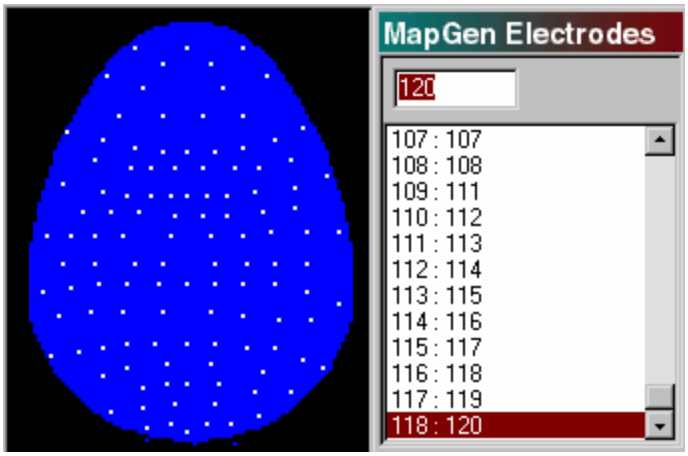
MapGen 4.5



For Creating and Editing
2D *.map Files

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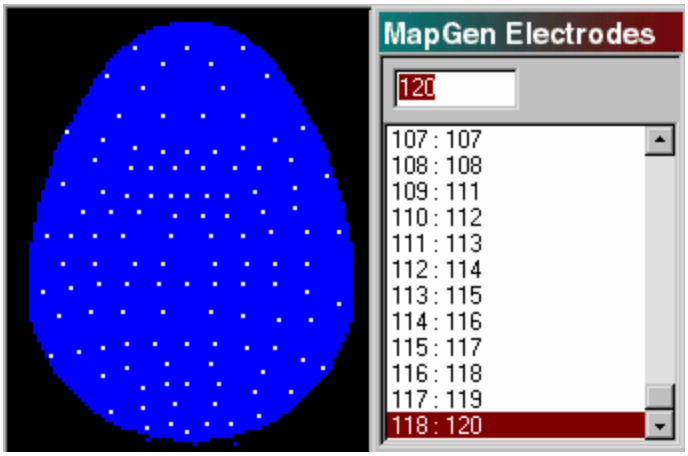

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7316A MapGen

1.1 Introduction

The MapGen program is used to create flat, 2D map files (.map extension) that are used in ACQUIRE and EDIT to map data files. MapGen has a number of useful features, including:

- Create map files to display data as a single map or a series of color, topographical maps.
- Create new map files from scratch.
- Modify existing map files by adding, deleting, renaming or repositioning electrodes.
- Use the "egg" shape to display data, or you can import other shapes on which to map the data.
- Import and export electrode position files as ASCII files.

To get you started, we will take an existing .map file, make a few modifications to it, then save the file for use in EDIT. The EDIT manual will explain all of the options for 2D mapping using files created in MapGen.

Some important things to realize when creating the .map files are:

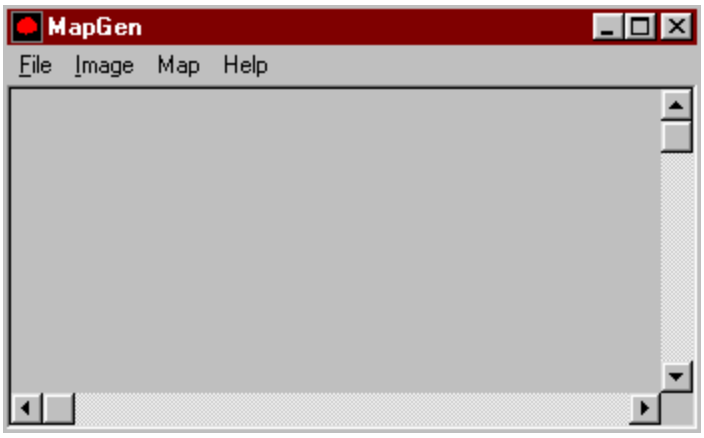
1). The electrodes in the MapGen Electrodes list do not have to be in the same order as they are in ACQUIRE. The labels themselves should match exactly with those in the ACQUIRE setup file, or in your existing data files that you wish to map.

