

User manual JPR for CH (Swiss) tiles (J4CHT.exe)

JPR for NL (Dutch) tiles (J4NLT.exe)

JPR for GB (Great Britain) tiles (J4GBT.exe)

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Introduction

Some words in advance

Building a GPS related application is the cross pollination of two of my hobbies, Maps/GPS and building Visual Basic applications. This applications is about geo-referencing self-created raster-maps¹. Several applications, for instance Memory-Maps®, FUGAWI®, PathAway® and OZI® uses reference files, the first three uses JPR-files and OZI® use MAP-files². As a user of Memory-Maps® I concentrated on referencing with JPR-files. The specifications for these files you will find on the website of FUGAWI®³.

Geo-referencing can be a time-consuming and painstaking procedure. For every self-created map you must find at least three significant apparent points⁴ on your map and their geographical coordinates. In some cases automation of the process is possible. The main condition is a coordinate-grid on your map. I wrote the application in three versions, one for Swiss-maps (J4CHT.exe), one for Dutch-maps (J4NLT.exe) and one for British-maps (J4GBT.exe). My choice was based on my countries of interest and open-information about the specific geographical-grid.

Behind the curtains

The core step in the applications are some mathematical approximate calculations, which I found on the internet. These calculations convert native coordinates to geographical coordinates in latitude and longitude (WGS84).

The Swiss version (J4CHT.exe) of the application is based on the document “Approximate solution for the transformation CH1903 ⇔ WGS84” published by “Bundesamt für Landestopografie swisstopo” in October 2005. The precision of the used approximate formulas is better than 4 metres. If you accept the fact that your position maybe 2 pixels off grid⁵ you can use the application for maps with a scale 1:20000 or smaller (1:25000, 1:50000, etcetera).

The Dutch version (J4NLT.exe) is based on the information I found in the forum “GEOCHACHING.NL”⁶ (with regards to “DeBruineBeren”). The precision is described as “For normal use”. My interpretation: then application useful for scales 1:25000 or smaller.

The British version (J4GBT.exe) is based on the formula's in the document “A guide to coordinate systems in Great Britain D00659 v2.1 Dec 2010” and the VBA-code in the corresponding spreadsheet “projection-and-transformation-calculations.xls”, both issued by Ordnance Survey. The precision of the used approximate formulas is better than 5 metres. If you accept the fact that your position maybe 2 pixels off grid⁷ you can use the application for maps with a scale 1:25000 or smaller.

(Be aware of the accuracy of your GPS. According to “Wikipedia” (English version) between 3 and 5 meter. If you accept the fact that your position maybe 2 pixels of grid⁸ you can use the application for maps with a scale 1:25000 or smaller. Worst case scenario: 2 pixels for the map and 2 pixels for the GPS is 4 pixels. This means 10 meter off grid).

¹ Maps based on pixels, not on vectors.

² Conversion from JPR-file to MAP-files is possible. Have a look on the website of OZI®.

³ Or just Google® “FUGAWI” and “JPR”.

⁴ J4CHT.exe, J4NLT.exe and J4GBT.exe uses 4 reference points

⁵ Based on 254 Dot per inch/500 dot per kilometer.

⁶ <http://forum.geocaching.nl/index.php?showtopic=7886>

⁷ Based on 254 Dot per inch/400 dot per kilometer.

⁸ Based on 254 Dot per inch/400 dot per kilometer.

About this manual

This manual is telling the mainstream story and uses the Swiss version. It doesn't tell all the small details; the application has tooltips and warnings in place at the crucial moments/places. It doesn't include the format details for the calibration process. Please look these details up on the websites of Memory-Maps®, FUGAWI®, PathAway® and/or OZI®.

Some definitions

Picture: Image-file representing the map in raster format⁹.

Picture X coordinate: amount of pixels from left to right.

Picture Y coordinate: amount of pixels from top to bottom.

Map: Original map.

Map X coordinate: Easting/X coordinate in the native grid.

