3 Georeferencing and Mosaics

Preview

This lesson highlights all of the basic operations you need to create a seamless mosaic image.

This lesson starts the process from freshly-scanned images and continues through the following operations:

- Batch Conversion and Color Compression
- Contrast Stretch
- Georeferencing
- Resampling
- Creating a Seamless Look

Batch Conversion and Color Compression

One of the most important operations is to properly prepare the images. This section focuses on:

- Converting the images
- Allowing room in the color tables for a transparent color

➤ **Set up MicroStation Descartes**

1. From the MicroStation Manager dialog box, select
   Workspace > dcartes.

2. Open the LESSON3.DGN file supplied with the tutorial. The
   file should be in the …\dcartes\tutorial directory.

Converting the Images

For this exercise, we will use the Batch Conversion feature. This
feature, through its complete interface, allows us to specify all of
the required parameters in order to obtain images at the proper
scale and format and to standardize the number of gray levels in
the color tables.

W Though images can be opened as is, it does not allow to reduce
the number of colors. By batch converting, all three images will
have a reserved color for the transparent color.

➤ **To convert the images**

1. From the MicroStation File menu, select Batch Conversion.

   The Batch Conversion dialog box opens.
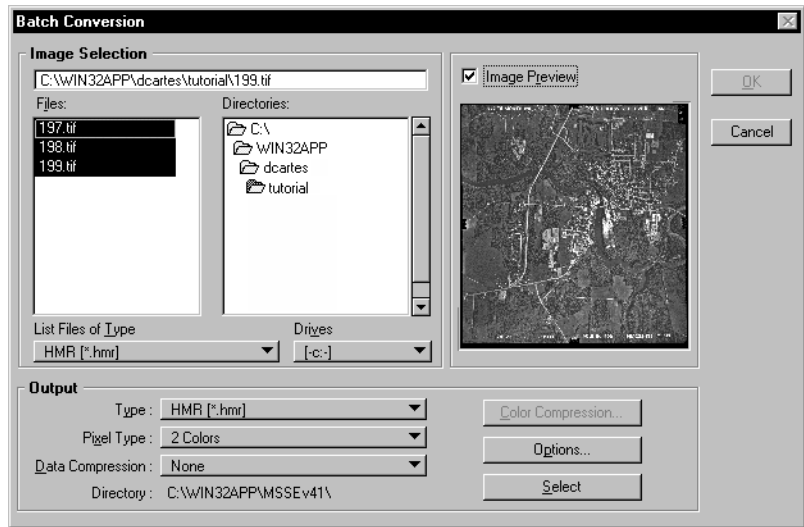
2. Change the directory to …\dcartes\tutorial and select 197.TIF, 198.TIF and 199.TIF.

   You can also set the List of File Types to TIFF (*.tif) to reduce the number and types of images to display in the Files list box.

✍ Multiple selections are accessible by pressing the <Ctrl> and/or <Shift> key while clicking.

3. Set the Output section as follows:

   Type: HMR[*.hmr]

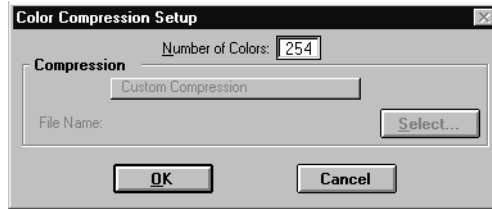   *Pixel Type*: Gray Scale

   Data Compression: Deflate

   Directory: …\dcartes\tutorial

   Next, we will set the number of gray levels for each image so that all the images will look alike and also to free the last color that will be used for applying transparency.

➤ **To set the Color Compression options**

1. Select Color Compression.

   The Color Compression Setup dialog box opens.

Color Compression Setup	✕

   Number of Colors: `254`

   Compression

   Custom Compression

   File Name: Select...

   OK   **Cancel**

2. Set the number of colors to 254.

   We will use color 254 for background transparent color.

3. Click OK.

4. Click OK in the Batch Conversion dialog box to start the batch conversion process.

   The Batch Conversion Progress dialog box opens.

5. When the three files are successfully converted, click OK.

Optimizing the Contrast and Tone Balance

These features allows you to optimize the color table so that all images display identical contrast and shade.

