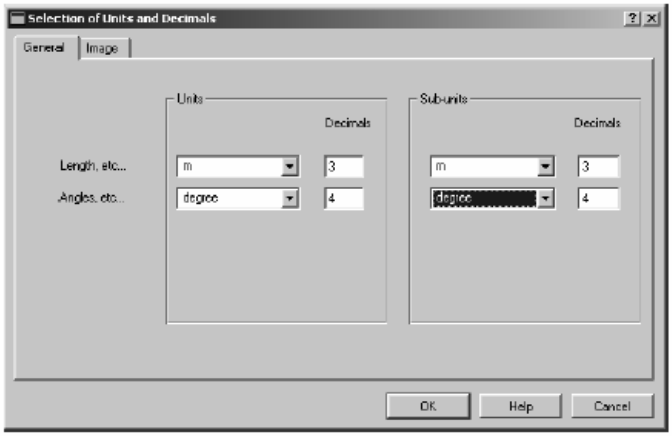


Izaberite senzore za projekat (lijevi miš+Ctrlza dodavanje selekcije, lijevi miš+Shiftza biranje bloka, Ctrl+a za selekciju svega), pritisnite ***Next>***, unesite boresight misalignment ako je potrebno (ne za tekući projekat), pritisnite ***Next>***, unesite offset antene ako je potrebno (ne za ovaj projekat), pritisnite ***Finis***h.

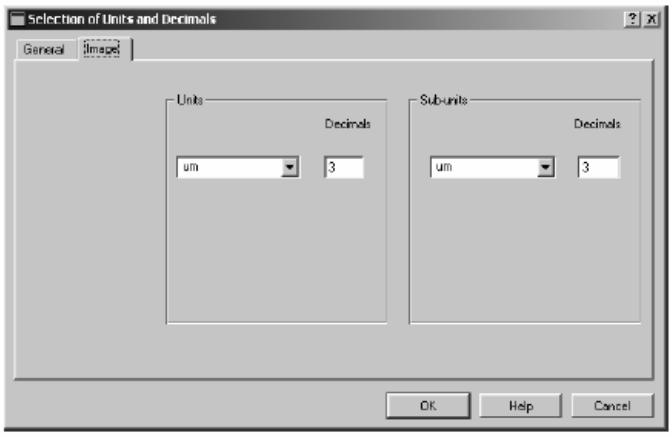
2.5 Korak 5: Selekcija jedinica



Startujte **'Units'** čarobnjaka.



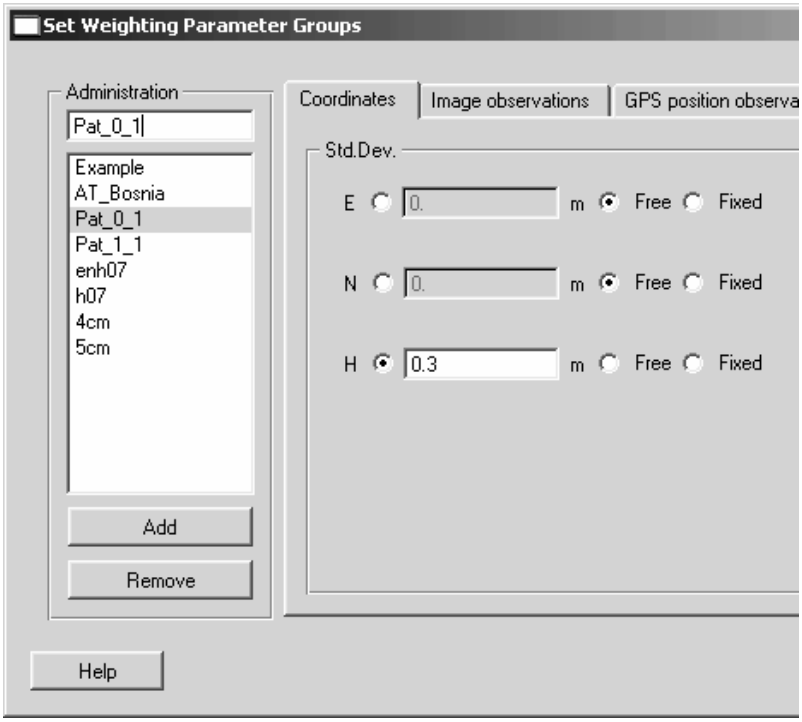
Za jedinice I podjedinice zaberite metre (m) sa 3 decimale za kontrolne tačke I GPS koordinate, a stepene sa 4 decimale za IMU uglove. Izaberite tab dialog **Image.**



Za koordinate slika, kao jedinice I podjedinice, izaberite mikrometre (um) sa jednom decimalom.

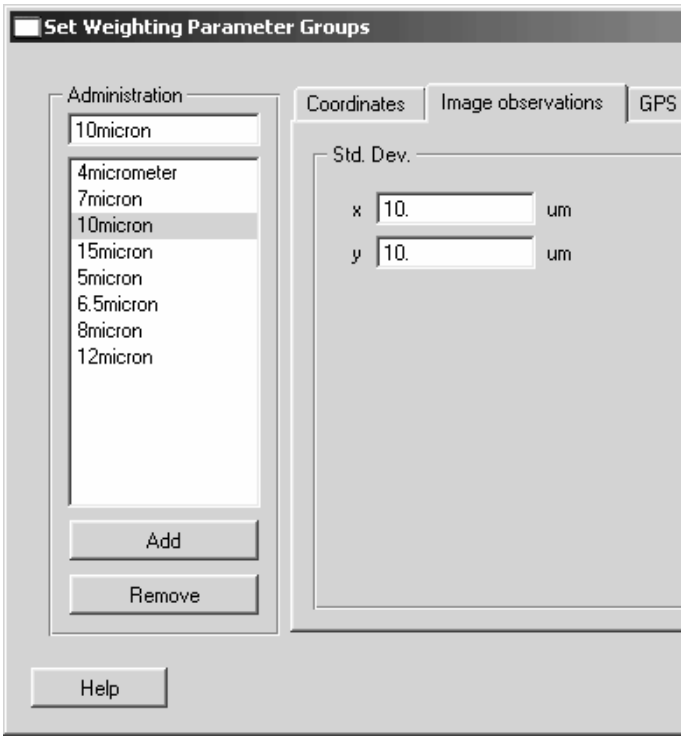
2.6 Korak 6: Podešavanje težinskih parametara

Aktivirajte**'Weighting parameters'** čarobnjaka.



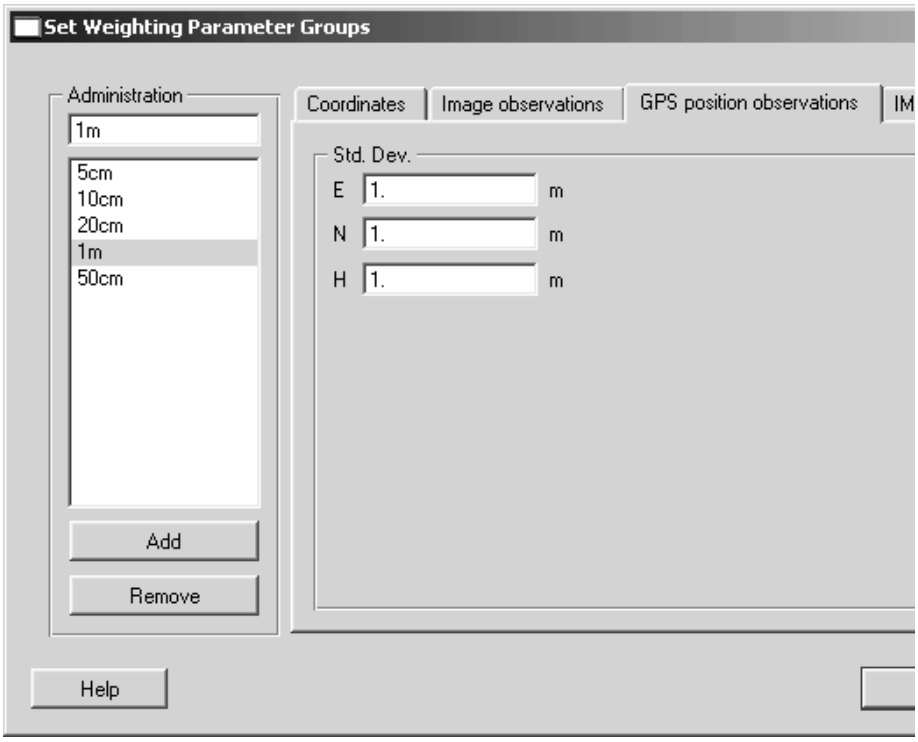
Pritisnite ***Add*** i unesite imena težinskih parametara kontrolnih tačaka i izaberite ime grupe. Izaberite E, N i H i unesite poznate standardne devijacije koordinata kontrolnih tačaka.

Izaberite tab meni **Image observation**s.

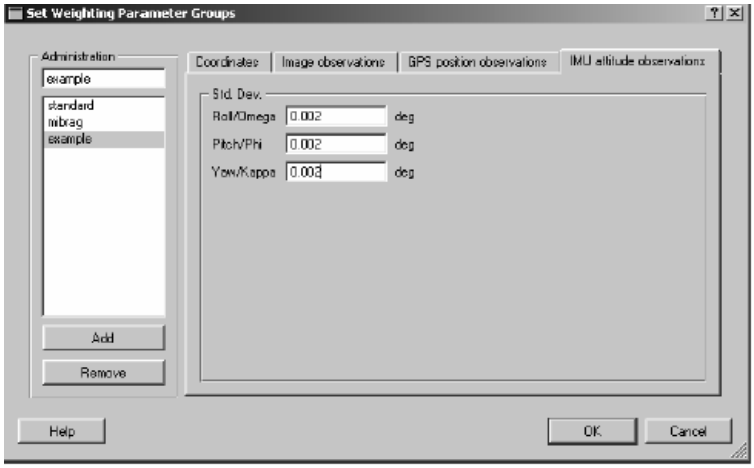


Pritisnite***Add*** i unesite ime parametara težine za osmatranje slika i izaberite ime grupe. Unesite poznate standardne devijacije za osmatranje slika.

Izaberite tab menu **GPS position observation**s.



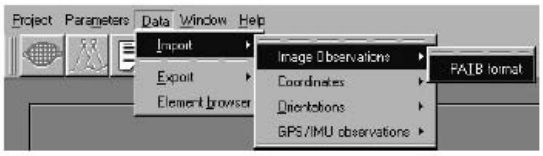
Pritisnite ***Add*** i unesite ime parametara mjerenja GPS pozicije i izaberite ime grupe.Unesite poznate standardne devijacije GPS pozicija.
Izaberite tab menu **IMU attitude observation**s.



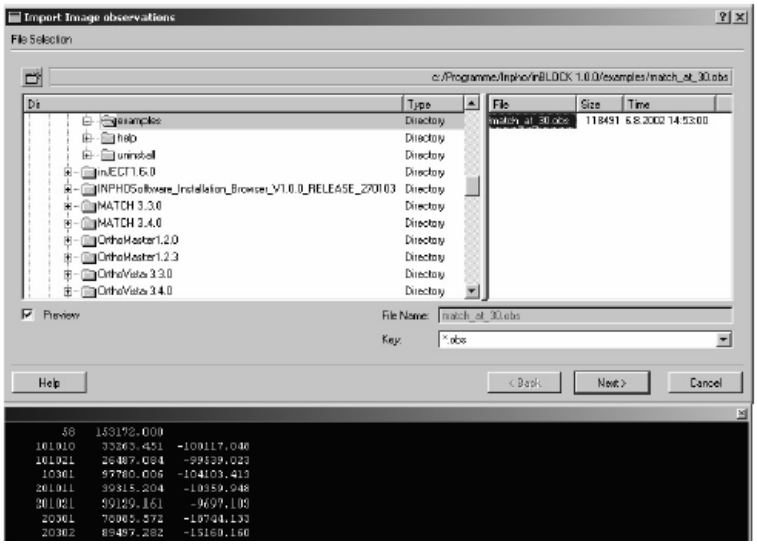
Pritisnite ***Add*** i unesite imena parametara mjerenja IMU osmatranja i izaberite ime grupe. Unesite poznate standardne devijacije IMU osmatranja.

