

Getting Started with *ORTHO32*

Introduction

Rectification is the process of creating a new image file free of the terrain relief and camera tilt distortions found in the original image. *ORTHO32* is a Windows (95, 98x, NT, 2000 and XP) image rectification program which reads and writes JPEG and Windows Bitmap (BMP) files with a colour resolution of 24-bits.

Rectification always involves the following input items:

- A JPEG or BMP image - derived from a scanned aerial photograph or one taken with a digital camera and converted to JPEG or BMP.
- Ground control points - a minimum of four X + Y [+ Z optional] points per photo.

If you wish to remove ground height distortions you must also input:

- Camera details - focal length and either fiducial mark coordinates (for a film camera) or array dimensions of a digital camera. Radial lens distortion is optional for both types of camera.
- A digital description of the terrain - in the form of either a Digital Elevation Model (DEM) or Digital Terrain Model (DTM). These terms are often used interchangeably but have different meanings in the *ORTHO32* system as seen in Help on the form which appears when you click the "Terrain Model" button on the main menu.

Output from the process is a rectified image (JPEG or BMP) known as an orthoimage, plus those geo-referencing files you choose to output. Geo-referencing files are written to the same path as the rectified image and allow a GIS or CAD program such as *ArcView* or *Mapinfo* to automatically register the rectified image produced by *ORTHO32*.

ORTHO32 includes a Help system based upon ASCII files which may be viewed within the system whenever you see a "Help" button.

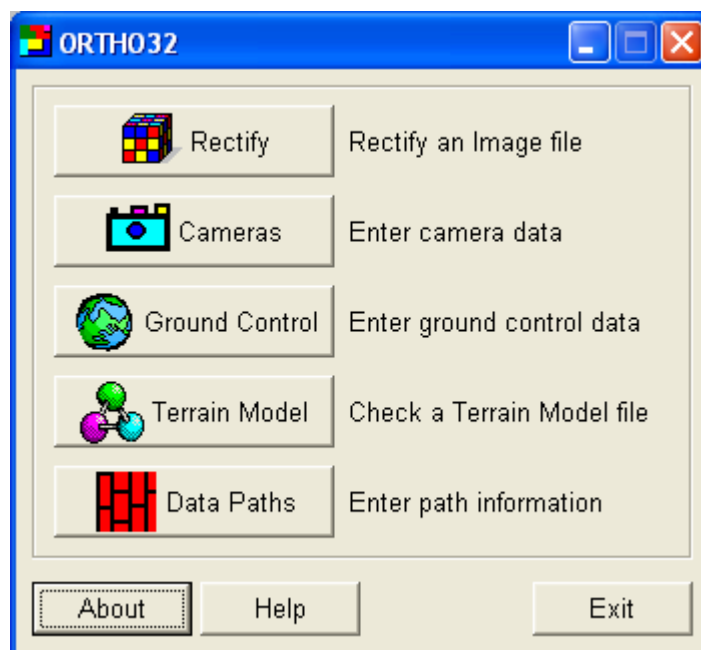


Figure 1 Main Menu

Installing and Removing *ORTHO32*

Go to <http://www.digmapsys.com/ortho32.htm> and download *InstallORTHO32.EXE*. We use the *Vet Anti-Virus software* from *Computer Associates* and keep our virus updates current. We guarantee that our downloads are virus-free.

Run *InstallORTHO32.EXE* and an installation wizard will lead you through a conventional installation process.

To remove *ORTHO32* go to the Control Panel, find Add/Remove Programs, highlight *ORTHO32* and click the "Add/Remove" button.