*2). The internal mapping scheme in EDIT can be used to map data files having extended 10-20 system labels. In that case, you do not need to create a *.map file. You will receive a message in EDIT if you try to map a file that has channels that the internal mapping system does not recognize. In that event, either rename the channels, or create a .map file that has manually named channels.*

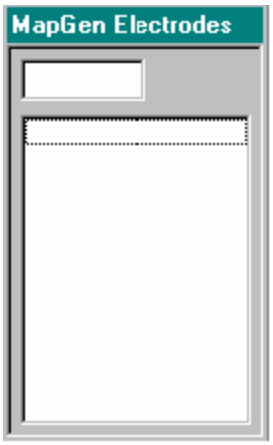
3). You can create a map that has fewer placements than your original data file. Typically, most users do not map the artifact channels, and these are excluded from the .map file. You may also wish to create maps for one side of the head only, for example, and these would contain only those electrodes.

1.2 Modifying an Existing .Map File

1. In EDIT, go to Tools and select the MapGen option. The main MapGen screen will appear. Size it as desired.



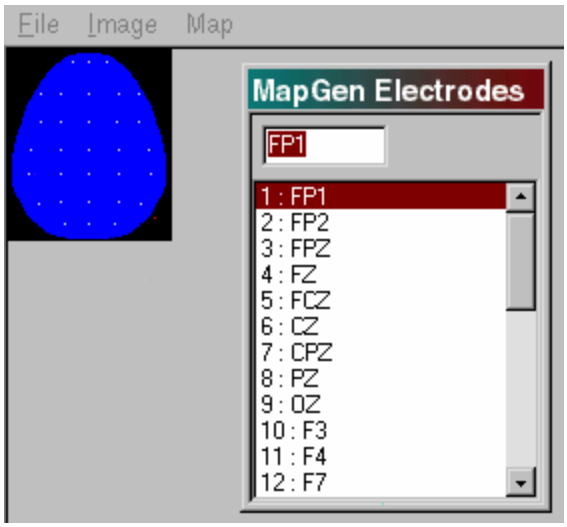
Notice also that the MapGen Electrodes window appears also. It will be empty at this point, and may be hidden behind the main MapGen screen.



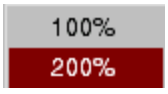
2. Select **File** → **Open** 

, and a standard Open Files utility will appear. Find and select an existing .map file, such as the supplied *cap32.map* file, and click Open. You will see the *cap32.map* file displayed, and the electrodes will be listed in the MapGen Electrodes window.

Shortcut: *If you double-click on a .map file from, for example, the Windows Explorer program, the file will open automatically in MapGen (with a x4 scale).*



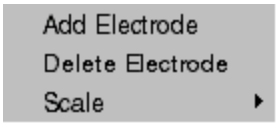
3. For ease of operation, we will increase the size of the *cap32.map* file display. Click **Image** → **Scale** 

, then select the 200% option 

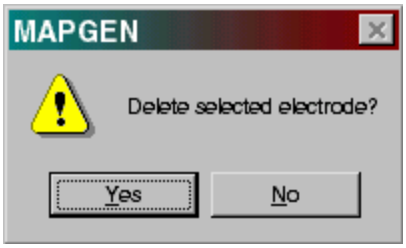
. This will double the size of the display.

4. Let's say that we want to delete FPZ, reposition FP1 and FP2, rename one of the midline electrodes, and add two more electrodes at CP1 and CP2.

Deleting an Electrode: Position the cursor over the electrode you wish to delete, FPZ in this example, and click the right mouse button. You will see a list of menu options.

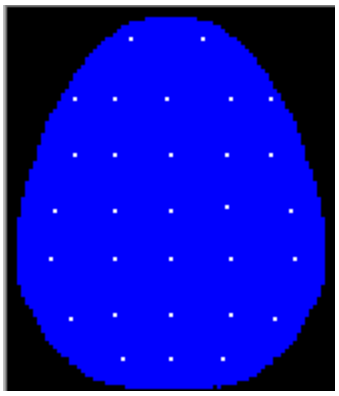


You may need to select the electrode with the left mouse button first. You should see the [FPZ] electrode highlighted in the MapGen Electrodes display. Then click the right button to access the menu with Delete Electrode. Click the Delete Electrode option, and you will be asked for verification. Click Yes.