Izađite iz menija tako što ćete pritisnuti ***OK***

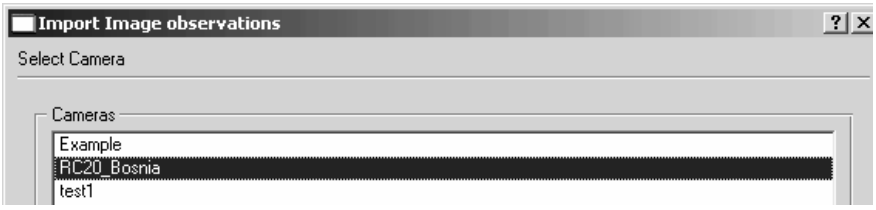
2.7 Korak 7: Unos osmatranja slika



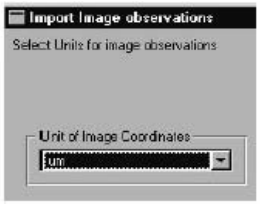
Aktivirajte **'Import/Image Observations/PATB format'**čarobnjaka.



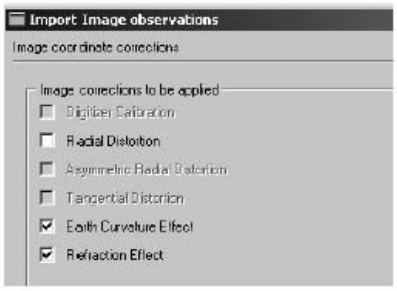
Izaberite fajl ***match_at_30.obs*** koji sadrži osmatranja slika, pritisnite ***Next>***



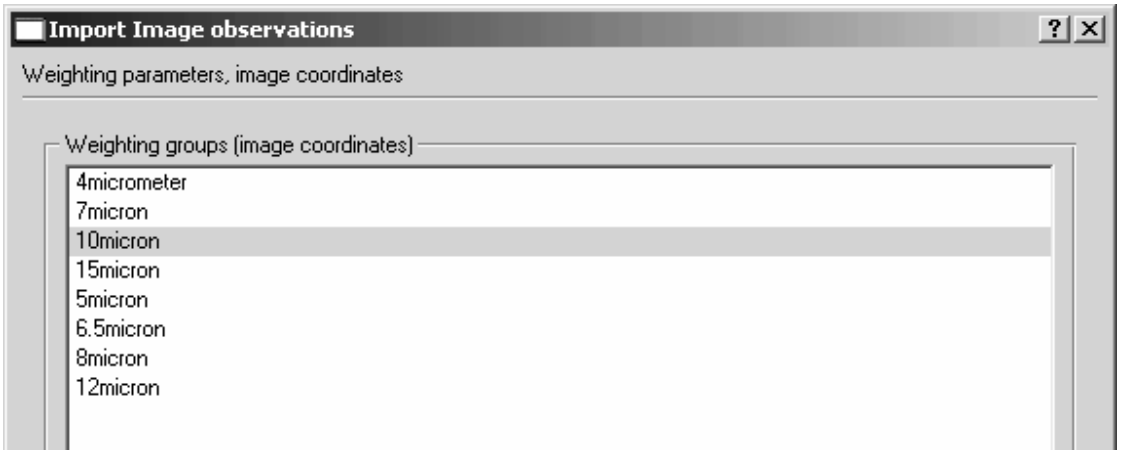
Izaberite kameru projekta iz senzorne baze podataka, pritisnite ***Next>***



Unesite jedinice za koordinate slika koje će se unijeti i pritisnite ***Next***>.

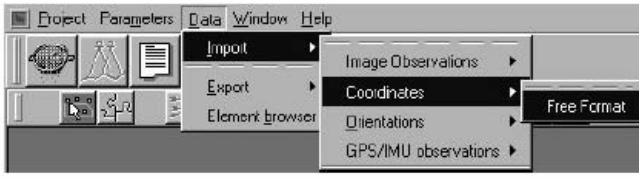


Definišite korekcije slika koje će se primjeniti u izravnanju. Unošenje krivina (nabora) zemlje i refrakcija je logično za gotovo svaki projekt. Pritisnite ***Next>***

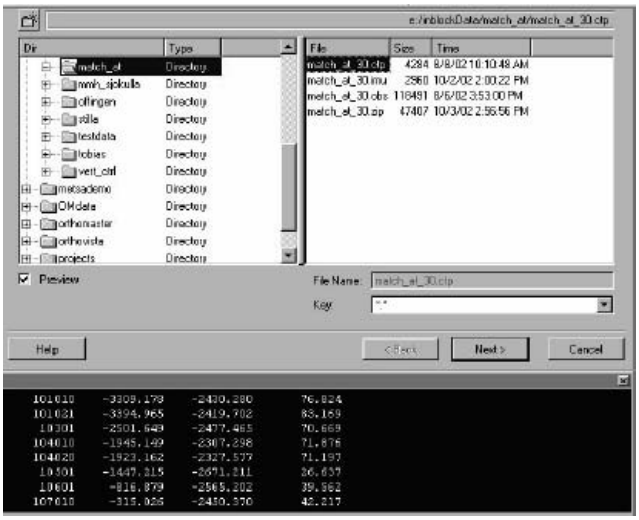


Izaberite definisanu grupu težine za opservacije slika i i pritisnite ***Finish***
inBLOCK sada unosi opservacije slika, za sada unesene tačke ne mogu biti prikazane jer ne postoje 3d koordinate.

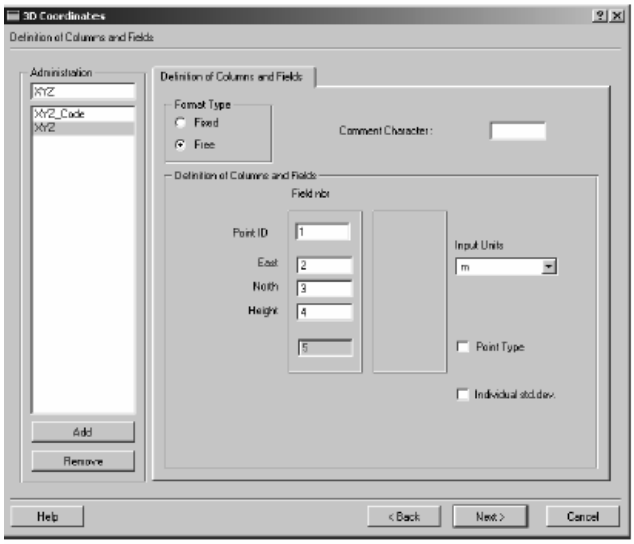
2.8 Korak 8: Unos osmatranja kontrolnih tačaka



Aktivirajte **'Import/Coordinates/Free Format'** čarobnjaka.

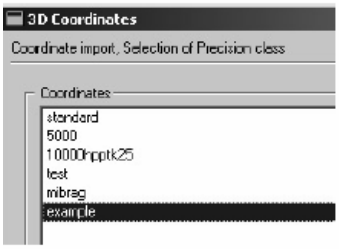


Izaberite fajl ***match_at_30.cpt*** koji sadrži informacije o osmatranjima kontrolnih tačaka i pritisnite ***Next>.***



Pritisnite ***Add,*** unesite ime formata unosa fajla kontrolnih tačaka i izaberite ime dodanog formata. Definišite ***Format Type*** (slobodno), ***Columns and Fields*** (PointID, East, North, Height) i
Input Units (m).Trenutni set podataka je strukturiran u broju tačke, X, Y, Z.Tip tačke i individualne standardne devijacije nisu definisane. **Primjedba**: Tip tačke definiše tip, e.g. punu kontrolu(3), planimetrijsku kontrolu(2), visinsku kontrolu(1).

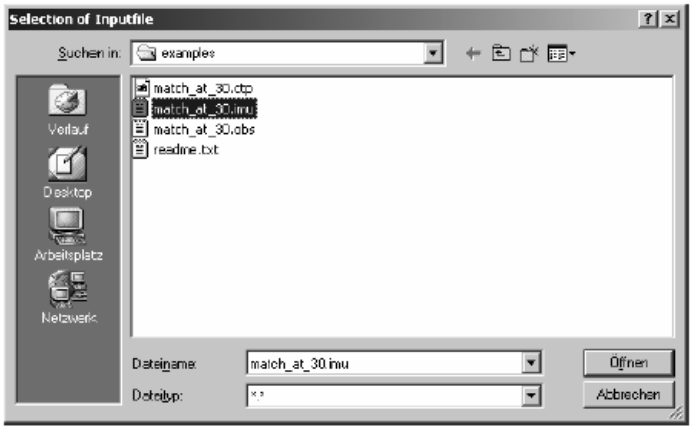
Pritisnite ***Next>***



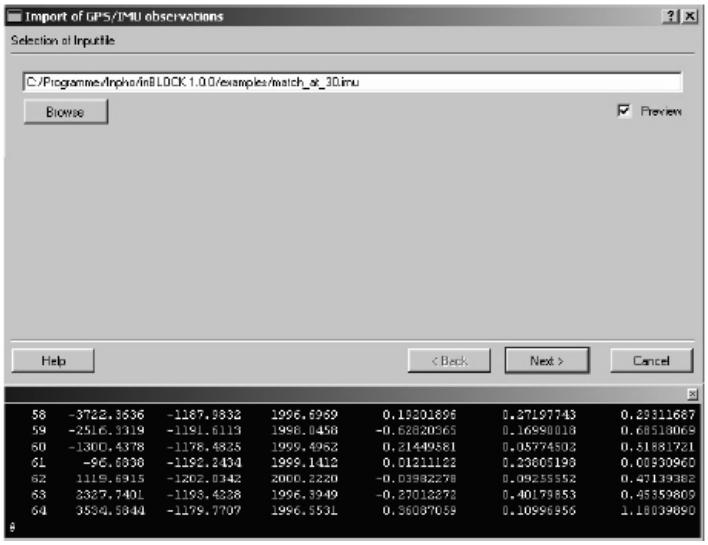
Izaberite težinsku grupu za opservacije težinskih tačaka i pritisnite ***Finish***. Biće prikazane pozicije kontrolnih tačaka.

2.9 Korak 9: Unos GPS/IMU osmatranja

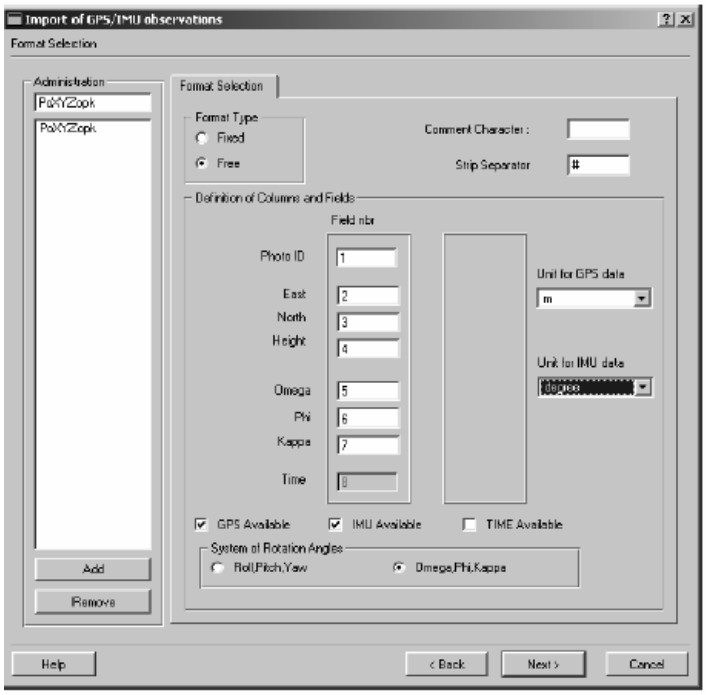
Aktivirajte **'Import/GPS/IMU observations/Free Format'** čarobnjaka.