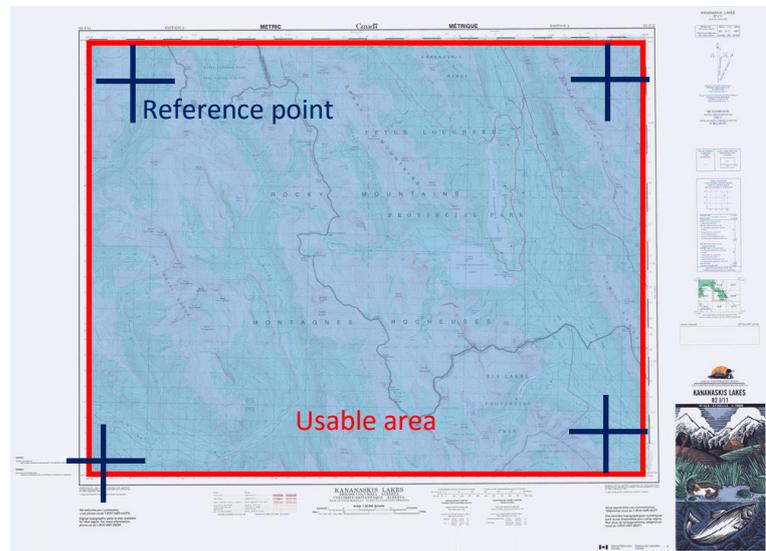
Map Y coordinate: Northing/Y coordinate in the native grid.

Reference point: Point on the map/picture with a known map and picture coordinates.

Map tile: Picture-file with corresponding reference file (JPR).

Usable area: Part of the picture containing map information.

Calibration data: calculated latitude and longitude data for the reference points.



The optimal use of the applications

In the image above reference points, border usable area and picture border differs. The applications are optimized for the situation where picture and usable area border matches and the reference points represents the corners of these borders.

Disclaimer

This application is provided "as is". The use of the application is on your own risk. Direct or indirect damage by using this application is users responsibility, not the application-builders. Redistribution by a third party (commercial or non-commercial) is prohibited. Download the application direct from www.hzns.nl.

⁹ In JPG-, PNG- or TIF-format

Running the application step by step

Step 0, Installing and opening the program

Installing the application is quite simple. Just download J4CHT.zip from www.hzns.nl, unpack the ZIP-file, run setup.exe and follow the setup-instructions.

Step 1, Selecting a file (Picture-file)

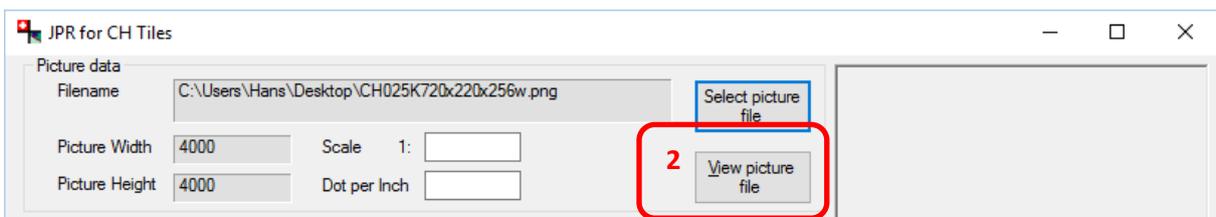
The first step is selecting your picture-file. By clicking the “Select picture file”-button you can select your picture-file. The select-options are limited to the JPG, TIF or PNG file-format.



If your picture has a colour depth more than 256 colours (8-bit), you will get a warning, but it doesn't stop the procedure.

Step 2, Viewing the map tile

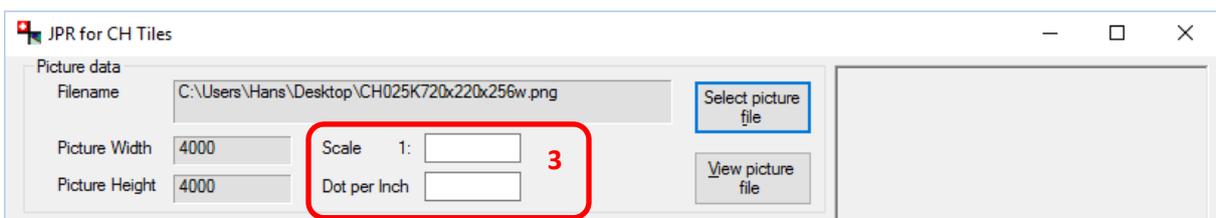
If you like to check the selected map, use the “View Picture-file”-button.