There are two methods that can be used to sharpen and balance images that will form a mosaic. The quickest or easiest method consists on using one single tool - Tone Balance along with the Average method.

Tone Balance creates a tone balance among all selected images by averaging the Histograms of all three images. The resulting Averaged Histogram is then applied to the images. In this scenario, all images are changed.

The preferred method is to choose the best image, apply a Contrast Stretch and then proceed with a Tone Balance using this corrected image as a Reference. In this scenario, all images except the one chosen as the reference are modified by applying the histogram of the reference image to all other selected images. This is the method that we will use.

➤ **To optimize the contrast**

1. From the MicroStation File menu, open the Descartes - Image Manager dialog box and select View 2.

2. Open all three images in the following order.

   199.hmr = Top position
   198.hmr = Middle position
   197.hmr = Bottom position

3. From the Image Manager dialog box, select Display > Fit All Images to View and enter a data point in view **2**.

4. Set 199.HMR as active, either by double-clicking on the file name in the Image Manager dialog box or using the *Select Images/Active Image* tool and double-clicking on the image.

5. From the MicroStation Utilities menu select Image Enhancements > Contrast Stretch.

   The Contrast Stretch dialog box opens.
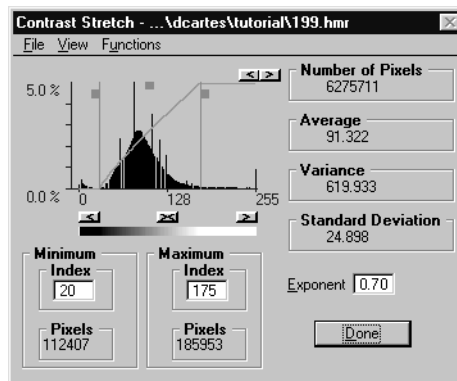
6. Enter 20 in the Minimum field and 175 in the Maximum field and press <Enter> or <Tab>.

   Notice the Exploration Devices getting into position at the entered indexes. Notice also that the image is now much clearer.

7. In the exponent field, enter "0.70."

   Notice the curve (green diagonal line) which is now slightly concave.

8. Click Done.

   A Warning dialog box opens prompting you to apply the changes to the image's color table.

9. Click Yes.

➤ **To Tone Balance all three images**

1. From the Tools menu, select Image > Mosaic.

   The Mosaic tool box opens.

2. Select the *Tone Balance* tool.

3. From the tool settings, set Mode to From Reference and Source Area to Entire Image.
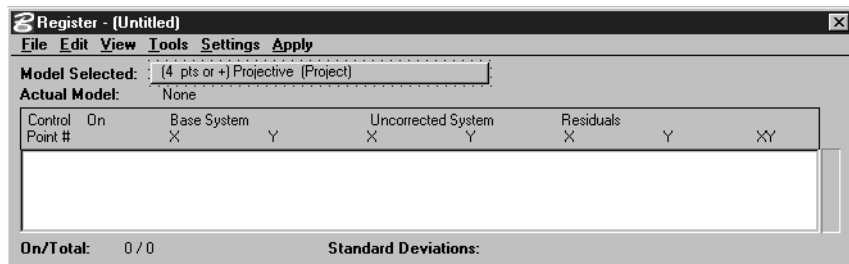
   IMGMOSA BALANCE TONE

Mode:	From Reference ▼
Source Area:	Entire Image ▼

4. In turn, select 197.HMR and 198.HMR.

5. Accept the selection with a reset.

6. Select the image to use as the Reference, 199.HMR.

   This is the image we have done a Contrast Stretch earlier.

7. With 199.hmr highlighted with a dotted line, accept with a data point.

   All three images are now similarly balanced.

Georeferencing and Resampling the Images

Now that all of the images are ready, the next step is to fit them in to the design file.

1. From the MicroStation Tools menu, choose Image > Register.

2. From the Register tool box, select the *Register Dialog* tool.

   The Register dialog box opens.