Izaberite fajl ***match_at_30.imu*** koji sadrži GPS i IMU osmatranja i pritisnite ***Open***.

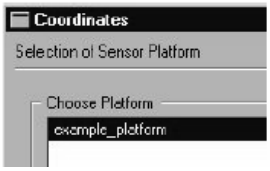


Kada je check box Preview aktiviran, prve linije od fajla koji treba biti unesen će biti prikazane. Pritisnite ***Next>***

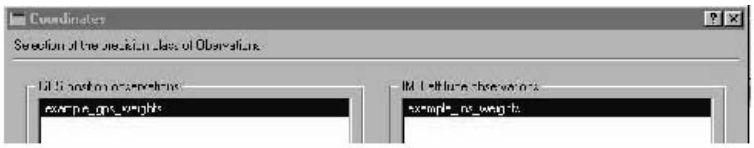


Pritisnite ***Add***, unesite ime formata unosa fajla GPS/IMU osmatranja i izaberite ime formata. Definišite ***System of Rotation Angles*** (Omega,Phi,Kappa), ***Format***

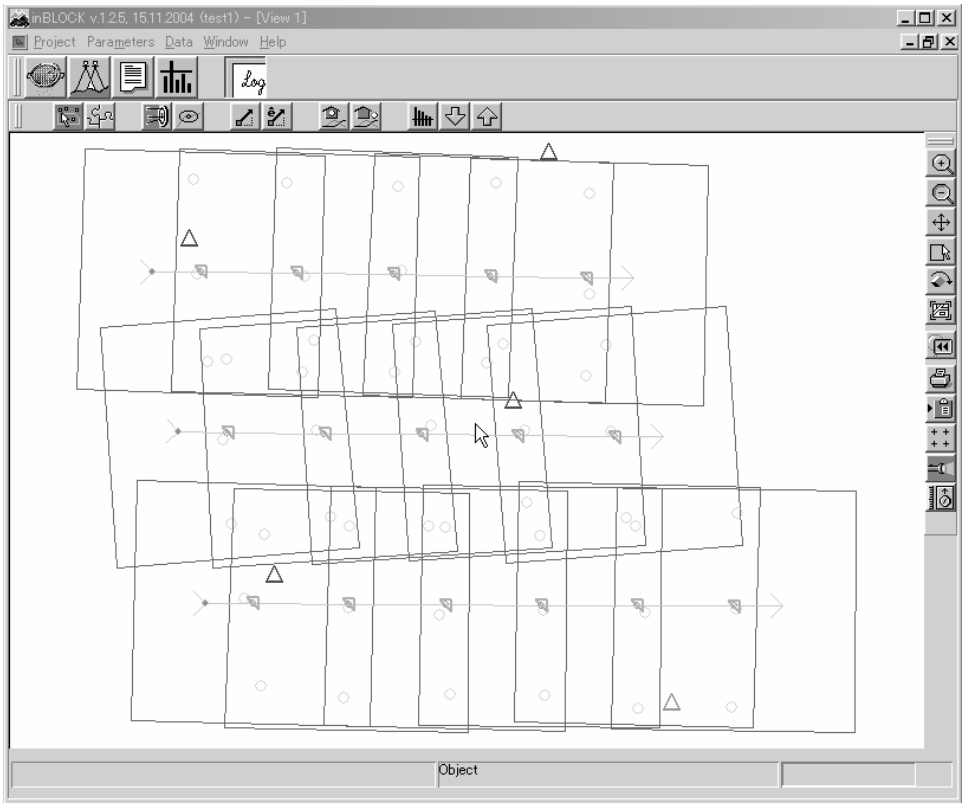
Type (slobodno), ***Strip Separator*** (#), ***Columns and Fields*** (PointID, East, North, Height, Omega, Phi, Kappa), ***Unit for GPS data*** (m) and ***Unit for IMU data*** (degree). Za ovaj primjer vrijeme nije dostupno.
Pritisnite ***Next>***



Izaberite korištenu platformu i pritisnite ***Next>***

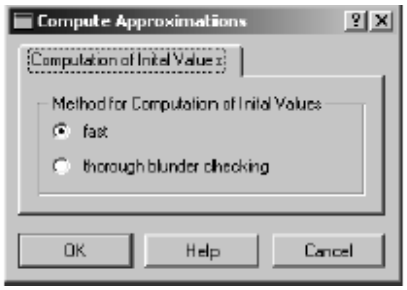


Izaberite težinsku grupu za GPS i IMU osmatranja i pritisnite ***Finish***.



2.10 Korak 10: Računanje aproksimativnih vrijednosti

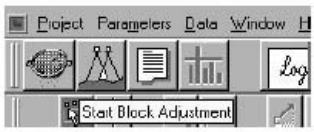
'**Start Approximation**s'.



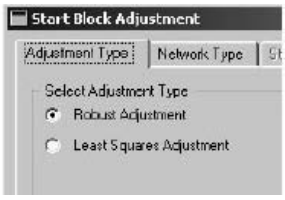
Izaberite brzu metodu da za obezbjeđivanje aproksimacija za poravnavanje. Pritisnite ***OK***

Primjedba: ovaj korak ovdje i nije neophodan jer postoje dobre aproksimacije za orjentaciju sa GPS/INS

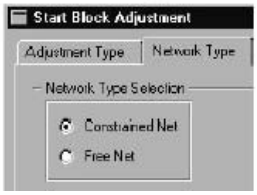
2.11 Korak 11: Računanje robusnog izravnanja



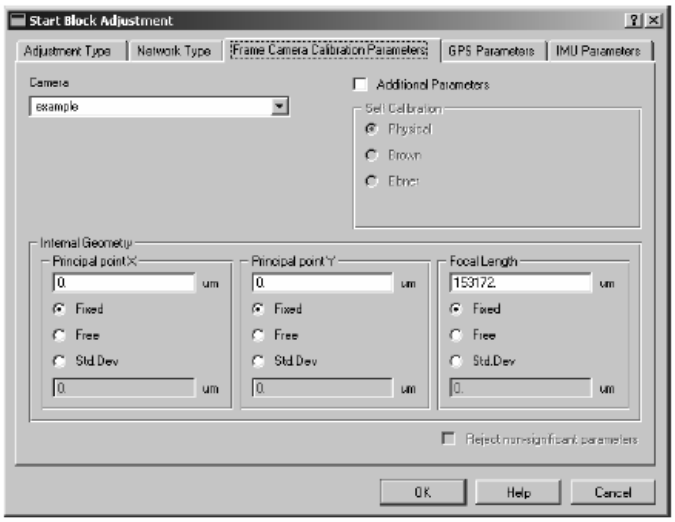
Aktivirajte'**Block Adjustment**'.



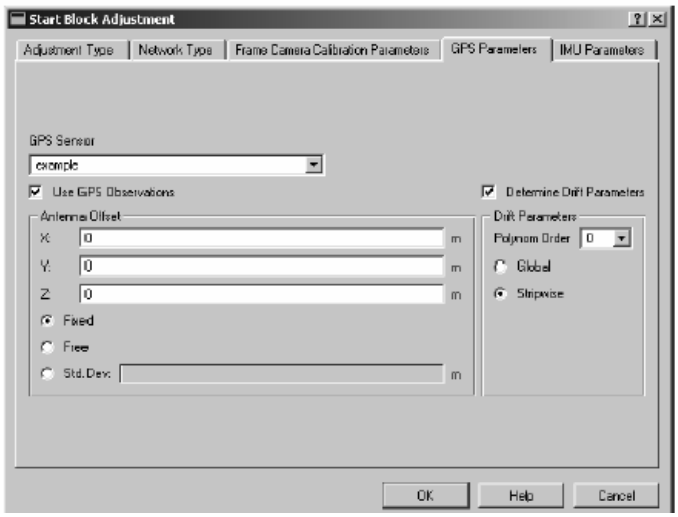
Izaberite ***Robust Adjustment*** kao korišteni tip poravnanja i izaberite tab meni Network Type:



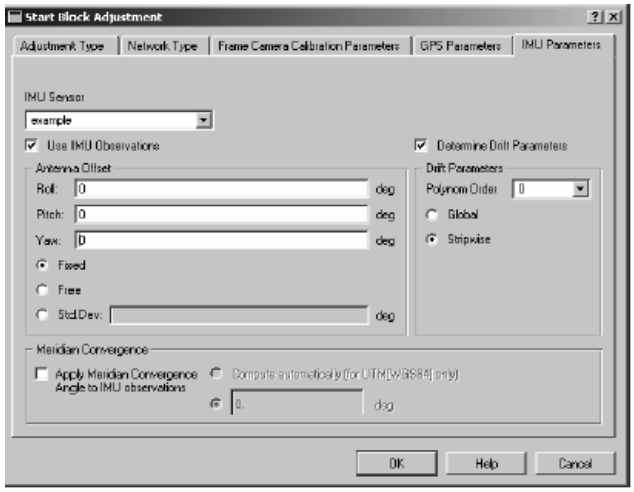
Izaberite ***Constrained Net*** kao korišteni tip mreže i izaberite tab men Frame Camera Calibration Parameters:



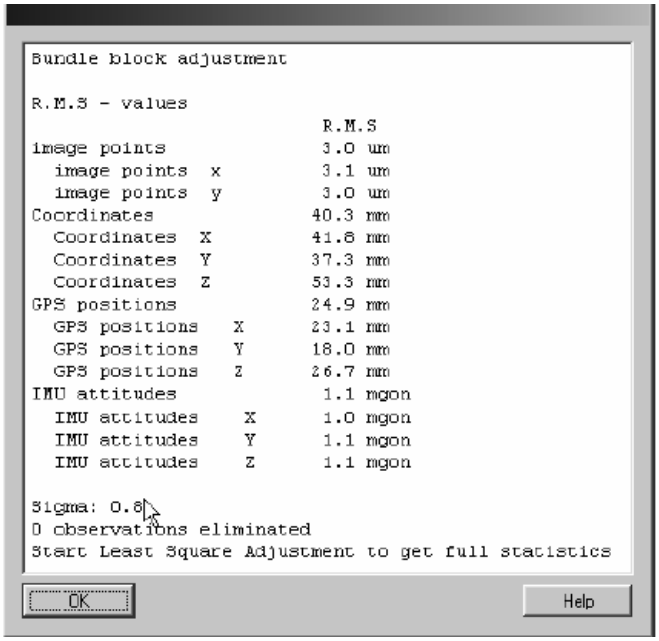
Izaberite korištenu kameru iz senzorne baze podatakaSelect used camera from sensor database, isključite ***Additional Parameters*** za korištenje samokalibracije, definišite ***Internal Geometry*** kao ***Fixe***d,. Izaberite tab menu GPS Parameters:



Izaberite GPS senzor iz baze podataka, potvrdite ***Use GPS Observations*** box (on), ***Antenna Offset*** na ***Fixed*** i uključite check box za ***Determine Drift Parameter***s. Koristite stripwise drift i polinom reda 1 (constant + linear: "shift + drift"). Izaberite tab meni IMU Parameters:

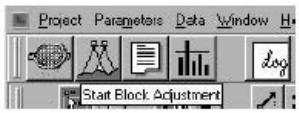


Izaberite korišteni IMU senzoriz baze podataka, otvorite ***IMU Observations*** *box* (on), definišite
Antenna Offset za ***Fixed*** i uključite check box ***Determine Drift Parameter***s. Koristite stripwise drift i polinom reda1 (constant + linear). Ne primjenjujte ***Meridian Convergence Angl***e. Pritisnite ***O***K.