Registering *ORTHO32*

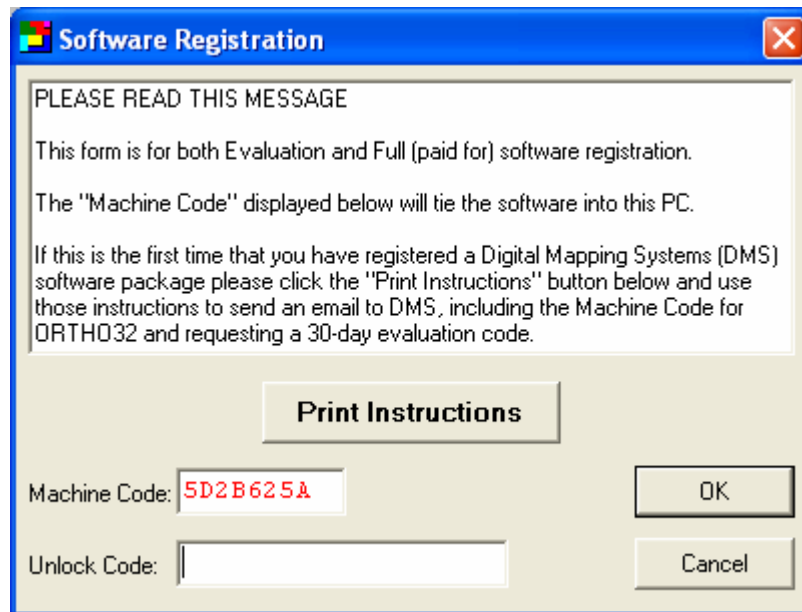


Figure 2 Software Registration Form

Run *ORTHO32.EXE* and if it isn't registered a form like Figure 2 will appear. The Machine Code shown on the form above and in the printed instructions below is specific to one PC only, which is the PC on which the software has been installed. If you click the "Print Instructions" button text similar to that shown in Figure 3 will be printed.

```
How to Register ORTHO32 for a 30-day evaluation.
=====

NOTE: The Machine Code and the Unlock Code are constructed from a limited
range of characters including the numbers 0 to 9 and the alpha
characters A to F. We mention this so that you do not send us a code
containing invalid characters.

Getting a Test Code
=====
(a) Start your email program (for example Outlook or Eudora),
(b) Begin a new message,
(c) In the TO: field enter "sales@digmapsys.com" without the quotes,
(d) In the SUBJECT: field enter "ORTHO32 test code" without the quotes,
(e) In the message body enter "5D2B625A" without the quotes,
(f) Add your name and contact details (usually by adding a signature file),
(g) Send the new email,
(h) Click the "Cancel" button on the registration form to close down ORTHO32,
(i) Wait until your email reply is received.
```

Figure 3 Sample Software Registration Instructions

```

Unlocking ORTHO32 after you receive your Test Code via Email
=====
(a) Run ORTHO32 again (double-click on the icon),
(b) You will be taken straight to the Software Registration form,
(c) Enter the Unlock Code supplied to you in the email,
(d) Click the "OK button and you will be taken into ORTHO32.

HINT: You can Cut and Paste items to and from the Windows Clipboard and this
      can be very useful when transferring the Unlock Code from your email
      to this program. If you highlight the Unlock Code and press Ctrl-C
      the highlighted text will be Copied to the Clipboard. After running
      ORTHO32 again you can click in the Unlock Code field and press Ctrl-V
      to Paste the text from the Clipboard.

End of document.

```

Figure 3 Sample Software Registration Instructions (continued)

An evaluation system can be converted to a fully paid system by deleting the file **ORTHO32.INI** (in the same folder as **ORTHO32.EXE**), running the program again, sending off your Machine Code and receiving back a different unlock code. In this way you don't lose any data setup during the evaluation period.

Data Paths

ORTHO32 reads and writes its data from pre-defined data paths which can be changed at any time by clicking the "Data Paths" button on the Main Menu.

Figure 4 Data Paths Form

If you find that drop-down lists on the form which appears after you click the "Rectify" button on the Main Menu are empty, that will be because you have not correctly defined the data paths.

Entering Camera Data

When you click the “Cameras” button on the Main Menu you will be asked to enter a new file name or to select an existing camera file for editing. In this example a new camera name is entered (Figure 5).

