

Using a Background Map In FAST Survey

Preparing a Map File for Use as a Background Map in FAST Survey

Use your office computer and the Carlson Image X-Port.exe program to georeference a map before uploading it into your FAST Survey field terminal as a background map.

Note: The Carlson Image X-Port.exe program can be downloaded for free from: http://update.carlsonsw.com/kbase_main.php?action=display_topic&topic_id=477). After opening this web page, click on the "Carlson Image-Export.exe" link at the bottom of the page and save the file to your computer.

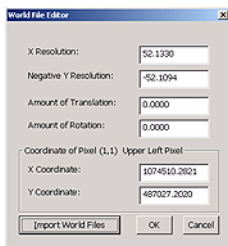
Follow the instructions below to prepare a map.

1. Create a new folder (e.g. "Maps") on your computer, **necessarily in the "My Documents" folder**.
2. Copy the image file (e.g. "RFS20L.TIF") you want to georeference to the new folder.
3. Run Carlson Image X-Port.exe.
4. Select **File>Open Image File**. Browse to the image file folder, and double-click the file name. This opens the map in the program window.

If necessary, use the **Zoom Level** drop-down menu to adjust the map zoom setting.

You can also use the **Tools>Image Brightness** function to make the map lighter or darker. **Important!** The resulting background map in FAST Survey will feature the same brightness.

5. Select **Tools>World File Editor**. This opens the World File Editor window in which you have to define the following parameters:



- **X Resolution:** The ratio between the real distance represented by the total width of the map and the total number of pixels used horizontally. Example: the map width represents 2000 meters and the number of pixels is 1000, then X Resolution=2.
- **Negative Y Resolution:** Usually equal to X Resolution with a minus sign placed before.
- **Amount of Translation:** "0" by default. Enter a negative or positive distance, in meters, if you want to shift the map (horizontally??).
- **Amount of Rotation:** "0" by default. Enter a negative or positive rotation angle, in degrees, if you want to rotate

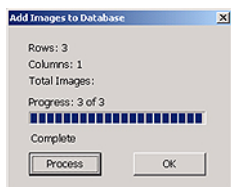
the map. (Negative for angle measured anticlockwise??).

- **X Coordinate:** Easting of upper left corner of the map (pixel 1,1)
- **Y Coordinate:** Northing of upper left corner of the map (pixel 1,1)

Note that if the file was georeferenced earlier, all these parameters may have been saved in a *.tfw, *.jgw or *.bpw file. If that is the case, click on the **Import World Files** button, select the corresponding file and click **Open**. This causes all the fields on the World File Editor window to be filled in from this file.

If there is not such a file, you have to work on finding georeferencing information for the map, as explained in *Determining Georeferencing Information for an Image File* on page 3.

6. After entering all the parameters in the World Map Editor window, click **OK** to close it.
7. Select **Image Database>Add Image to Database**. This opens the Add Images to Database window in which the program indicates that the original map is going to be split into several smaller map sections, each in BMP file format. The program indicates the number of files that will be created in the horizontal (columns) and vertical (row) directions
8. Click on the **Process** button and wait until the program has finished processing the original map. In the left column is an example of a map split into three smaller map sections arranged vertically (i.e. column=1; rows=3).
9. Click **OK** to close the window.
10. Click **File>Save as Image Database** and name the project file (e.g. "Map1"). This will be a text file gathering the georeferencing data of the map project as well as the paths and names of the different bmp files created through the above process step.
11. Click **Save** to save the different files of the map project to the folder created earlier ("Maps" in our example).
12. Click **File>Exit** to quit the program. If you now have a look into the "Maps" folder, you will see the following list of files (still referring to our example):
 - Map1.imd (map project description file)
 - A_RFS20Lr1c1.bmp (1st bitmap file, 1st row, 1st column),

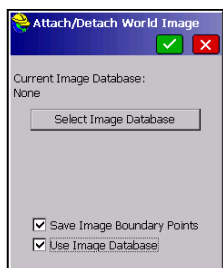


- A_RFS20Lr2c1.bmp (2nd bitmap file, 2nd row, 1st column),
- A_RFS20Lr3c1.bmp (3rd bitmap file, 3rd row, 1st column).

The naming convention used for the BMP files is the following:

- “A_” for prefix,
- Original file name re-used in the body of the filename,
- “rxcx” suffix to identify the row and column of the map section,
- File extension (bmp).