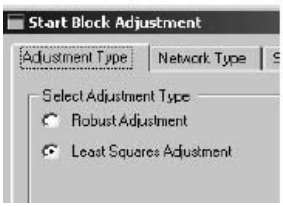


Pritisnite ***OK***

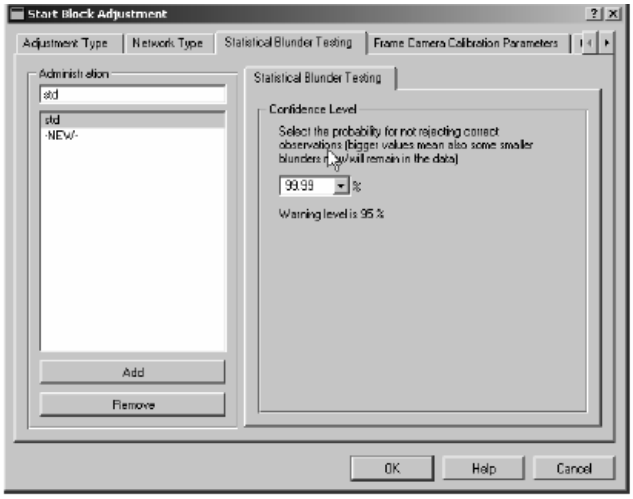
2.12 Korak 12: Računanje izravnavanja najmanjih kvadrata



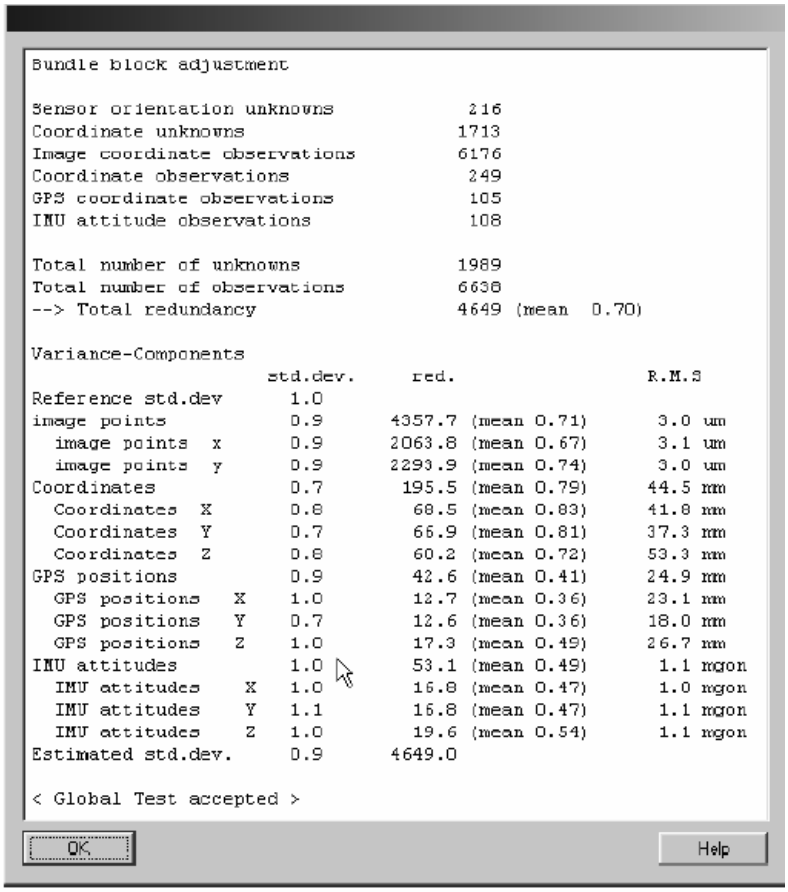
Startujte **'Block Adjustment'**.



Izaberite ***Least Squares Adjustment*** za korišteni Adjustment Type i izaberite tab Statistical Blunder Testing.



Izaberite 99.99 % za nivo tačnosti za pogreške i pritisnite ***O***K.
Birate između 99%, 99.9%, i 99.99%; pomoću njih dolazite do kritičnih vrijednosti za standardizovane ostatke (probne vrijednosti) od 2.58, 3.29, i 3.89. Veći % znači da budete "oprezniji" kod eliminisanja grešaka u osmatranju.



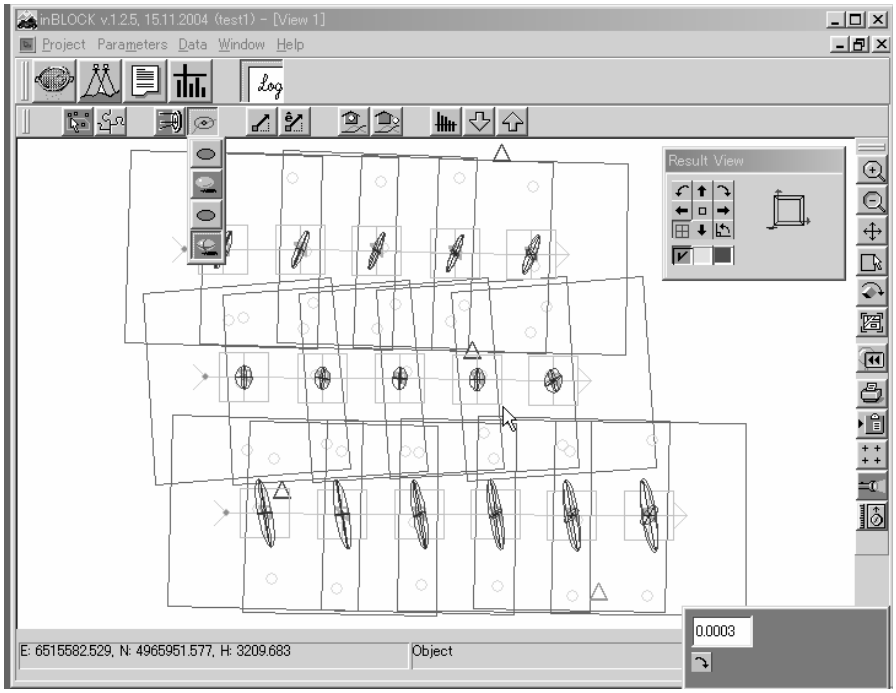
```
Bundle block adjustment

Sensor orientation unknowns            216
Coordinate unknowns                   1713
Image coordinate observations         6176
Coordinate observations                249
GPS coordinate observations            105
IMU attitude observations              108

Total number of unknowns              1989
Total number of observations          6638
--> Total redundancy                  4649 (mean  0.70)

Variance-Components
                      std.dev.     red.                    R.M.S
Reference std.dev        1.0
image points             0.9      4357.7 (mean 0.71)       3.0 um
  image points  x        0.9      2063.8 (mean 0.67)       3.1 um
  image points  y        0.9      2293.9 (mean 0.74)       3.0 um
Coordinates              0.7       195.5 (mean 0.79)      44.5 mm
  Coordinates  X         0.8        68.5 (mean 0.83)      41.8 mm
  Coordinates  Y         0.7        66.9 (mean 0.81)      37.3 mm
  Coordinates  Z         0.8        60.2 (mean 0.72)      53.3 mm
GPS positions            0.9        42.6 (mean 0.41)      24.9 mm
  GPS positions   X      1.0        12.7 (mean 0.36)      23.1 mm
  GPS positions   Y      0.7        12.6 (mean 0.36)      18.0 mm
  GPS positions   Z      1.0        17.3 (mean 0.49)      26.7 mm
IMU attitudes            1.0        53.1 (mean 0.49)       1.1 mgon
  IMU attitudes    X     1.0        16.8 (mean 0.47)       1.0 mgon
  IMU attitudes    Y     1.1        16.8 (mean 0.47)       1.1 mgon
  IMU attitudes    Z     1.0        19.6 (mean 0.54)       1.1 mgon
Estimated std.dev.       0.9      4649.0

< Global Test accepted >
```

OK Help

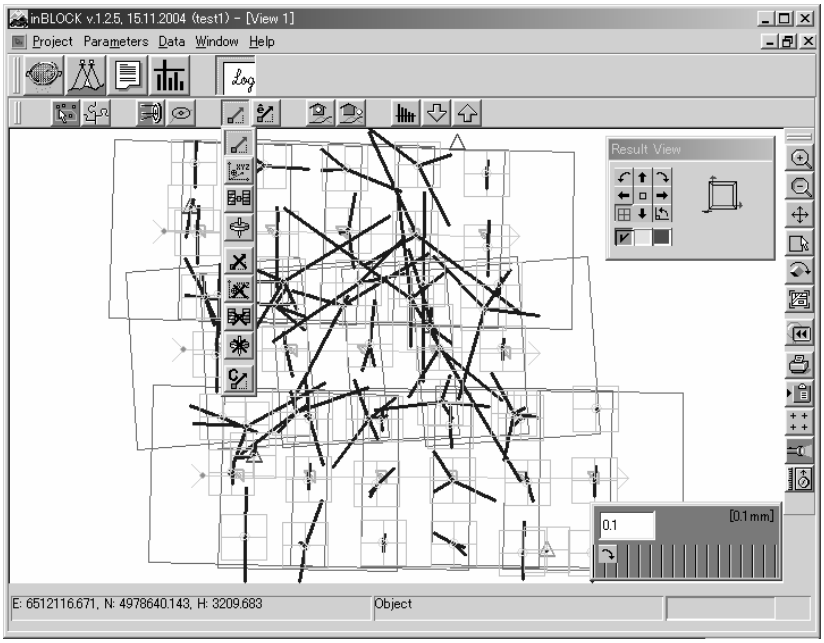
Example Session

Osnovne statističke vrijednosti izravnanja su prikazane. Brojevi komponenti odstupanja su faktori (zajednički činioci) između a priori odstupanja za ovaj tip osmatranja i procijenjenih odstupanja izravnanja. Oni nisu značajni ako je iznos redundancije za tip posmatranja mali. Vrijednosti R.M.S (srednji kvadratni korjen) su izračunate iz ostataka i obično su se koristile u druge svrhe za procjenu odstupanja osmatranja. Ovdje su samo da bi se mogle uporediti sa drugim programima. Vidi se i da su R.M.S vrijednosti uglavnom previše optimistične u poređenju sa komponentama odstupanja.