Cameras are automatically assigned the file extension **.CAM**

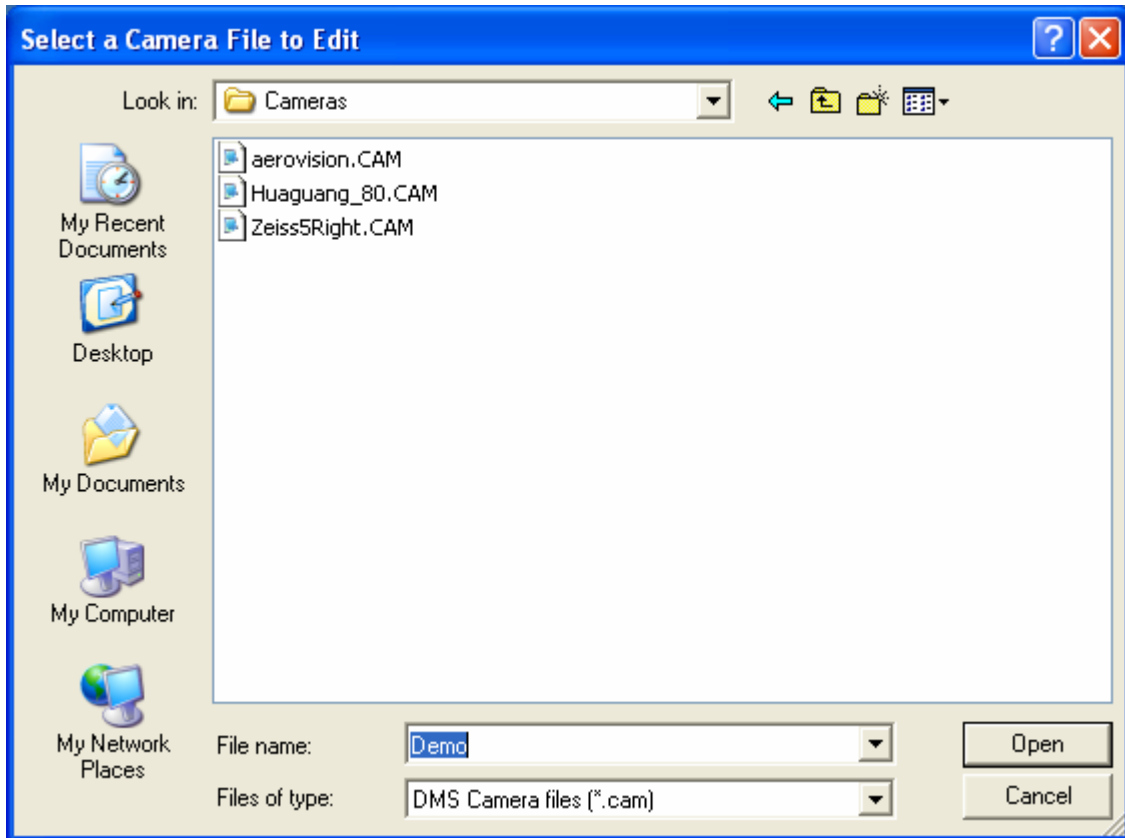


Figure 5 Entering a Camera Name

A data entry form (Figure 6) will then appear. The form which appears will differ depending upon whether you define the camera as a film or a digital type.

Camera Data Entry

Description:

Camera Type: Entered data must be in the same units for this camera.

Distance Units:

Focal Length: mm

Number Fiducial Marks:

FID #	X-coord	Y-coord
1	-106.000	106.000
2	106.000	106.000
3	106.000	-106.000
4	-106.000	-106.000

NOTE: Radial Lens Distortion is zero by default

Figure 6 Film Camera Data Entry

If you have Radial Lens Distortion data to enter, click the “Enter Radial Lens Distortion data” button on the form.

Entering Ground Control Data

You will be asked for a file name. Enter a new or existing file. The software will automatically assign the file extension **.GCF** to the file name. After selecting a file name you see a free-format data entry form similar to that shown in Figure 7 below.

C:\PROJECTSWORTH032\GroundControl\mackeyspeak.GCF

PARKS_NW	634192.3	5888044.5	100.0
PARKS_NE	634213.2	5888038.8	100.0
PARKS_SW	634208.7	5887971.0	100.0
PARKS_SE	634232.6	5887970.0	100.0
AERO_SW	634204.0	5887970.0	100.0
AERO_SE	634223.0	5887969.0	100.0
AERO_NW	634189.0	5888046.0	100.0
AERO_NE	634205.0	5888037.0	100.0

OK Cancel Help

Figure 7 Entry of Ground Control Data

Click the "OK" button to quit the data entry and save data to the file nominated when you started. Clicking the "Cancel" button will close the form without data being saved.