   Register - (Untitled)

   File Edit View Tools Settings Apply

Model Selected:	(4 pts or +) Projective (Project)						
Actual Model:	None						

Control Point #	On	Base System X	Y	Uncorrected System X	Y	Residuals X	Y	XY

   On/Total: 0 / 0   Standard Deviations:

3. Be sure the Model Selected is (3 pts or +) Affine-1.

4. From the View menu of the Register dialog box select Views Displaying Uncorrected Data. Turn on View **2** and turn on Also Display Non Warped Elements.

5. From the View menu, set Dynamic Warping in Views Displaying Uncorrected Data item to on.

6. *Fit View* in Window 1. Select image 197.HMR and *Bring To Front. Fit Image To View* and set image as active. At this point, you should see the design file in Window 1 and the image 197.HMR in Window **2**.
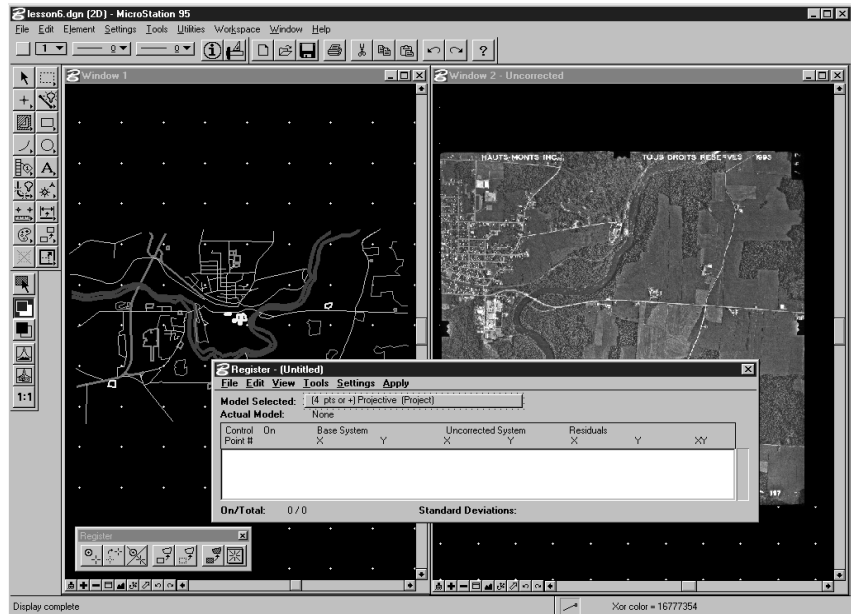
7. From the Register tool box, select the *Place Control Points* tool.

8. Place the base control point on the vector data in Window **1** as displayed below.
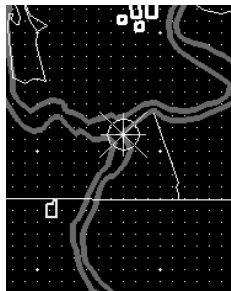
9. Place the uncorrected point on the image in Window **2** as displayed below.

When you have placed the uncorrected control point, Register moves and redisplays the vector data on your image. Register also adds the pair of points to the Register dialog box in the list of control point.

10. Repeat this warping process using the control points shown below. Place the point first on the vector data (shown on left here) and the second one on the image (shown on right).

After placing these points, the vector data should appear to be correctly overlaid on the image.
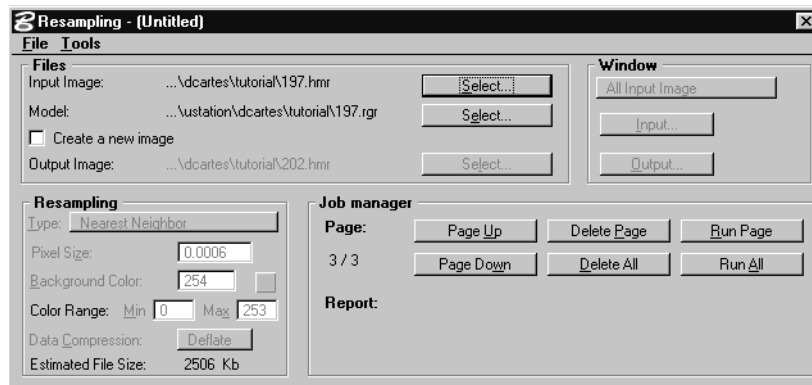
Point 2:
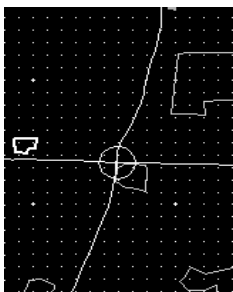
Point 3:

Point 4:
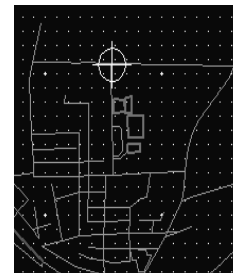
Point 5:
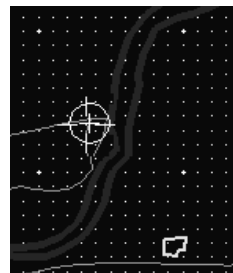
➤ **Resample an Image**

1. From the Register tool box, select the *Resample Image* tool.
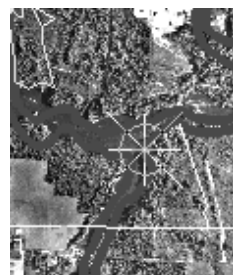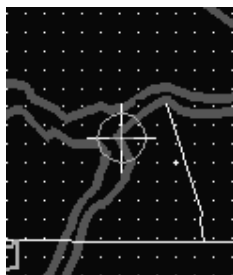   The Resampling dialog box opens.

Note that the input image is the image set as active. The output image is automatically assigned (in this case, it is grayed out). The model file is the name of the current image plus the extension.rgr (in this case, 197.RGR).
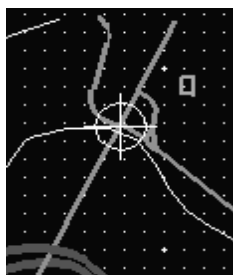
✍ Make sure that Create a New Image is turned off.

2. Close the Resampling dialog box and from the File menu of the Register dialog box, select New to begin a new.RGR file.

3. From the Register dialog box, select Affine-1 for the Model.

4. Select image 198.hmr and bring it to front.

5. Do a *Fit Image to View* and set the image as active.

6. From the Register tool box, select the *Place Control Points* tool.

7. Place the base control point on the vector data in Window **1** and then place the uncorrected point on the image in Window **2**, using the following points.

   When you have placed the uncorrected control point, Register moves and redisplays the vector data on your image.

Register also adds the pair of points to the Register dialog box in the list of control points.

Point 1:

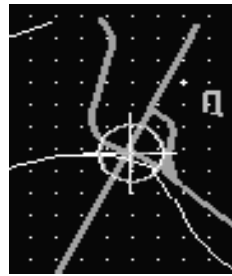Point 2:

Point 3:

Point 4:

Point 5:

8. From the Register tool box, select the *Resample Image* tool.

   The Resampling dialog box opens. Be sure you are on page 2/2 and the input image is 198.HMR and the model file is 198.RGR. The output image must be grayed out. If not, turn OFF Create a New Image option.

9. From the File menu of the Register dialog box, select New to begin a new.RGR file.

10. From the Register dialog box, select Affine-1 for the Model.

11. Repeat steps 5 through 8 to georeference and resample
199.HMR using the following control points.
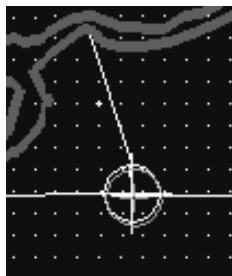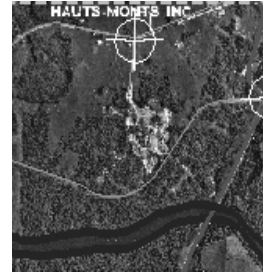
Point 1:

Point 2:

Point 3:

Point 4:

Point 5:

12. When you have completed the georeferencing for each image and your resampling file has three pages, click Run All. An Alert dialog box will ask you if you really want to submit the resampling of images. Click OK.

13. When the resampling is complete, 197.HMR, 198.HMR and 199.HMR will be automatically moved under the design file elements.

    After a Fit View, Window **2** should look as follows.

Creating the Seamless Look

Creating the seamless look is achieved by removing unwanted portions of an image's overlap factor and boundary while using the image beneath to replace the removed portions of the top image. It's like cutting down two pieces of a puzzle.