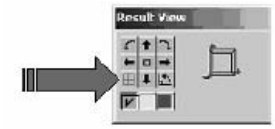
2.13 Korak 13: Grafička analiza



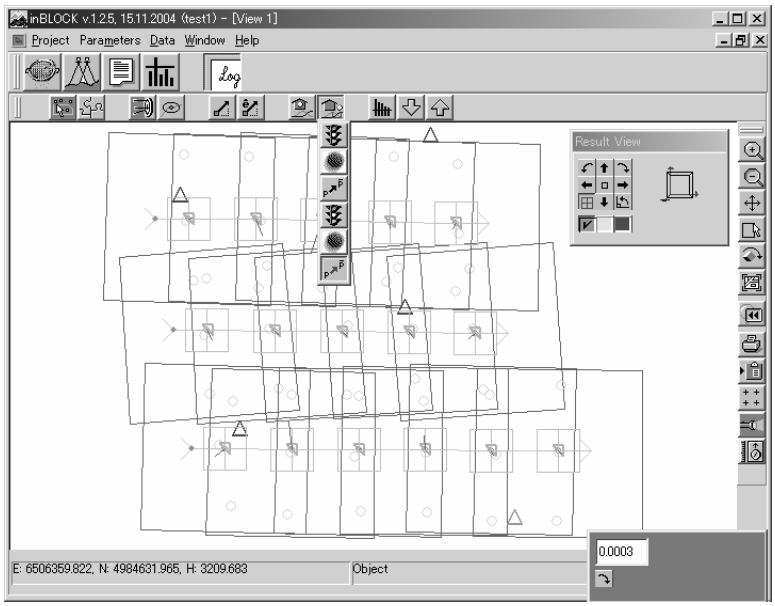
Display *Error Ellipsoids for Projection Centers* korištenjem skale 0.1.



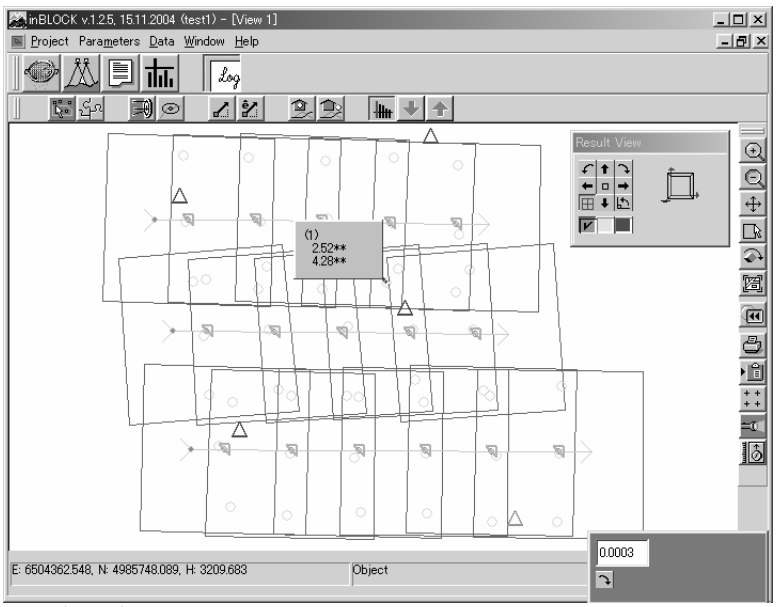
Display ***Residuals of Image Observations*** korištenjem skale 0.2.



Primjedba:Za jasniji prikaz prečke lokalne mreže koordinata (vizualizira rotaciju lokalne xy plane) u **Result View**



Prikažite ***Empirical Reliability for Projection Centers*** korištenjem skale 1.



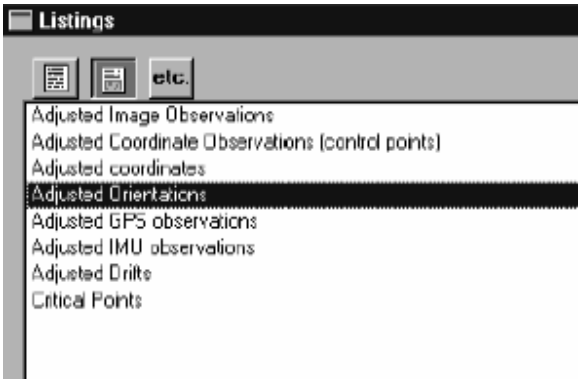
Example Session

Prikažite najveću grešku – ***Blunders, max->min*** – korištenjem skale 0.5.

2.14 Korak 14: Numerička analiza

Startujte blunder browser i provjerite greške. Razvrstane su po važnosti (normalizovani ostaci) Možete prebaciti na *eliminated* i *possible blunders* ako su dostupni.

Startujte **Listings** funkciju.



Izaberite **Adjusted Orientations** i pritisnite ***Apply***

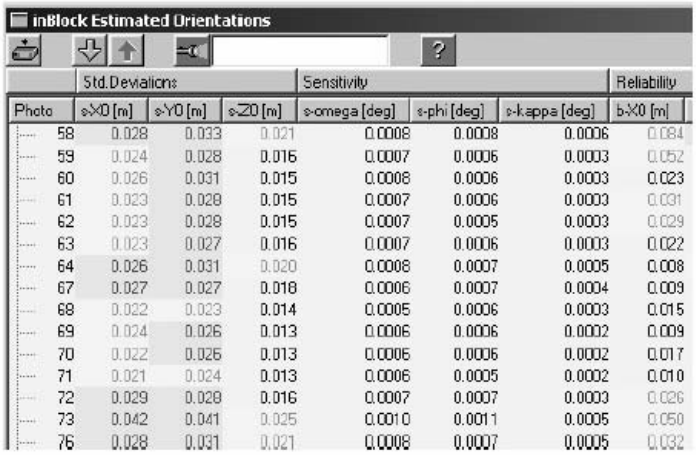
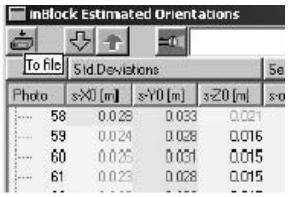


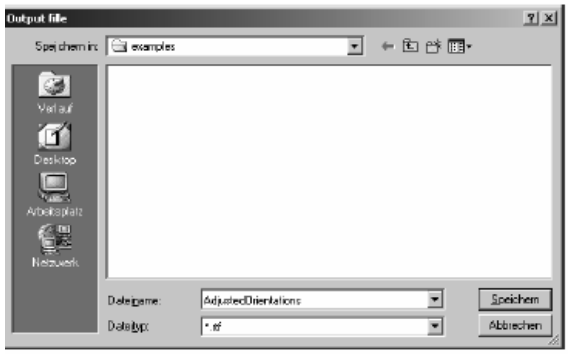
Photo	s-X0 [m]	s-Y0 [m]	s-Z0 [m]	s-omega [deg]	s-phi [deg]	s-kappa [deg]	b-X0 [m]
58	0.028	0.033	0.021	0.0008	0.0008	0.0006	0.084
59	0.024	0.028	0.016	0.0007	0.0006	0.0003	0.052
60	0.026	0.031	0.015	0.0008	0.0006	0.0003	0.023
61	0.023	0.028	0.015	0.0007	0.0006	0.0003	0.031
62	0.023	0.028	0.015	0.0007	0.0005	0.0003	0.029
63	0.023	0.027	0.016	0.0007	0.0006	0.0003	0.022
64	0.026	0.031	0.020	0.0008	0.0007	0.0005	0.008
67	0.027	0.027	0.018	0.0006	0.0007	0.0004	0.009
68	0.022	0.023	0.014	0.0005	0.0006	0.0003	0.015
69	0.024	0.026	0.013	0.0006	0.0006	0.0002	0.009
70	0.022	0.026	0.013	0.0006	0.0006	0.0002	0.017
71	0.021	0.024	0.013	0.0006	0.0005	0.0002	0.010
72	0.029	0.029	0.016	0.0007	0.0007	0.0003	0.026
73	0.042	0.041	0.025	0.0010	0.0011	0.0005	0.050
76	0.028	0.031	0.021	0.0008	0.0007	0.0005	0.032

Da onesposobite e.g. svih daljnjih unosa osim **Std.Deviations** kliknite desnim mišem na e.g. **Parameters** i izaberite ***disable***. Onesposobljena polja se mogu aktivirati na isti način izabiranjem ***enable***. Zavisno od već podešene preciznosti mete (Parametri računanja) polja mogu biti obojena crvenom ili žutom bojom da bi se prikazalo u kojoj mjeri je prekoračena preciznost mete.
Listing sadrži brojeve slika, izravnane koordinate centara projekcije (XYZ), izravnane (rotations round) x-, y-, I z- axis (ù.ê), standardne devijacije izravnanih koordinata, standardne devijacije izravnane rotacije, senzitivnost izravnanih koordinatathe, senzitivnost izravnanih rotacija, pouzdanost izravnanih koordinata, pouzdanost izravnanih rotacija. Ubuduće će biti prikazani kontrolni indikator i status elementa.

2.15 Korak 15: Spašavanje rezultata

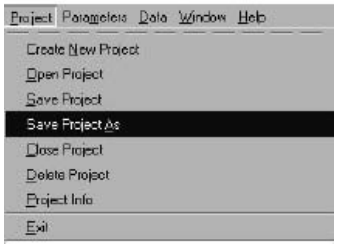


Spašavanje svih listinga se radi po istoj proceduri. Ako je listing pripremljen na način na koji treba biti štampan pritisnite save ***To file*** na top meni baru.

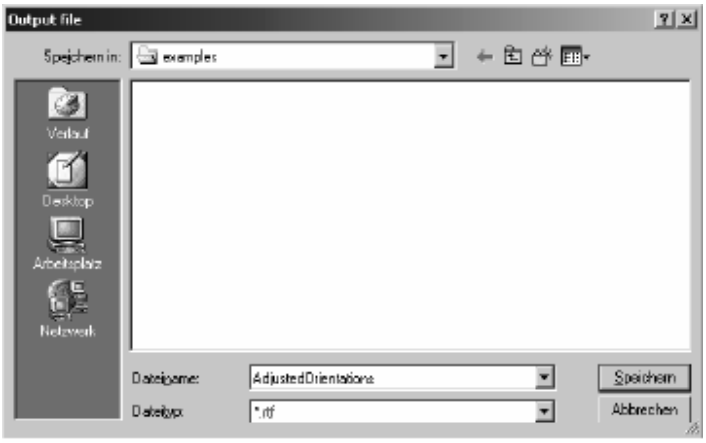


Prelistajte spisak fajlova i unesite ime fajla. Fajl će biti pohranjen u .rtf formatu.

2.16 Korak 16: Sačuvajte rezultate u fajlu

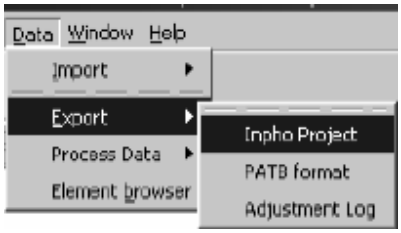


Izaberite **Save Project As** iz **Project** menija.

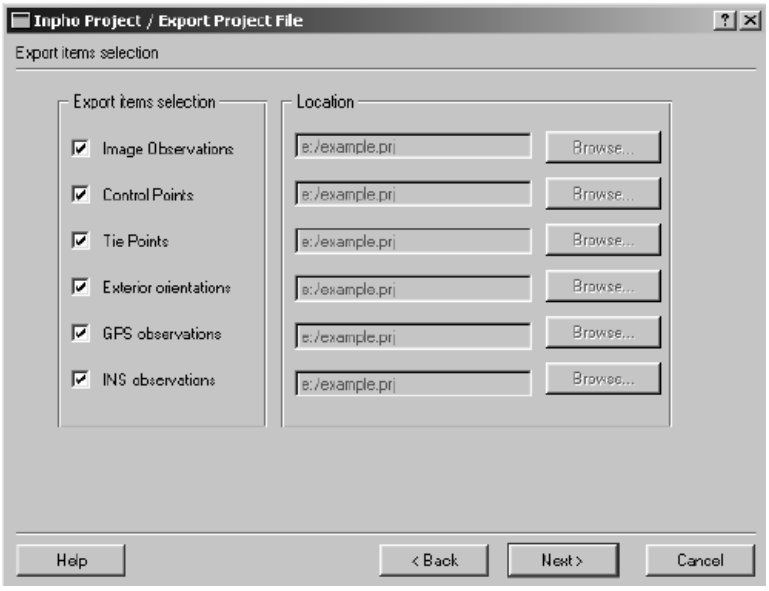


Unesite path i ime za fajl projekta.