Entering Digital Elevation Model Data

Refer to Help after clicking the “Terrain Model” button on the Main Menu (Figure 1).

You must have already constructed an ASCII **.DEM** or **.DTM** file according to the Help file. A portion of a simple .DEM file is shown below in Figure 8 which illustrates that each line has coordinate values in order X, Y and Z and the values are separated by:

- one or more spaces or
- commas or
- tabs

```
561800.0 5801540.0 17.66
561820.0 5801540.0 17.59
561780.0 5801560.0 17.71
. . . . .
. . . . .
561840.0 5801560.0 17.79
561760.0 5801580.0 17.67
561780.0 5801580.0 17.74
561800.0 5801580.0 17.84
```

Figure 8 Portion of an ASCII DEM file

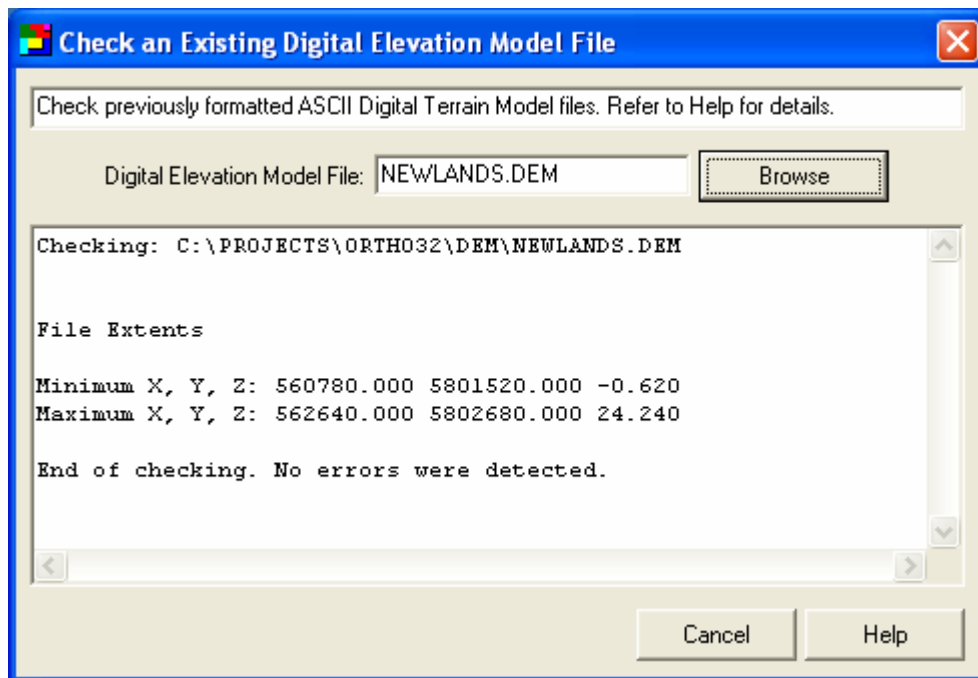


Figure 9 Checking a Pre-formatted ASCII **.DEM** or **.DTM** File

When a file is selected using the “Browse” button the file’s internal structure is checked and if no errors are found the data limits (minimum and maximum X, Y and Z) are displayed as shown in Figure 9.

If cameras, ground control points and an elevation model have been defined you can proceed to rectification of an image as described next.

Rectification of an Image

Click the “Rectify” button on the Main Menu (Figure 1) to see the data entry form of Figure 10.