Enabling/Disabling a Background Map in FAST Survey



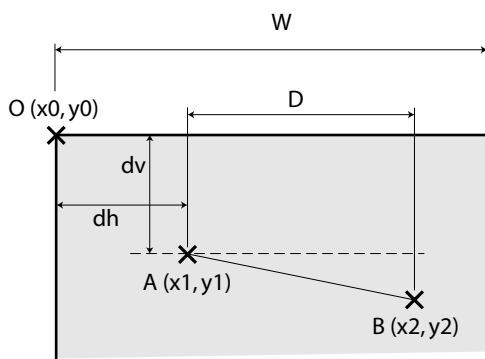
1. Create a new folder in the root directory of your field terminal's memory card. This folder must have the same name as the one created in “My documents” on the office computer (“Maps” in our example).
2. Copy the IMD file as well as the generated BMP files to that folder. You don't need to copy the original image file or the world file to the folder.
3. Remove the memory card from the office computer and insert it into your field terminal.
4. Run FAST Survey and start a new job.
5. Tap  in the upper-right corner of the screen.
6. Tap **TOOLS>Place World Image**.
7. Check on **Use Image Database** and **Save Image Boundary Points**.
8. Tap on the **Select Image Database** button and find the IMD file on the memory card.
9. Select the IMD file and tap  twice.
10. Tap  to adjust the zoom so the background map can now be seen.

If later on you wish to hide the background map, simply go back to **TOOLS>Place World Image** and clear the **Use Image Database** box.

Determining Georeferencing Information for an Image File

You may have no information at all that would allow you to quickly georeference the image file of your background map. In that case, you need to determine the following parameters (illustrated in diagram below) to be able to georeference the image file:

1. **Real coordinates of points A (x_1, y_1) and B (x_2, y_2), and horizontal distance (D) between points A and B.** Points A and B are arbitrary points well distributed horizontally on the image file and easy to spot both on the image file (map) and in the field.
2. **Real coordinates of point O (x_0, y_0)** located at the upper-left corner of the image file.
3. **Image width** expressed in pixels.



Determining Points A & B and Distance D

- Choose two points that can easily be spotted both on the image file and in the field.
- Go to the field and survey these two points with your surveying system. This immediately gives the coordinates x_1, y_1 and x_2, y_2 of points A and B respectively.
- From these coordinates, you can deduce D:

$$D = |x_2 - x_1|$$

Determining the Coordinates (x_0, y_0) of Point O

- Print out the image file using a high-quality printer.
- Using a graduated ruler, measure successively the lengths of D, dh and dv on the map printout.
- Assuming the obtained measurements are respectively D' , dh' and dv' , we have:

$$D / D' = dh / dh' = dv / dv'$$

This means the values of dv and dh can be determined as follows (make sure you use the same distance unit for all these distances):

$$dh = (D \times dh') / D' \text{ and } dv = (D \times dv') / D'$$

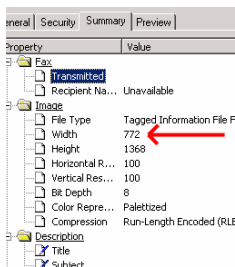
The (x0, y0) coordinates are then:

$$x0 = x1 - dh \text{ and } y0 = y1 + dv$$

x0 and y0 are the values you have to enter in the **X Coordinate** and **Y Coordinate** fields of the World File Editor window.

Reading the Image Width

- Still with the graduated ruler, measure the map width. Assuming W is the real distance in the field, then W' is the equivalent length measured on the map printout.
- Using Windows Explorer on your office computer, navigate to the folder containing the image file.
- Right-click on the filename and select **Properties** from the popup menu.
- On the **Summary** tab, click on the **Advanced** button (this may not be necessary if the advanced parameters are displayed by default).
- Read the number of pixels (P) displayed for the width parameter (see example on the left).



Computing the X Resolution

- Since we have:

$$W / W' = D / D'$$
- Then the value of the real distance W is:

$$W = (W' \times D) / D'$$
- And the X Resolution is finally equal to:

$$X \text{ Resolution} = W / P$$

The X Resolution is the value you have to enter in the **X Resolution** field of the World File Editor window.

Saving the Georeferencing Information

You can create an ASCII text file, using a simple text editor such as Microsoft Notepad, to save the parameters you have just determined. The file should be saved with the tfw, igw or bpw extension, depending on whether the original image file is respectively a TIF (or TIFF), JPG (or JPEG) or BMP file. The content of the ASCII text file should always be formatted as follows:

X Resolution (x.x)
 Amount of Translation (x.xxx)
 Amount of Rotation (x.xxx)
 Y Resolution -x.x)

x0 coordinate (xxxxxx)

y0 coordinate (xxxxxx)

After saving the ASCII text file to the same folder as the original image file, you can come back to the procedure described in *Preparing a Map File for Use as a Background Map in FAST Survey on page 1* to georeference your map and generate the corresponding BMP map sections used by FAST Survey.