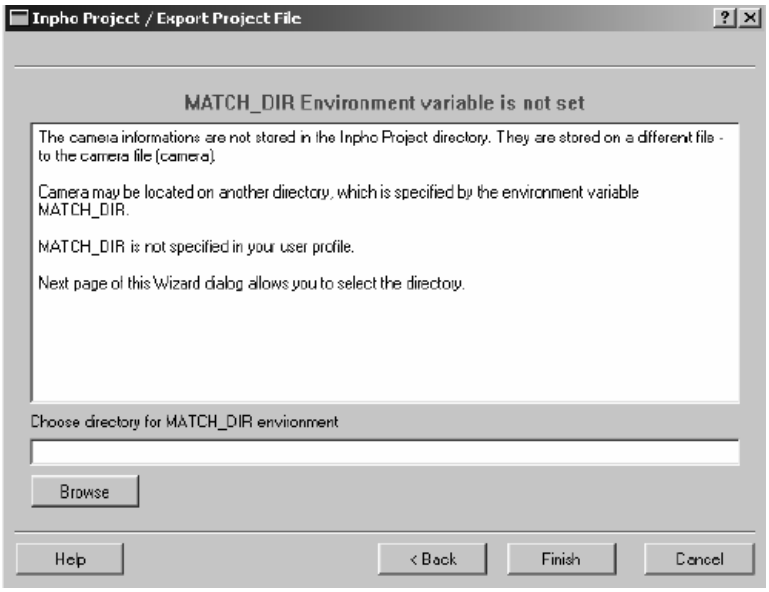
2.17 Korak 17: Export rezultata



Startujte **'Export/Inpho project'** čarobnjaka.
U boxu za selekciju fajlova izaberite path i unesite ime fajla za export i pritisnite ***Next>***



Izaberite predmete za export i pritisnite ***Next>***.



Example Session

Izaberite direktorij za kamera fajl. Ako u ovom direktoriju ne postoji kamera fajl on će ovdje biti kreiran i u njega će se izvršiti export kamere. Kliknite ***Finish*** da započnete export.

Digital Plotting Manual

This manual was made on the basis of the operation manual of “DAT/EM Capture Including Super/Imposition” by DAT/EM Systems International.

Day-to-Day Use of DAT/EM CAPTURE

This chapter gives instructions and hints for digitizing, editing, and outputting with DAT/EM CAPTURE.

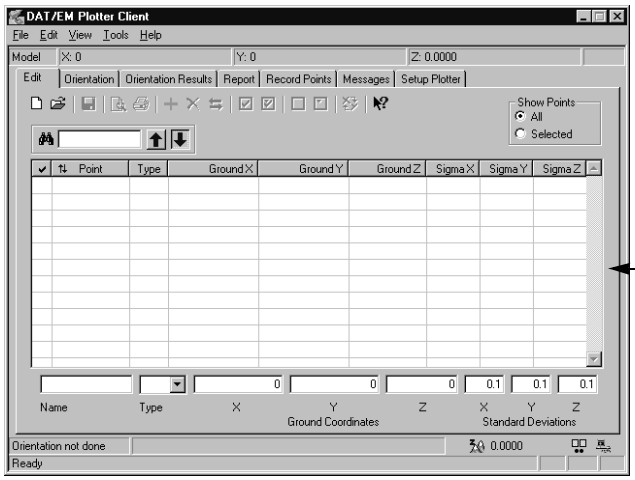
Understanding the Software Components

There are several software applications that the user will see every time DAT/EM CAPTURE is used. The following sections describe their functions and general information about them.

The DAT/EM Plotter Client

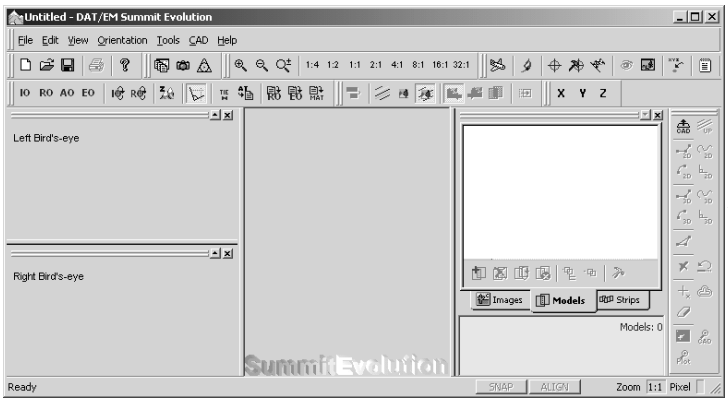
Every time DAT/EM CAPTURE is used, the DAT/EM plotter client will be running.

- The plotter client communicates with the stereoplotter and AutoCAD. It must be running in order to digitize ground coordinates into an AutoCAD file.
- With the DAT/EM SUMMIT PC and SUMMIT EVOLUTION digital stereoplotters, the stereoplotter and the plotter client functions are combined into a single application.
- On analog stereoplotters, the plotter client offers orientation functions. On analytical stereoplotters, the manufacturer's orientation software results are used.
- The plotter client looks different for different brands and types of stereoplotters. The following are some examples of DAT/EM plotter clients:



A box similar to this one will appear for all **analog and analytical** stereoplotters.

- On analog stereoplotters, raw encoder counts are shown until orientation is done.
- On analytical stereoplotters, the orientation is read from the manufacturer's software and ground coordinates are displayed in the box



The **SUMMIT EVOLUTION** digital stereoplotter

The DAT/EM plotter client for some digital stereoplotters appears as an icon on the taskbar. This client is used for stereoplotters such as **SOCET SET** and **OrthoEngine Airphoto DEM** (**OEAD**).

How DAT/EM CAPTURE Affects the AutoCAD Environment

There are several differences between using AutoCAD with a standard 2D digitizer and using AutoCAD with DAT/EM CAPTURE. The most noticeable additions are as follows:

- With DAT/EM CAPTURE, there are two digitizers: the 2D mouse and the 3D stereoplotter. Read more about digitizer-related subjects in:

  "Hints for Seeing the Cursor in a New Drawing File" on page 14-3
  "Cursor Control with Mouse and Stereoplotter" on page 14-3
  "Z Indexing" on page 14-4

- The DAT/EM KEYPAD, P-series tablet menu, pull-down AutoCAD menu, and toolbar menus all contain many useful DAT/EM CAPTURE utilities and digitizing aids. Read more about the menus in:

  "Using the DAT/EM Menus" on page 14-7

"Customizing the DAT/EM KEYPAD" on page 15-3

- DAT/EM CAPTURE provides commands to quickly digitize streamed and point-to-point 2D and 3D polylines and block symbols. Read more about these digitizing commands in:

  "Digitizing Polylines with DAT/EM CAPTURE" on page 14-8
  "Digitizing Blocks with DAT/EM CAPTURE" on page 14-9
  Chapter 16, "DAT/EM CAPTURE Command Reference"

Hints for Seeing the Cursor in a New Drawing File

In a new drawing, the cursor does not immediately appear on the screen. The cursor position is in the model area, while the view displayed in the blank default drawing file shows some other coordinate range. When AutoCAD's view is set to fit around the model area, the cursor will appear.

Even if the cursor is not on the screen, objects can still be digitized at the correct locations. AutoCAD is constantly updated with the current stereoplotter location, whether or not the cursor is in the graphics view.

To display the model area, AutoCAD's **zoom** command is used. But using **zoom** alone would require a time-consuming entry of the model coordinates. The following are two faster methods to get the cursor into the graphics view:

1. **Showing the Cursor By Using Lc**

   The fastest way to digitize some objects and **zoom** to the model area is to insert the control points as symbols using the **lc** (Load Control) program. For instructions, see "Lc" on page 16-65.

2. **Showing the Cursor By Digitizing Model Corners**

   Another option is to digitize the model boundary. Select the Pline Point-to-Point keypad or menu item, or enter

   ```
   Command: pline
   ```

   Then move the stereoplotter to the model edges, pressing the digitizing button at each corner. After digitizing the last corner, use the **c** option to close the polyline. Then use **zoom** Extents to bring the new boundary into view. After **zoom extents**, perform a **zoom 0.8x** to give a view extending just outside the boundary.

After changing the view, it may be helpful to use **view s all** to save the whole model view.

Cursor Control with Mouse and Stereoplotter

The system mouse and the stereoplotter may be used interchangeably to move the cursor. Switching from one to the other is easy: just move the desired digitizer for it to obtain cursor control.

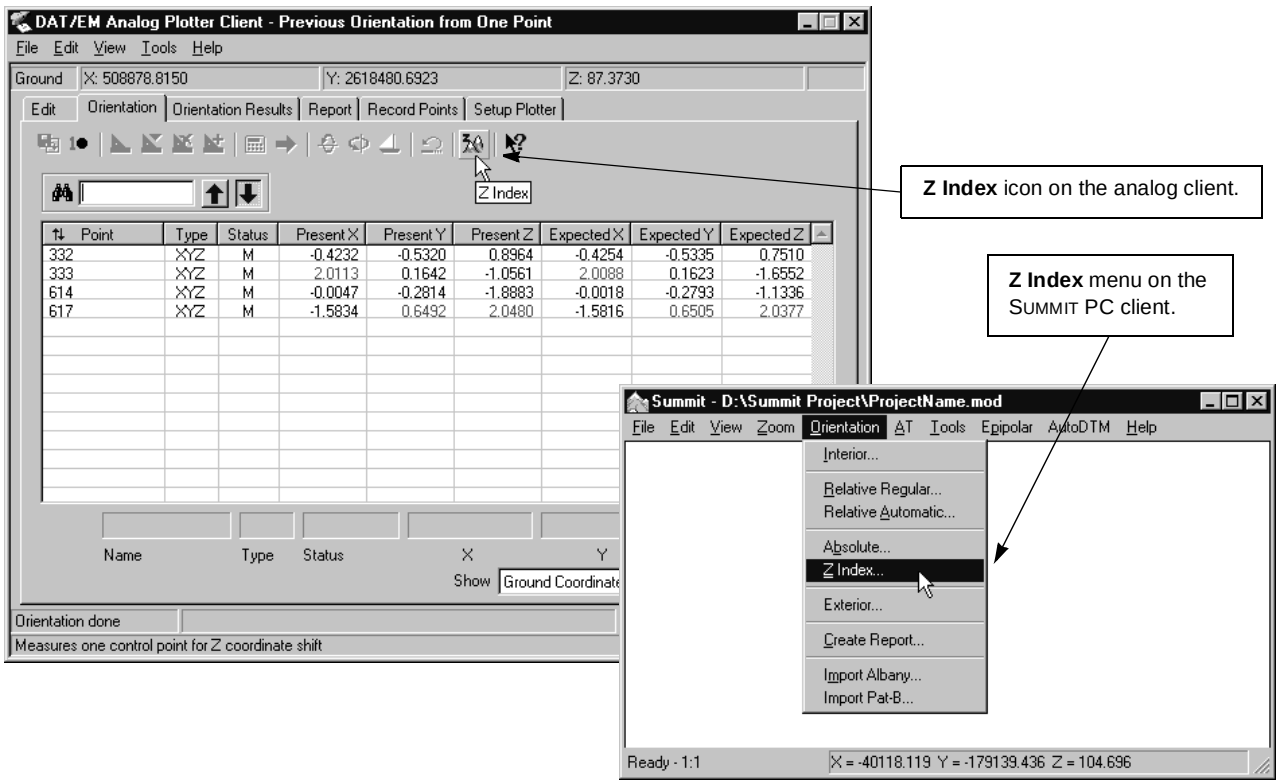
Keep in mind that only the stereoplotter can control the Z coordinate. The mouse is restricted to X and Y.