If the file is too large the application may crash.

Step 3, Adding data

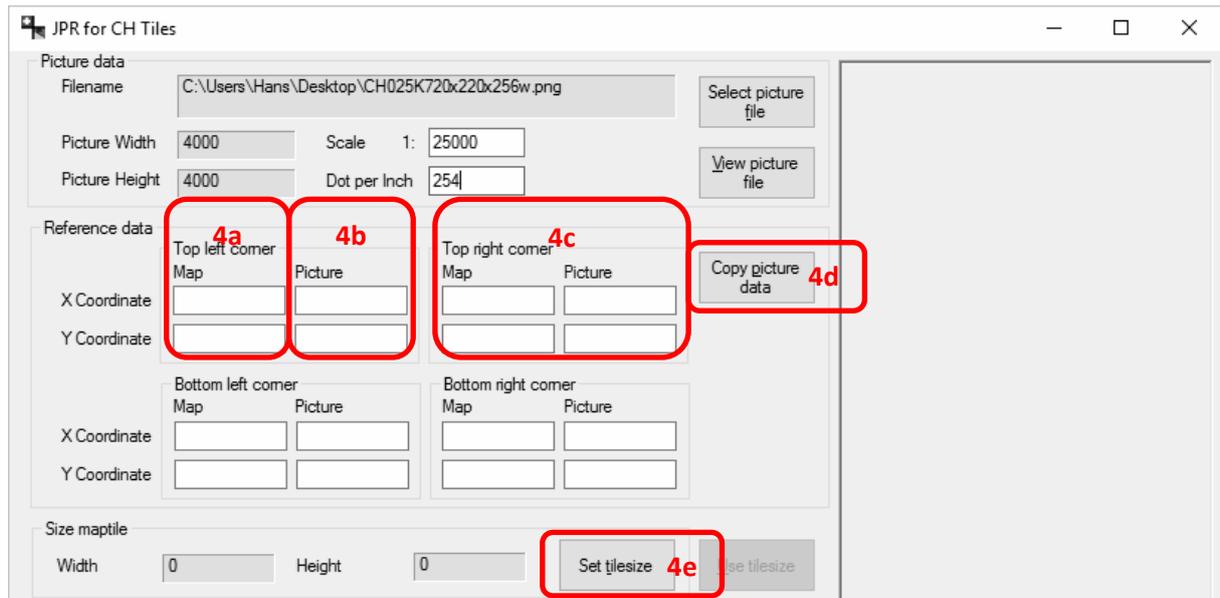
The next step is inserting the scale factor and the resolution in Dot per inch



Step 4, Putting reference data in place

Reference data means linking a specific pixel in the picture to the referencing Swiss grid coordinate. The application needs four reference points. In each corner one. Not necessarily exact the corner, but if so, it is convenient.

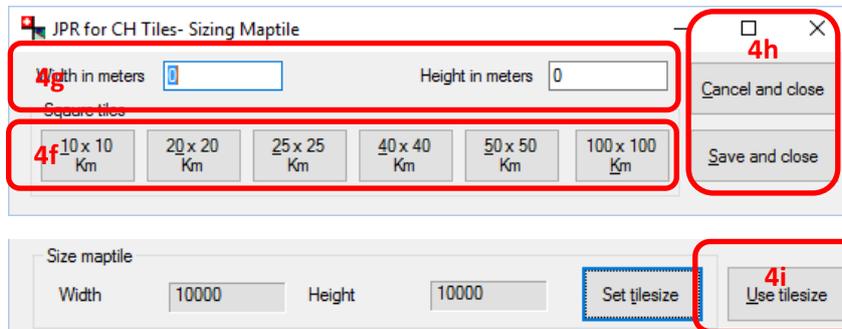
There two different options to inserting the reference data. The first is inserting all information “by



hand”; the second is using some automation. This last option is only possible if the exact “real” corners are used. If In both cases you must insert the X and Y coordinate (easting and northing) of the top left corner (4a) from the map.