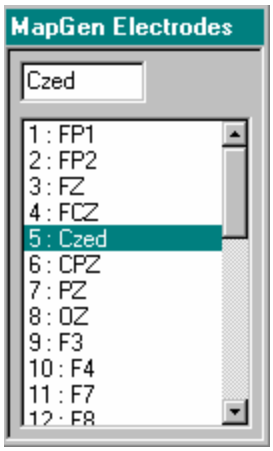


The electrode has been deleted. If you did not see the verification screen, and the electrode is still there, select it again with the left mouse button and repeat the rest of the sequence.

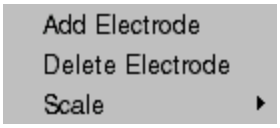
Repositioning an Electrode. Let's say all we want to do is separate FP1 and FP2 a little bit more. When you position the cursor over the blue region, and click the left mouse button, the nearest electrode will jump to the mouse location. If you click and hold the left mouse button, you can drag the electrode to a new position. Position the mouse cursor over or near FP1, click and hold the left button, and move it slightly to the left. Move FP2 slightly to the right.



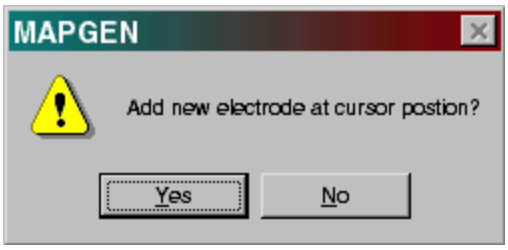
Renaming Electrodes. Let's say we want to rename CZ to Czed. *Realize that the labels must match what you have entered in the Channel Assignment table in your ACQUIRE setup file, or in your existing data files that you wish to map.* To rename an electrode, position the mouse directly over the electrode and click the left mouse button (remember, the electrode will jump to the mouse location when you click the left button, so position it directly over the electrode you wish to rename). Then simply enter the new name at the top field of the MapGen Electrodes display.



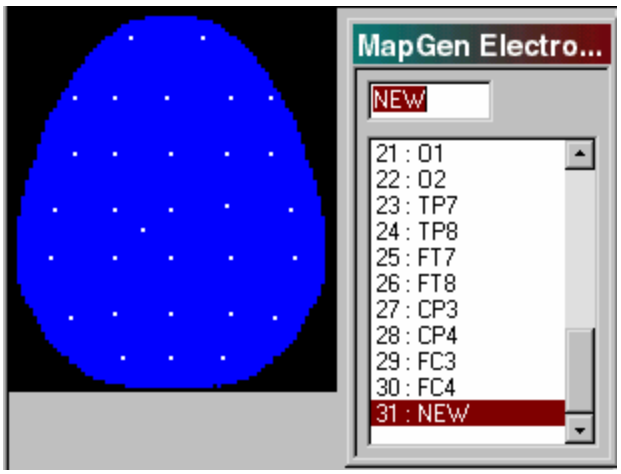
Adding Electrodes. Lastly, we'll add the CP1 and CP2 electrodes. Position the mouse cursor over the approximate position of the CP1 electrode (you can always move it later), and click the right mouse button. You will see a list of menu options.



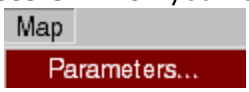
Click the Add Electrode option, and you will be asked for verification. Click Yes.



The new electrode will appear at the mouse location. You will also see the label NEW in the top field of the MapGen Electrodes display, and the label NEW at the last electrode position.

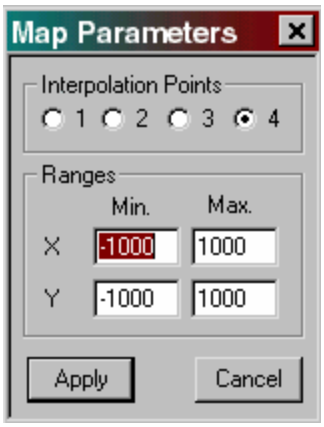


Enter in the label for the new electrode (CP1), and repeat the sequence for CP2.