Z Indexing

A new Z index may be done at any time from the plotter client box. A Z index introduces a Z offset from the original Z that was set by the orientation measurements. Sometimes it is used when the stereoplotter operator changes, and the two operators have differences in determining when the floating mark is “on the ground.”

- Z indexing is not a completely accurate method of correcting for operator differences. It is always preferable to perform a complete absolute orientation.
- Z index should never be used for correction if the analog or analytical stereoplotter has been bumped or moved.
- DAT/EM includes Z index due to user demand. Z index is *reluctantly* included because of the possibility that the user might introduce a large offset error. Once the Z offset is used to digitize objects in AutoCAD, there is no way to tell which objects were digitized before or after the Z index.

The Z index option is activated differently depending on the plotter client. For example, it is activated from an icon on analog plotter client, but from a pull-down menu on the SUMMIT PC client:



Detailed information for performing a Z index with the analog stereoplotter is given in “Z Indexing” on page 12-37. For SUMMIT PC or SUMMIT EVOLUTION, refer to that product’s operation manual.

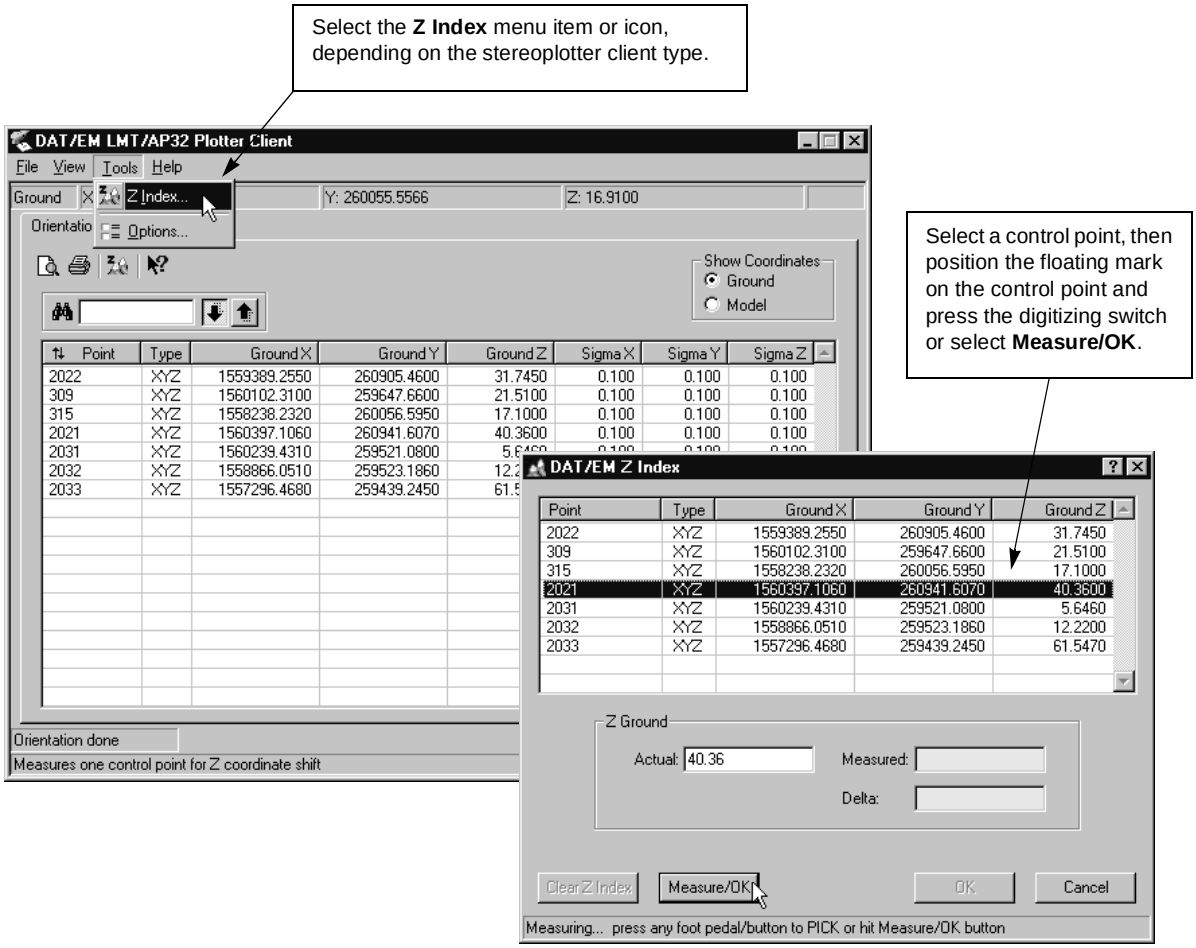
The following is an example of performing a Z index. Plotter client and dialog box appearance and the location of the Z index menu or icon varies with the type of stereoplotter:

Step 1) Select the **Z Index** menu item or icon.

Step 2) Select a control point from the list.

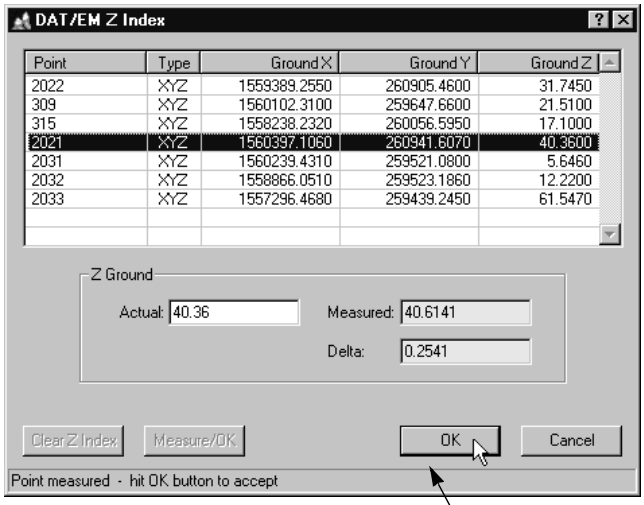
Step 3) Carefully position the floating mark on that control point.

Step 4) Either press the stereoplotter's digitizing switch or select **Measure/OK**.



Step 5) Review the offset that has been introduced by the Z index. *If accepted, every Z measurement from this time on will be offset by this number from the original Z calculated during orientation.*

Step 6) To accept the Z index offset, select **OK** to make it active. Or, to exit the dialog box without saving the Z index, select **Cancel**.



To save and activate the Z Index, select **OK**.

After the Z index is done on some stereoplotter clients, the current Z offset is displayed next to the mountain icon on the status bar:

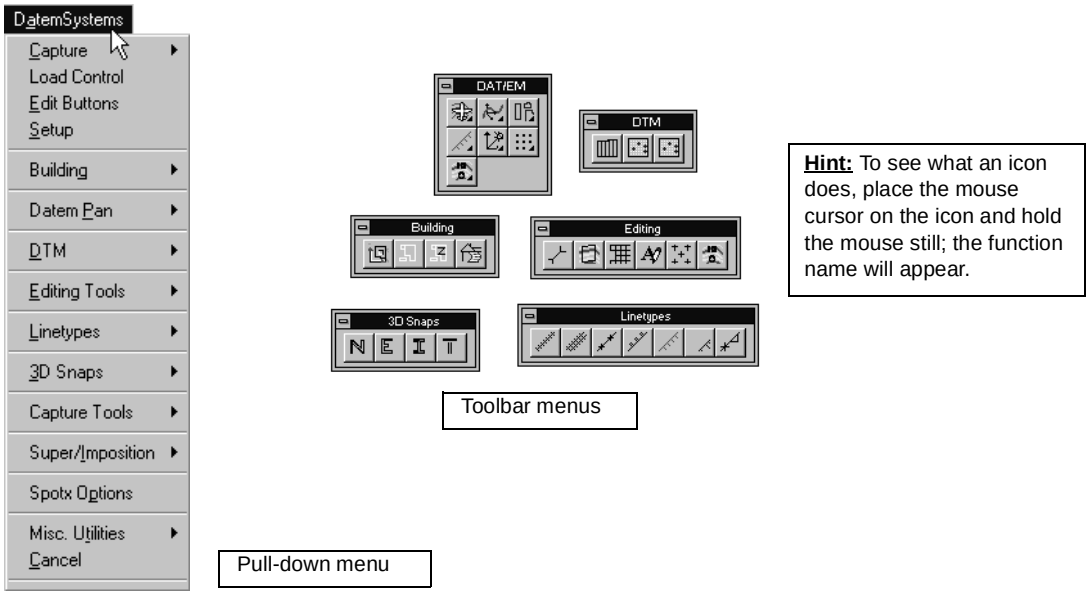
The Z offset is displayed on the status bar at the bottom of some plotter client boxes.

If desired, the z index may be removed again by selecting **Clear Z Index**. This button will only be available if a Z index is currently active.

Using the DAT/EM Menus

There are two kinds of AutoCAD menus provided with DAT/EM CAPTURE. Instructions for configuring AutoCAD to display them appear in *Chapter 5*.

There is a pull-down menu and a set of toolbar menus:



:

Most of the DAT/EM CAPTURE commands appear on the menus, as well as snap utilities and other tools. These commands are also available on the DAT/EM KEYPAD. The menus are provided as an alternate method of quickly starting DAT/EM CAPTURE commands.

Getting Started with DAT/EM CAPTURE Digitizing Commands

When digitizing, the user may use any of the commands that come with AutoCAD plus the specialized mapping-specific commands that come with DAT/EM CAPTURE.

For example, a building *could* be digitized by starting AutoCAD's **pline** command and digitizing each corner of the building, then entering the letter "C" to close the polyline. The result of this time-consuming **pline** command will be a building with sides that are not quite perpendicular. But DAT/EM CAPTURE offers several building commands that streamline the process, allow some corners to be calculated rather than digitized, square the building sides when necessary, and automatically close the polyline. There are even commands that streamline the process of digitizing a complex multi-level roof line.

Each of the DAT/EM CAPTURE commands is described in detail in *Chapter 16*. The most commonly-used DAT/EM CAPTURE commands are described below in this chapter:

- To digitize elevation contours and other point-to-point or streamed polylines, see "Digitizing Polylines with DAT/EM CAPTURE" on page 14-8.
- To digitize mapping symbols using blocks, see "Digitizing Blocks with DAT/EM CAPTURE" on page 14-9.

Digitizing Polylines with DAT/EM CAPTURE

The DAT/EM CAPTURE system uses polylines for drawing linear features. In AutoCAD, there are two types of polylines, two- and three-dimensional (2D and 3D).

Two-dimensional polylines are entities consisting of a connected sequence of line and/or arc segments. The 2D polyline takes on the elevation of the first vertex.

- Use AutoCAD's **pline** or DAT/EM's **autoarc2d** to digitize point-to-point 2D polylines.
- Use **capt2d** to digitize in stream mode, with the first vertex's elevation rounded off to the nearest contour interval. All the other vertices will remain set to this same elevation, even if the stereoplotter elevation is changed while digitizing. This command is most useful for digitizing elevation contours. See "Capt2d" on page 16-21.

Three-dimensional polylines are entities consisting of a connected sequence of line segments. Each vertex in a 3D polyline takes on the elevation of the digitizer (stereoplotter) at the time it was digitized.