The screenshot shows the "Data for Rectification" dialog box. It is titled "Data for Rectification" and has a close button in the top right corner. The dialog is organized into several sections:

- Images:** Input: Newlands.BMP, Output: Newlands_Rect.BMP
- Camera:** File Name: Zeiss5Right.CAM
- Digital Elevation Model:** File Name: NEWLANDS.DEM
- Ground Control:** File Name: NEWLANDS.GCF. Below this are two lists: "All Control Points" (11, 14, 16, 9, EXTRA) and "Selected Control Points" (11, 14, 16, 9). There are arrows between the lists to move points.
- Type of Orientation:** Radio buttons for "NORMAL manual with DEM" (selected), "EXTERNAL data with DEM", and "FLAT TERRAIN manual without DEM".
- Output Options:** Checkboxes for "Write ArcView geo-reference file", "Write MapInfo geo-reference file" (checked), "Write ER-Mapper geo-reference file", "Write Pathfinder geo-reference file", "Process rectification in Batch mode", and "DEM points at image extents". A "Background color" field shows a green swatch.

At the bottom of the dialog are three buttons: "OK", "Cancel", and "Help".

Figure 10 Rectification Data Entry Form

Notes:

- Drop-down lists will be populated with data from paths defined as in Figure 4.
- The Output image name is automatically generated but can be changed to whatever you wish.
- The Type of Orientation is, by default, **NORMAL manual with DEM**. If you choose the **FLAT TERRAIN manual without DEM** type of orientation the Camera and Digital Elevation Model panels will disappear.
- When you have selected a Ground Control File Name the list of All Control Points will be populated. To add ground control points to the Selected Control Points list double-click on the point in the left-hand list to highlight the point and click on the “>” button.
- The “<” button lets you highlight selected points and remove them from the selected list.

To proceed with a normal manual rectification you should click the “OK” button. If the camera is digital you will measure only ground control points. If the camera is a film type you will first digitize fiducial marks and then ground control points. Figure 11 shows the form which allows you to digitize fiducial marks and ground control.