In the “by hand” option you continue with inserting the X and Y coordinate from the picture¹⁰ of the same corner (4b). And after that continue with the other corners (4c).

In the “automated” option you continue after (4a) with clicking the “Copy picture data”-button (4d). Based on the size of the picture all picture corner data will be inserted. Before you can use the “automation” for the map coordinates the size of the map(tile) must be defined. By clicking the “Set tilesize”-button the following windows opens. You can use pre-defined tiles (4f) of define your own



tile (4g). Next is saving size data and closing the window (click on “save and close”-button) of cancel the procedure (click on “Cancel and close”-button) (4h).

Last action using this tile size by clicking on the “Use tile size”-button (4i).

¹⁰ “Real” Origin is the top left corner from the picture, the X coordinate is the amount of pixels/dots to the right, the Y coordinate is the amount of pixels/dots down.

Step 5, Putting useable area border in place

The usable area is the part of the picture you will use for your map. There are three different options.

The screenshot shows the 'JPR for CH Tiles' software window. It contains several sections for configuring map tiles:

- Picture data:** Includes fields for 'Filename' (C:\Users\Hans\Desktop\CH025K720x220x256w.png), 'Picture Width' (4000), 'Picture Height' (4000), 'Scale' (1: 25000), and 'Dot per Inch' (254). Buttons for 'Select picture file' and 'View picture file' are present.
- Reference data:** Contains four corner coordinate tables. Each table has 'Map' and 'Picture' columns. The 'Top left corner' and 'Bottom left corner' tables have '0' in the 'Picture' column. The 'Top right corner' and 'Bottom right corner' tables have '3999' in the 'Picture' column. A 'Copy picture data' button is located to the right.
- Size maptile:** Includes 'Width' (10000) and 'Height' (10000) fields, with 'Set tilesize' and 'Use tilesize' buttons.
- Border useable area:** A table with columns for 'Comer', 'Top left', 'Top right', 'Bottom left', and 'Bottom right'. It has rows for 'X Coordinate' and 'Y Coordinate'. The values are: X (0, 3999, 0, 3999) and Y (0, 0, 3999, 3999). A red box labeled '5a' highlights the 'X Coordinate' row. To the right are two buttons: 'Copy form reference' (labeled '5c') and 'Copy from picture data' (labeled '5b').

The first option is inserting the data “by hand” (5a). You can also chose the outline of picture, just by clicking on the “Copy from picture data”-button (5b). The last option is using the area between the reference points (click on the “Copy form reference”-button (5c).).

Step 6, Calculating the calibration data

This is the magic step. The math takes over and calculates the latitude and longitude (in WGS84) for

The screenshot shows the 'JPR for CH Tiles' application window. It has a title bar with standard window controls. The main area is divided into several sections:

- Picture data:** Includes a 'Filename' field with the path 'C:\Users\Hans\Desktop\CH025K720x220x256w.png', 'Picture Width' (4000), 'Picture Height' (4000), 'Scale' (1: 25000), and 'Dot per Inch' (254). There are buttons for 'Select picture file' and 'View picture file'.
- Reference data:** Contains four corner input boxes: 'Top left corner', 'Top right corner', 'Bottom left corner', and 'Bottom right corner'. Each box has 'Map' and 'Picture' sub-fields for X and Y coordinates. A 'Copy picture data' button is on the right.
- Size maptile:** Has 'Width' (10000) and 'Height' (10000) fields, with 'Set tilesize' and 'Use tilesize' buttons.
- Border useable area:** A table with columns for 'Comer', 'Top left', 'Top right', 'Bottom left', and 'Bottom right', and rows for 'X Coordinate' and 'Y Coordinate'. A 'Copy form reference' button is on the right.
- Calibration data:** A table with columns for 'Comer', 'Top left', 'Top right', 'Bottom left', and 'Bottom right', and rows for 'Latitude' and 'Longitude'. A red box labeled '6a' highlights the 'Calculate calibration' button.

At the bottom right, there are 'Save JPR-File' and 'End' buttons.