- Use AutoCAD's **3dpoly** or DAT/EM's **autoarc3d** to digitize point-to-point 3D polylines.
- Use **capt3d** for stream mode digitizing. This command is very useful for digitizing features that vary in elevation such as streams and field boundaries. It is also used to digitize break lines for use with contour generation packages. See "Capt3d" on page 16-23.

See the following sections for more information on digitizing polylines:

Capt2d Stream Mode

Capt2d is a command that should be used when digitizing streamed curvilinear features with fixed elevations.

- **Capt2d** is primarily used to digitize **elevation contours**

The frequency of data points captured for the polyline is a function of the curvature angle and distance criteria input in the **setup** dialog box. See "Setup" on page 16-88.

When using **capt2d**, the elevation is automatically rounded to the nearest contour interval.

For instructions on using this command, see "Capt2d" on page 16-21.

Capt3d Stream Mode

Capt3d stream mode is similar to the **capt2d** mode, except the elevation is exact, not rounded. Each elevation value may be different along the feature. **Capt3d** may be used when digitizing streamed curvilinear features with varying elevations such as:

- Streams
- Fences
- Trails
- Break lines for later use with contour generation packages

The frequency of data points captured for the polyline is a function of the curvature angle and distance criteria input in the **setup** dialog box. See "Setup" on page 16-88.

For instructions on using this command, see “Capt3d” on page 16-23.

Digitizing Blocks with DAT/EM CAPTURE

Symbols are defined in AutoCAD as blocks, which are a set of individual entities grouped together into a compound object. Blocks can be made to represent standard features such as utility poles, swamp symbols, runway lights, control points, and mail boxes.

Typical block symbols which might be used are as follows:

ANTENNA	H-CONTROL	PHOTO-CNTR	SPOTX
CROSS	HV-CONTROL	POLE	TREE
FENCETIK	LIGHTP	POST	UTILITYP
GATE	MAIL-BOX	RLIGHT	V-CONTROL
GRID	MISC-OBJECT	ROCK	WINDSOCK
GUYANC	PASS-POINT	SIGN	SIGN

The default drawing file supplied with DAT/EM CAPTURE contains a set of blocks for mapping. Each of these blocks is matched to a key on the keypad overlay or menu diagram. The blocks and overlay can be customized for any mapping purposes. For instructions on customizing the default file blocks, see “New Block Symbols” on page 15-1.

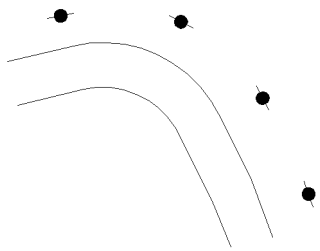
To place symbols with the One- or Two-Shot modes, perform the following steps:

Step 1) **Select a symbol key on the DAT/EM KEYPAD.** DAT/EM KEYPAD keys typically set a layer, use **-inssetup** to set the name of the block, and activate the **ins** command.

Step 2) **Digitize one or two points.** The first point specifies the block insertion point. For the **ins** Rotate, **ins** Scale, and **ins** All options, the second point specifies an angle, a scale factor, or both. (One-shot blocks are placed according to the active rotation angle and map scale/symbol factor set with the **setup** dialog box.)

Step 3) **Continue inserting blocks.** The **ins** command remains active until another command is used.

Example: A series of power poles is to be plotted with the symbol ticks parallel to a street. The size of the UTILITYP block is correct using the **setup** map and scale factors.



Step 1) **Select *Utility Pole* on the DAT/EM KEYPAD.** This sets the UTILITY layer, uses **-inssetup** to set the block name to UTILITYP, and activates **ins** Rotate.

Step 2) **Digitize a point at the base of a power pole.**

Step 3) **Move the stereoplotter parallel to the street and digitize a second point.** The UTILITYP block is inserted at the digitized angle.

Step 4) **Continue selecting pole bases and angles.** More UTILITYP symbols are inserted.

Step 5) **Select another command** to cancel the symbol insertion mode.

One-Shot Mode (-Inssetup O and Ins)

In One-Shot block insertion mode, the system will accept one digitized point at a time, with a beep sound each time the data switch is pressed. One-Shot is used especially for

- block placement
- spot elevation placement

To activate this mode, enter **-inssetup o**, then set the symbol name with the **ins** command:

```
Command: -inssetup
One/Rotate/Scale/All: o
Command: ins
Block name/? smalltree
```

Proceed to insert one or more blocks using the digitizing switch.

To set the block name and a layer for the block that is independent of the currently set AutoCAD layer, use the **inssetup** command instead of **-inssetup**. A dialog box allows all the settings to be made. However, when activating the command from the keypad, the **-inssetup** command should be used to avoid the dialog box.

Many of the symbol insertion keys on the keypad overlay or menu diagram activate the One-Shot mode and **ins**.

Two-Shot Mode (-Inssetup Rotate, Scale, and All)

This mode is similar to One-Shot mode, but the system will accept *two* digitized points at a time. Two-Shot mode is used especially for:

- block placement with rotation angle specified
- block placement with scale specified
- block placement with both angle and scale specified

To set this mode, enter **-inssetup**, select **Rotate**, **Scale**, or **All**, then set the symbol name with the **ins** command. For example:

```
Command: -inssetup
One/Rotate/Scale/All: r
Command: ins
Block name/? smalltree
```

Proceed to insert one or more blocks using the digitizing switch. The first digitized point will be the block insertion point, the second point will define the rotation angle, scale, or both.

To set the block name and a layer for the block that is independent of the currently set AutoCAD layer, use the **inssetup** command instead of **-inssetup**. A dialog box allows all the settings to be made. However, when activating the command from the keypad, the **-inssetup** command should be used to avoid the dialog box.

Some of the symbol insertion keys on the keypad overlay or menu diagram set the Two-Shot mode.

Regulating Block and Text Size

Many of the DAT/EM CAPTURE commands automatically insert blocks and text into the drawing. These commands must tell AutoCAD the block insertion size and the text size.

These routines use three variables to determine the size of text and blocks:

- Map scale
- Block scale factor
- Text scale factor

These variables appear in the DAT/EM Mapping Parameters dialog box, which may be activated with the **setup** command. (See "Setup" on page 16-88.)

Because the software is inserting the blocks using a scale factor, blocks should be created at a size of one ground unit in the template drawing file. (See "New Block Symbols" on page 15-1.)

AutoCAD Commands that are Useful for Mapping Projects

While digitizing and editing a map, all of AutoCAD's commands are available. AutoCAD has many commands, some of which will never be used in mapping projects. Other commands will be used extensively.

The following is a brief list of the most commonly used AutoCAD commands for mapping projects. The user is encouraged to review them in the *AutoCAD Reference Manual* or the AutoCAD on-line help.

3dpoly	**extent**	**pan**	**undo**
array	**insert**	**pedit**	**view**
audit	**layer**	**pline**	**wblock**
block	**list**[a]	**purge**	**window**
change	**mirror**	**save**	**xref**
copy	**move**	**text**	**zoom**
erase	**offset**	**trim**	

The cancel function in AutoCAD is **<Esc>**.

a. Consider using DAT/EM CAPTURE'S **autolist.arx** instead of **list**.

Some AutoCAD commands have a direct application to mapping projects. Read more about them in:

- "Using Layers to Separate Data" on page 14-12
- "Referencing Edge Ties" on page 14-12
- "Editing the Drawing File" on page 14-13
- "Drawing Output" on page 14-13

Using Layers to Separate Data

The concept of AutoCAD layers is similar to that of transparent overlays used in drafting applications. Within AutoCAD, any number of layers may be defined, each containing a different type of information. Colors and linetypes can be assigned to each layer.

Please read the AutoCAD documentation regarding layers.

Each different type of feature in a mapping project should be digitized on a unique layer. For example, place all paved roads on the ROAD-PAVED layer, and all unpaved roads on the ROAD-UNPAVED layer. Then when it comes time to extract information about one type of feature, it is very easy to freeze all layers except the layer in question.

A default **acad.dwt** drawing template file is supplied with DAT/EM CAPTURE. It contains a layer scheme for mapping. This scheme may be modified to suit the project. When making a layer scheme, try to make it detailed and flexible enough that it may be used on almost any type of project. Everyone concerned, including the map compiler, the editor, and the client will appreciate a consistent layering method.

Once the layer scheme is established, the layers should be added to the keypad overlay or menu diagram by programming the **.kds** file. The keypad overlay or menu diagram that comes with DAT/EM CAPTURE already has the layer items matched to the DAT/EM CAPTURE **acad.dwt** layer definitions.

When digitizing a feature, always set the layer first by selecting the layer name on the keypad or menu.

Referencing Edge Ties

When digitizing a model, it is useful to see what was digitized in the adjoining model, and be able to snap the new contours to the ones from the edge of the old file. The newer AutoCAD releases make this easy with reference files and the **xref** command. Please review the **xref** command in the *AutoCAD Reference Manual*.

Use the AutoCAD **xref attach** command to display a tie file in the current drawing:

```
Command: XREF
?/Bind/Detach/Path/Reload/Overlay/<Attach>: A
```

A dialog box appears to help select a file. Enter the insertion point, scales, and rotation angles. Always insert the tie at the origin, (0,0,0), and keep the original scale and rotation:

```
Insertion point: 0,0,0
X scale factor <1> / Corner / XYZ:<Enter>
Y scale factor (default=X):<Enter>
Rotation angle <0>:0
```

Objects in the original file may be snapped to objects in the referenced file.

When finished using the reference file, use **xref d** to detach it.

Editing the Drawing File

Editing the drawing file after all features have been digitized is a very important step. The editor's task is to verify the data, join models together, break the project into map sheets, and add any additional textual or legend information.

The stereoplotter station can be used for editing if necessary; however, since compilation time and editing time often vary, and users sometimes want a more powerful computer for editing, it is more efficient to have a separate AutoCAD editing station. A commonly available tablet digitizer with a 16-button cursor is also a great editing help.

- The **MAP/EDITOR**, is a set of editing tools provided with DAT/EM CAPTURE.
- The **autolist.arx** utility speeds up getting information about objects. See page 16-16.
- The **edbox** command helps keep track of edited areas of a drawing. See "Edbox" on page 16-46.

All the AutoCAD commands may also be used for editing. Some of the most useful commands are:

- **change**
- **ddlmodes**
- **list**
- **layer**
- **pedit**
- **purge**
- **xref**

Please review these commands in the *AutoCAD Reference Manual* or in AutoCAD's on-line help.

Drawing Output

Any ACAD drawing digitized using DAT/EM CAPTURE may be plotted like any other ACAD drawing. Refer to the AutoCAD documentation to become familiar with AutoCAD's plotting software.

The **xyzout** command may be used to create ASCII files. The user is able to specify the output file format and the objects that should be exported. For instructions on exporting objects with **xyzout**, please see "Xyzout" on page 16-108.

For those customers who have purchased INPHO GmbH's SCOP library, DAT/EM CAPTURE's **morphout** command is available to write morphological data from the AutoCAD file to an INPHO **.wnp** file. See *Chapter 17*.

GIS Data Preparation Manual

Introduction of Arc/Info 8

Pasco Corporation

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1 Welcome to Arc/Info 8

ESRI Arc/Info 8 software is consisted of the three desktop applications - ArcCatalog, ArcMap and ArcToolbox.

ArcCatalog is the tool such as Microsoft Explorer for browsing, organizing and documenting organization's GIS data holdings. ArcMap is the tool for creating, viewing, querying, editing, composing and publishing maps. ArcToolbox is a set of the same geo-processing tools as Workstation Arc/Info tools in a handy toolbox.

This appendix is intended to show you a first step of Arc/Info 8. You will be able to understand the basic functions of ArcCatalog and ArcMap. After leaning this appendix, you can also use the other books that come with Arc/Info 8 to learn more.