The cutting process can be achieved automatically or semi-automatically. During the process, the top image is cut. To hide the seam of the cut, "feathering" is applied alongside the seam on both images. This renders the seam nearly invisible. To achieve such results, we will use the *Define Seam* tool from the Mosaic tool box.
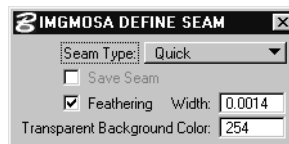
➤ **To create a seamless mosaic**

1. From the MicroStation Tools menu, select Image > Mosaic.

2. Before going on, using the *Send to Back and/or Bring to Front* tools, set the images to match the following order.

   199.hmr = Top position
   198.hmr = Middle position
   197.hmr = Bottom position

✍ From the Image Manager dialog box, the image at the top of the list is always the one on the top.

3. From the Mosaic tool box, select the *Define Seam* tool.

4. From the tools settings window, set the values as follows:

   IMGMOSA DEFINE SEAM
   Seam Type: Quick
   ☐ Save Seam
   ☑ Feathering   Width: 0.0014
   Transparent Background Color: 254

If you look at the status bar, you will notice the message: *Define Seam > Select First Image.*

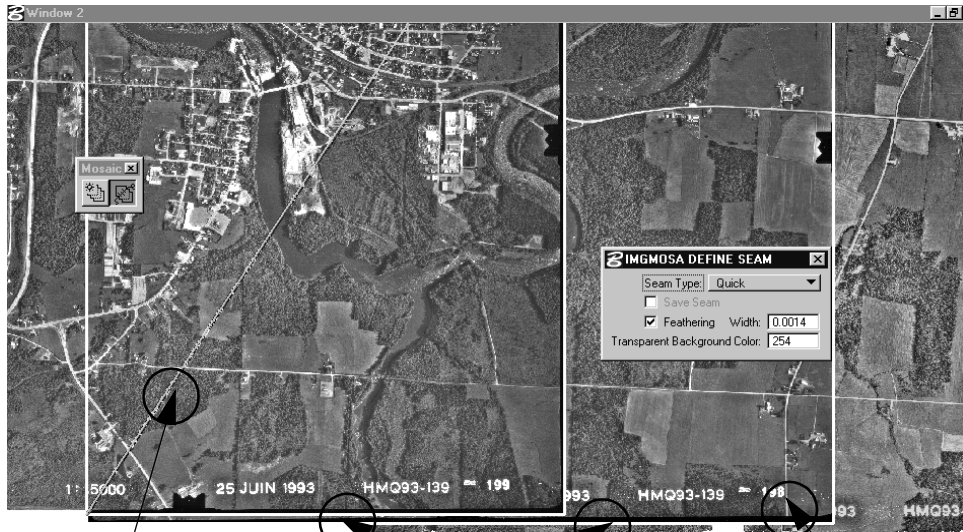5. Enter a data point on the top image, 199.hmr.
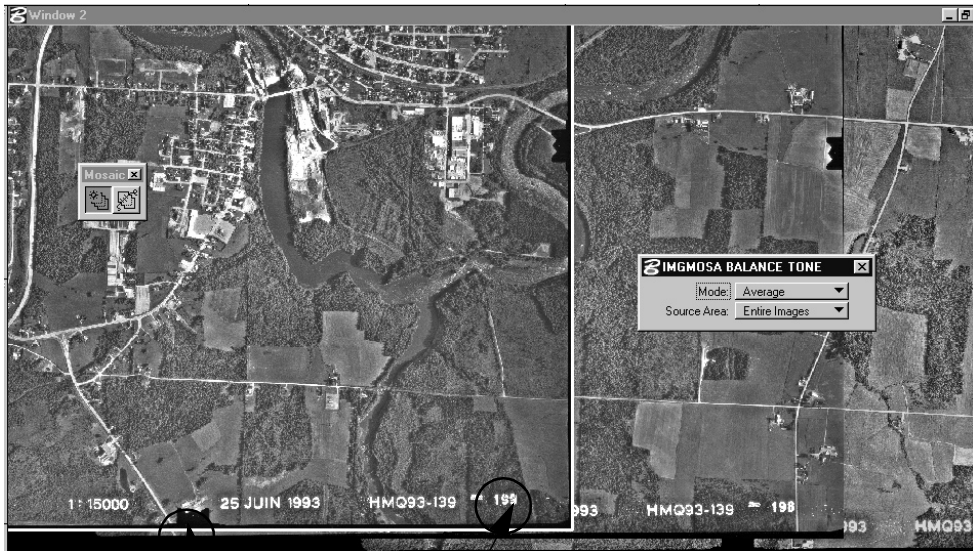
Blue Outline

Click Here to select the image

- You can enter the data point on the image name located at the bottom-right corner.