The screenshot shows the 'JPR for CH Tiles - Calculating calibration data' dialog box. It has a title bar with standard window controls. The main area is divided into several sections with checkboxes:

- Check picture reference data:** Top left corner, Top right corner, Bottom left corner, Bottom right corner.
- Check map reference data:** Top left corner, Top right corner, Bottom left corner, Bottom right corner.
- Consistency check picture reference data:** Top left corner > Top right corner, Bottom left corner > Bottom right corner, Top left corner > Bottom left corner, Top right corner > Bottom right corner.
- Consistency check map reference data:** Top left corner > Top right corner, Bottom left corner > Bottom right corner, Top left corner > Bottom left corner, Top right corner > Bottom right corner.
- Check useable area data:** Top left corner, Top right corner, Bottom left corner, Bottom right corner.
- Check picture file data:** File selected, Map scale, Dot per inch.
- Consistency check useable area data:** Top left corner > Top right corner, Bottom left corner > Bottom right corner, Top left corner > Bottom left corner, Top right corner > Bottom right corner.

At the bottom, there are three buttons: 'Recheck', 'Continue' (labeled '6c'), and 'Stop and close' (labeled '6d'). A red box labeled '6b' highlights the left column of checkboxes, and another red box labeled '6b' highlights the right column of checkboxes.

the four reference points. But first the application will check if all input data are in place and in there respectively range. Start the procedure by clicking on the "Calculate calibration"-button (6a). The checking ends with the following screen. All Checkpoints must be checked (✓) (6b). "Check" means the values were inserted. "Consistency check" means "top" is above "bottom" and "right" is right of "left". When all ✓ are in place you can continue ("Continue"-button) (6c). When not use the "Stop and close"-button (6d), make your corrections and try again.

The part of this step does the calculations (6e) and build the contents of the JPR-file (6f).

The screenshot shows the 'JPR for CH Tiles' application interface. It is divided into several sections:

- Picture data:** Includes fields for 'Filename' (C:\Users\Hans\Desktop\CH025K720x220x256w.png), 'Picture Width' (4000), 'Picture Height' (4000), 'Scale' (1: 25000), and 'Dot per Inch' (254).
- Reference data:** Contains four corner coordinate tables (Top left, Top right, Bottom left, Bottom right) with 'Map' and 'Picture' columns.
- Size maptile:** Fields for 'Width' (10000) and 'Height' (10000).
- Border useable area:** A table with columns for 'Comer', 'Top left', 'Top right', 'Bottom left', and 'Bottom right', and rows for 'X Coordinate' and 'Y Coordinate'.
- Calibration data:** A table with columns for 'Comer', 'Top left', 'Top right', 'Bottom left', and 'Bottom right', and rows for 'Latitude' and 'Longitude'. A 'Calculate calibration' button is next to it.

On the right side, a preview window shows the generated JPR file content, which is a text-based metadata file. A red box highlights the 'Calibration data' table and the 'Calculate calibration' button, labeled '6e'. Another red box highlights the preview window content, labeled '6f'.

```
//File created by JPR for CH Tiles
nm=CH025K720x220x256w
st=0
sn=0
sc=25000
pr=UTM
dm=WGS84
sr=254
it=png
rp1=47.120107,9.020049,0,0
rp2=47.118219,9.151794,3999,0
rp3=47.02829,9.148922,3999,3999
rp4=47.030175,9.017398,0,3999
vp1=0,0
vp2=3999,0
vp3=3999,3999
vp4=0,3999
```

Step 7, Saving JPR-file and closing or continuing.

To save the contents of the JPR-file just click on the “Save JPR-file”-button (7a). If the JPR-file already

exists, you will be prompted to overwrite (or not). End the application with the “End”-button (7b). For continuing to next map click the “Select picture”-button (7c).

The difference between Swiss and Dutch version

There is nearly no difference. It looks the same, it feels the same and it works the same. The only one you will find are different predefined sizes of map tiles (4f).

The difference between Swiss and British version

The difference between these two versions is a result of the way native coordinate systems differs. The British (OSGB) system has an option to use 100 KM square code. The British version has an

option to convert these square codes. To use this option click on the 100K-button (a). The window “Convert Coordinate” opens. Add the

coordinate data (b) and click on the “Process coordinate”- button (c). The application will generate a coordinate without a square code. By clicking on the “Copy Coordinate”-button (c) the coordinate data will be copied to the reference data.