5. **Map Parameters.** When you have made all the modifications, click **Map** → **Parameters...** 

, and the Map Parameters display will appear.

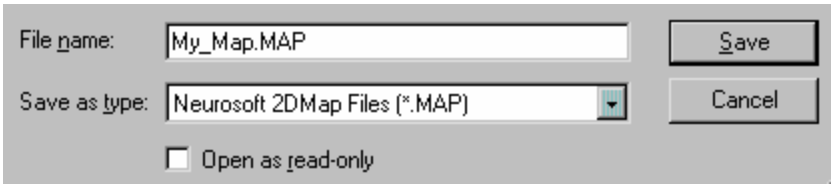
Interpolation Points. The mapping routine uses an x-point, linear interpolation procedure, where x is the number of the nearest electrodes to be included. Select the 4 point field (default). When the maps are drawn, the value at each pixel will be based on a linear interpolation using the voltages from the 4 nearest electrodes, and the distances from the pixel to the 4 electrodes. When mapped in EDIT, the calculated voltage will have a color assigned, based on the range of the voltage scale you select. The 4 point interpolation is one method used for mapping (the Local method). You can alternatively use the Global method, which uses all electrodes, as described in the EDIT manual.



Ranges. In this context, Ranges refers to the X,Y Cartesian coordinates used to locate electrode positions in the .map file. The center of the map file display will have X,Y coordinates of 0,0. You may specify the maximum values for the positive and negative positions. Each electrode will then have an X,Y position location, and these locations can be exported (and imported), as described in the Operating MapGen part of this manual. For this example, leave the values at +/-1000.

6. Click the Apply button on the Map Parameters display, and this display will disappear.

Now, click **File** → **Save**. The Map Parameters screen will appear again as a verification that these settings have been made. Click Apply. A Save As utility will appear in which you should designate the path and file name. The .map extension will be added automatically, and the file will be created and saved.



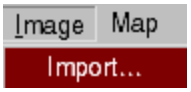
1.3 Creating a New .Map File

To create a completely new map file, having the same "egg" shape as the .map files we supply, retrieve one of the existing .map files, such as the *cap32.map* file described above. Delete all the electrodes, and then add and name the new electrodes, as described above.

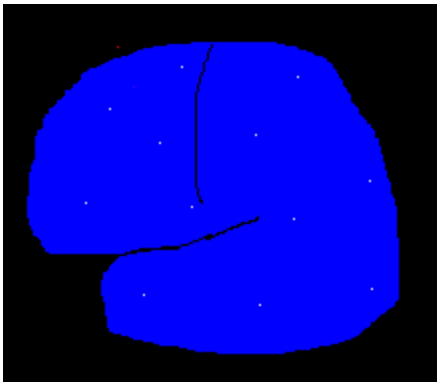
Instead of diligently placing the electrodes in their precise locations, it is possible to import the electrode position data from an existing ASCII file (.dat extension). This assumes, however, that the DAT file has the same number of electrodes and same electrode labels. That being the case, place the electrodes anywhere on the display, and then use the Import option to retrieve and apply the electrodes positions from the DAT file (see also Importing and Exporting electrode position data in the Operating MapGen section below).

Creating Your Own Shapes. You do not have to use the existing "egg" shape for your maps. You may create any shape that you like. Use any graphics package that will save graphics as a BMP file. The following was drawn in Paint. When you create

something, be sure to flood the unwanted outlying area in black. Also, save just the graphic and the immediately surrounding area - the entire region you save will be the .map file, even if your figure is only one small part of it. Save it as a BMP file.

In MapGen, click **Image** → **Import** 

, and a standard Open Files utility will appear. Select the BMP file, and click Open. Any part that is not black will be blue. Then, start adding electrodes where you wish.