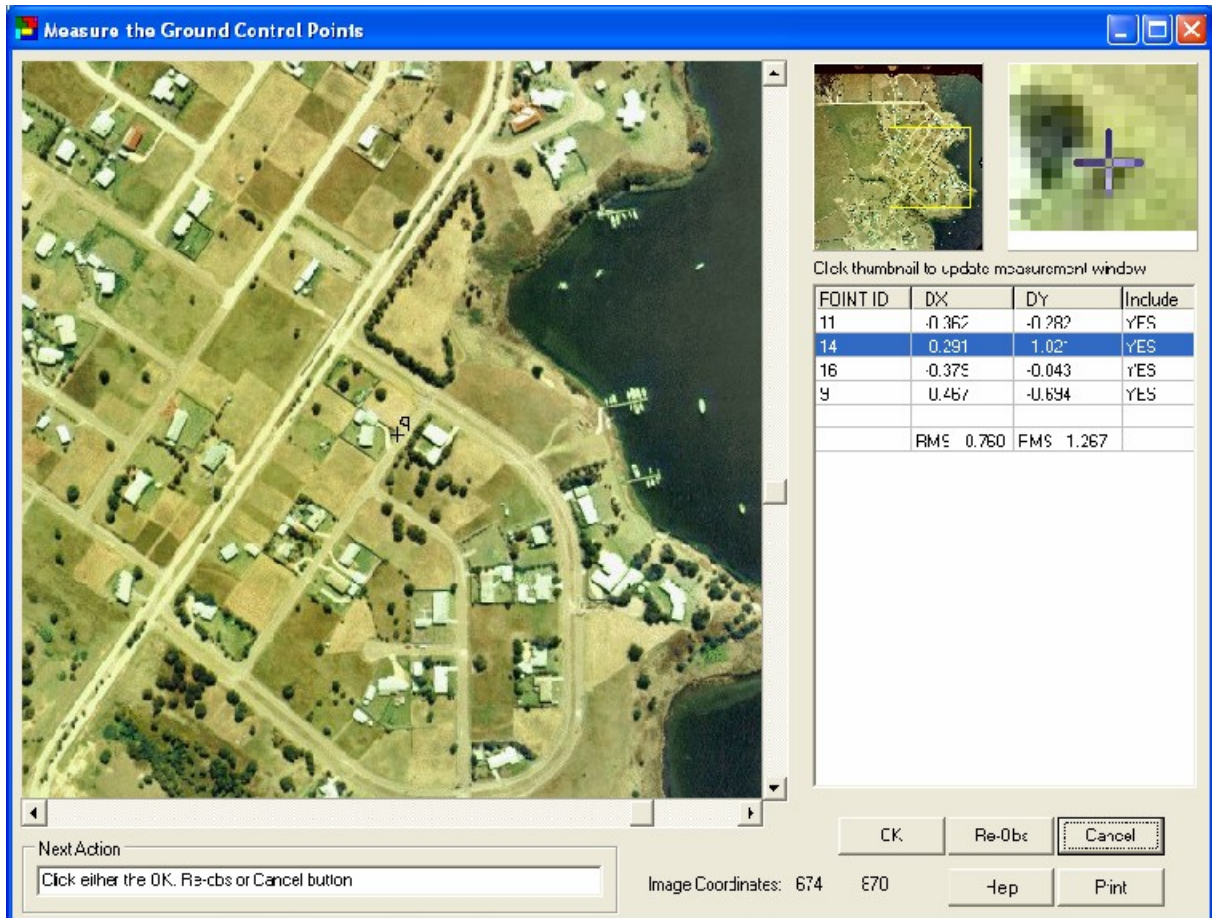


Figure 11 Measurement Form for Fiducial Marks and Ground Control Points

Notes:

- You are always prompted in the “Next Action” field as to what is expected next.
- By clicking on the thumbnail you will update the main measurement window to be centered on the chosen point.
- The zoom window shows an enlargement around the cursor.
- You must manually move to the first two fiducial marks or ground control points but afterwards the system will take you to the approximate location of the next point.
- The DX and DY residuals are explained if you click the “Help” button.
- To re-observe a point first highlight the POINT ID (point 14 is highlighted above) and click the “Re-Obs” button.
- The “Print” button will become active after the last ground control point is measured. This will allow you to see the results of the orientation and print them out if you wish, as shown in Figure 12.