- A blue outline surrounds the image.

- If you look at the status bar, you will notice the message: *Define Seam > Select Second Image.*

6. Enter a data point on the center image, 198.hmr.

Seam and cutting Area   *Blue Outline*   *Click Here to select the image*

- You can enter the data point on the image name located at the bottom-right corner.
- A blue outline surrounds the image.
- If you look at the status bar, you will notice the following message: *Define Seam > Accept to mosaic images.*

7. If you have selected the right images:

- Confirm the selection using a data point.
- Or Reset and restart from step 3.

8. At this point a lot of activity appears in the status bar. This is normal, sit back and wait until the automated mosaic is terminated.

9. Repeat the same process for 197.HMR and 198.HMR.

   The final result should look as follows.

Finished Mosaic

➤ **Creating a new image using Corridor**

1. Place a block using the MicroStation *Place Block* tool that includes the three images you have just warped, but excludes labels and marks.

2. Using the MicroStation *Copy* tool, copy an element and place it below the mosaic.

3. From the MicroStation Tools menu, select Image > Image Transform.

4. Select the *Corridor* tool.

5. Identify the closed element previously created over the mosaic as the source polygon and accept it.

6. Identify the element below the mosaic as the destination polygon and accept it.

   The Output Image Creation dialog box opens.

7. Set the Image section as follows:

   Output File Name: …\dcartes\tutorial\final.hmr

   Data Compression: Deflate

8. Set the DGN Elements section as follows:

    Copy DGN Elements: ON

    Copy Mode: Clip

9. Click Options and set as follows:

    Output Color Table: Active Image

    Background Color: 254
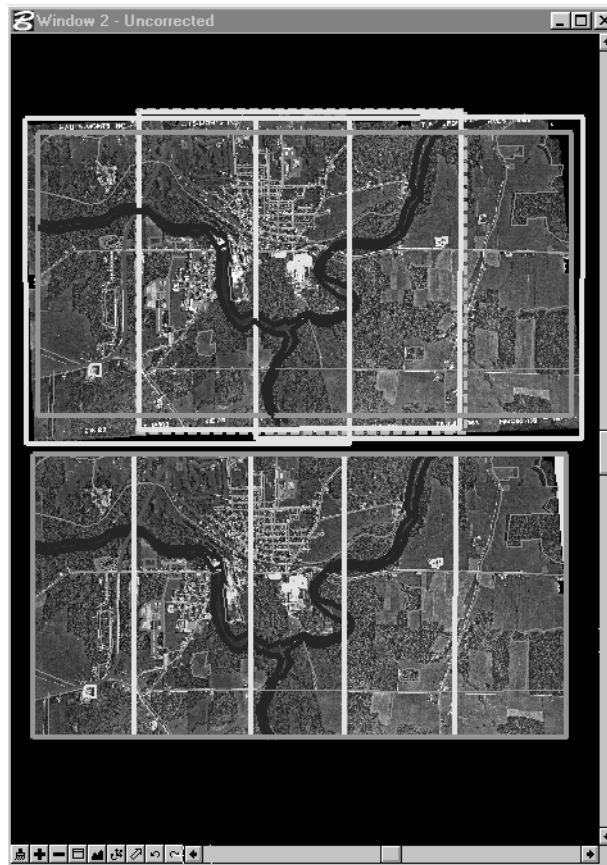
    Transparent: ON

    Color Min.: 0

    Color Max: 255

    Leave the other settings as they are.

10. Click OK, then click Run.

    At the end of the process, final.hmr automatically opens.

Congratulations! You have created a nice mosaic.