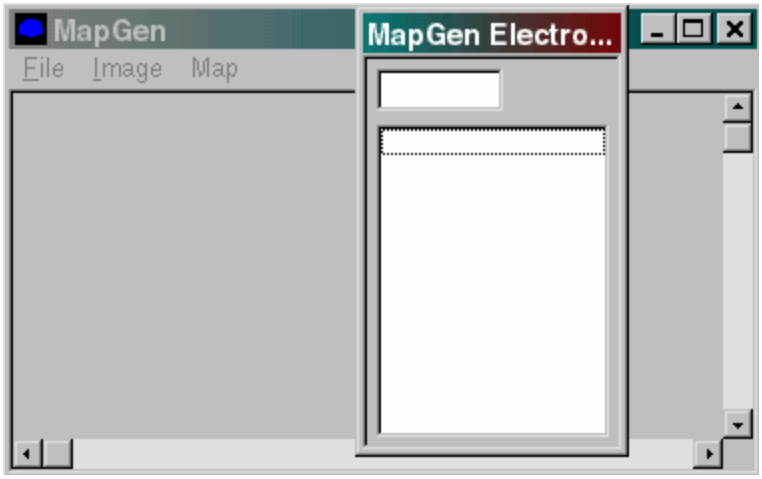


When you are finished, create and save the .map file, as described above. Note that in the above example, only a subset of electrodes are used to display the left side of the head. In EDIT, you will have the option to select the .map file that you wish to use to map your data. Again, the electrodes labels must match precisely the labels in your data file, but you may map a subset of the electrodes contained in your data file.

This concludes the quick introduction to MapGen. The following section describes the Operation of MapGen in complete detail.

2 Operating MapGen

Start MapGen by clicking Tools / MapGen from EDIT or ACQUIRE, and the main screen will appear along with the empty MapGen Electrodes display.



If the MapGen Electrodes screen is hidden behind the main screen, click the MapGen... 

icon on the Tool Bar in Windows to bring it to the front. It will be empty at this point.

There are four options to select from the MapGen Main Menu bar 

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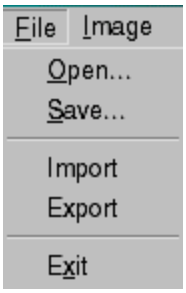
Note: Underlined letters indicate that the option may be selected from the keyboard. For example, the File option may be selected by using the combination keys of Alt and f. To select options from a pull down menu, such as the Exit option in the File list of options, press the "x" key alone to apply the option.

2.1 File

Selecting the File option produces a list of the following menu items.

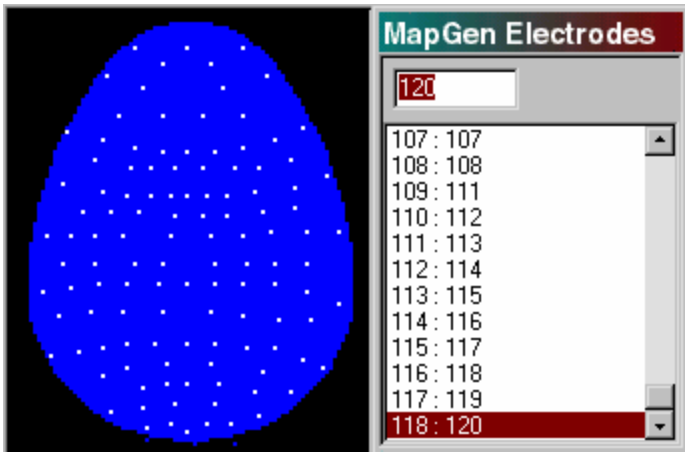


Open... Selecting **File** → **Open** 

displays a standard Open Files utility through which you may select an existing .map file. Select the file and click Open (or double click on the .map file). *Shortcut*: *If you double-click on a .map file from, for example, the Windows Explorer program, the file will open automatically in MapGen (with a x4 scale).*

You will see the .map file display showing the locations of the electrodes. In the MapGen Electrodes display, you will see a list of electrodes shown on the map. When you click on an electrode using the left mouse button, that electrode will be highlighted on the Electrodes list, and its label will be displayed in the field at the top of the Electrodes

display.

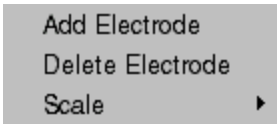


Note: Clicking the left button while the mouse cursor is positioned over the 2D map display will cause the nearest electrode to jump to the mouse location. Avoid inadvertent left mouse clicks, and, when you select an electrode for renaming, position the mouse directly over the electrode point (you can always drag the electrode back to its original location if you move one unintentionally).