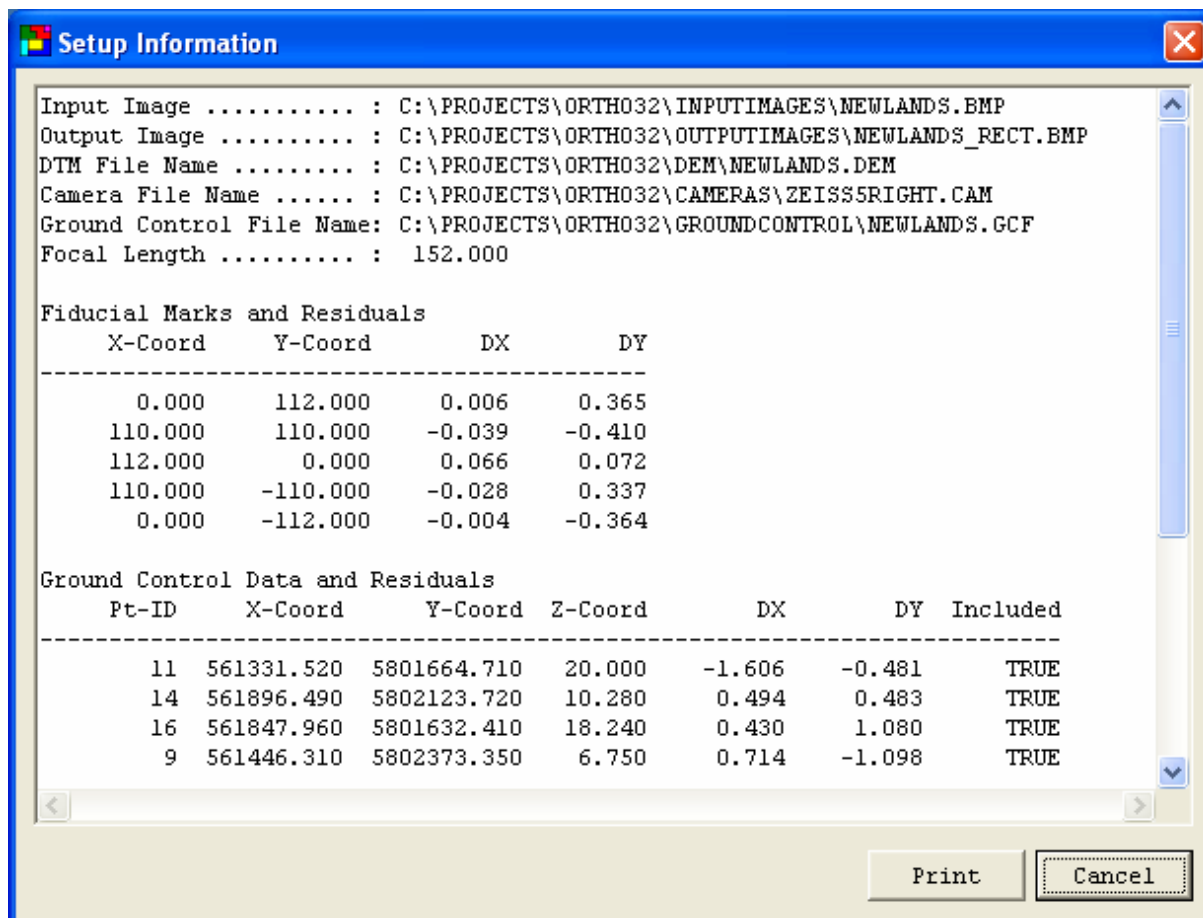


Figure 12 Results of the setup of an image

After accepting the setup by clicking the “OK” button in Figure 11, the rectification will proceed.

You will be asked whether you want to accept the calculated extents or enter your own extents, as shown in Figure 13.

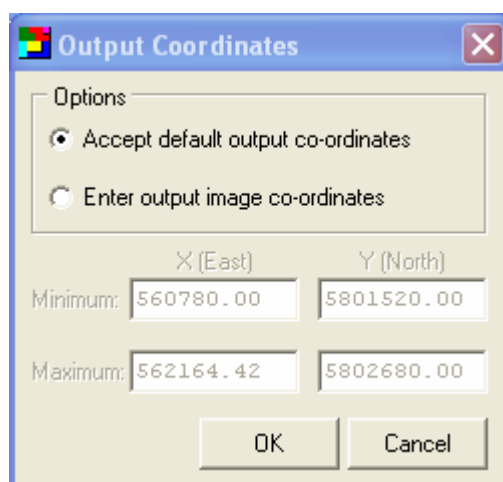


Figure 13 Selection of Extents

The rectification will then proceed to its conclusion, showing progress as in Figures 14 and 15.

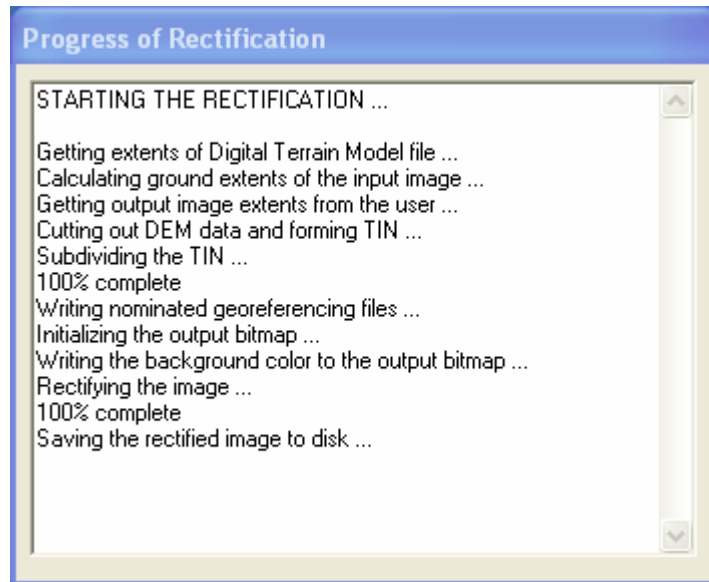


Figure 14 The Rectification Progress



Figure 15 The Completion Message

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