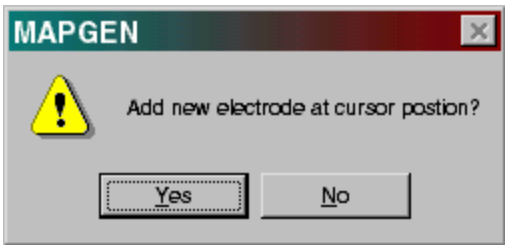
Renaming Electrodes. Position the mouse directly on top of the electrode to be renamed, and click the left mouse button. You should see that electrode highlighted in the list in the MapGen Electrodes display, and also see the same electrode label in the field at the top of the Electrodes display. You may rename the electrode at this point by typing in a different name in the top field.

Moving an Electrode. To move an electrode, click on or near it with the left mouse button, and hold the button down. The nearest electrode will jump to the mouse cursor position. Drag the electrode to the desired position, and release the left mouse button. The electrode now has been moved to that position.

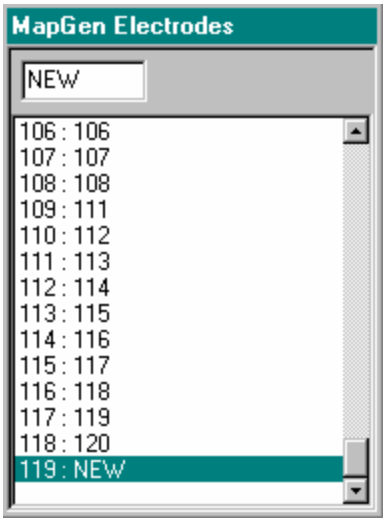
Right Mouse Button. The right mouse buttons brings up another list of menu options. This allows you to Add Electrodes, Delete Electrodes, or change the Scale or size of the .map file display.



Add Electrodes. To add an electrode, position the mouse where you want the electrode to appear, and click the right mouse button. Then click the Add Electrodes option. You will get a verification screen. Click Yes to proceed, or No to cancel.



An electrode will be added at the point where the mouse cursor was located. You can move the electrode by grab/dragging it, as described above. When you add the electrode, you will see "NEW" displayed in the field at the top of the MapGen Electrodes display, and at the bottom of the electrode list. Enter a label for the new electrode you have added. Repeat the process for all electrodes you wish to add.

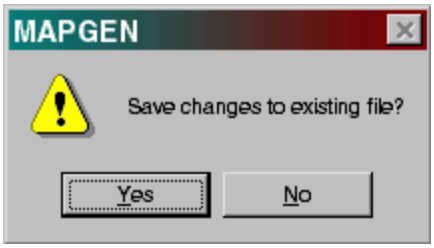


Delete Electrodes. To delete an electrode, position the mouse cursor on the electrode to be deleted, and click the right mouse button. Select the Delete Electrode line. You will see a verification window.

Click Yes to delete the electrode. *Note: If you do not see the verification window, click the electrode first with the left mouse button. You should see that electrode highlighted in the MapGen Electrodes display list. Then click the right mouse button again.*

Scale. The Scale button has the same effect as clicking **Image** → **Scale**. You have the option of resizing the .map file to 100%, 200% or 400% of its original size.

Note: If you have one .map file displayed, and you decide to open a second one, you will get a message asking if you want to save changes to the first file.



Only one .map file may be displayed at a time. Clicking Yes will save the changes; clicking No will replace this file with the new one without saving the changes.

Save... Selecting **File** → **Save...** opens a standard Save As... utility. When you are ready to create your new .map file, select the Save... option, and the Map Parameters screen will appear as a reminder to set these values. Set the values as desired, or accept the default ones, and click Apply. The Save As... screen will appear. Designate a path and file name, and click Save....

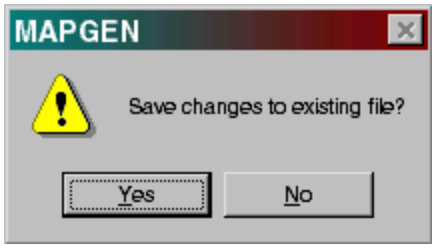
Import. Selecting **File** → **Import** displays an Open File utility for importing an ASCII file containing electrodes positions. You need first to retrieve a BMP file using **Image** → **Import**. The DAT file will be used to place the electrodes positions in the BMP display. After retrieving the bitmap, select **File** → **Import**, then select the electrode position file (.dat extension), and click Open. The electrodes will be placed in the BMP display.

Export. The Export option allows you to export the electrode position information to an ASCII file. Select **File** → **Export** and a Save File utility will appear. Enter a file name, designate a path, and click Save. The ASCII file will be created (the .dat extension will be added automatically). The resulting text file will appear as follows when viewed with, for example, Notepad (this is the .dat file for the *cap32.map* file).

FP1	-209.382	869.159
FP2	209.382	869.159
FPZ	-23.256	869.159
FZ	-23.256	532.710
FCZ	-23.256	233.645
CZ	-23.256	-46.729
CPZ	-23.256	-308.411
PZ	-23.256	-588.785
OZ	-23.256	-831.776
F3	-348.837	532.710
F4	348.837	532.710
F7	-600.000	532.710
F8	600.000	532.710
C3	-348.837	-46.729
T3	-720.930	-46.729
C4	348.837	-46.729
T4	720.930	-46.729
P3	-348.837	-588.785
P4	348.837	-588.785
T5	-627.907	-607.477
T6	627.907	-607.477
O1	-302.326	-831.776
O2	302.326	-831.776
TP7	-744.186	-308.411
TP8	744.186	-308.411
FT7	-600.000	233.645
FT8	600.000	233.645
CP3	-348.837	-308.411
CP4	348.837	-308.411
FC3	-348.837	233.645
FC4	325.581	233.645

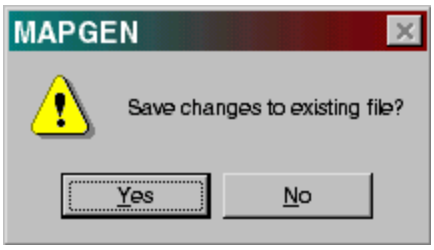
The Range for this file was the default +/- 1000, as set in the Map Parameters display.

The steps described above will occur if you open an existing .map file and Export it to ASCII. If you have created a new .map file, or have modified an existing .map file, then you will be asked whether you want to save the changes made to that file with the following window.



Select Yes, and the Save As... window will appear in which you may enter a file name and path for the .map file. Then a second Save As... window will appear to save the .dat file.

Exit. Exits the program. If you have a .map file open at the time, you will be asked whether you want to save changes made to that file. Clicking Yes will save the changes; clicking No will Exit the program without saving the changes.



2.2 Image

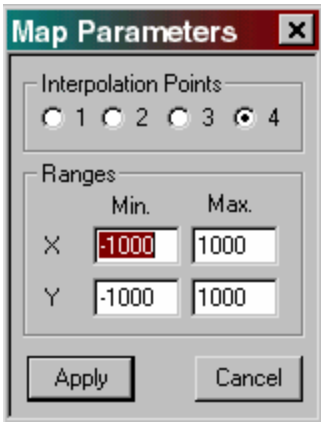
Selecting the Image option produces a list of the following menu items.

Import... Selecting **Image** → **Import** opens a standard Open Files utility for retrieving *.bmp files. Select the *.bmp file that you want to import and click Open (or double-click the file). Whereas the Import option under Files is used to import electrode position information, this option is used to import *.bmp files to use as the mapping surface instead of the "egg" heads. This is described in more detail above in the "Creating a New .Map File" section.

Scale > The Scale option is used to increased the size of the .map file that you have retrieved. The options are 100%, 200% and 400%. 200% doubles the display size; 400% quadruples it. 100% returns the display to its original size.

2.3 Map

Selecting the Map option allows you access to the Map Parameters display.



The display is divided into two parts: Interpolation Points and Ranges.

Interpolation Points. The mapping routine uses an x-point, linear interpolation procedure, where x is the number of the nearest electrodes to be included. When the 4 point field is selected, the voltage value at each pixel will be based on a linear interpolation using the voltages from the 4 nearest electrodes, and the distances from the pixel to each of the 4 electrodes. You may use fewer than 4 electrodes, although

4 is customary. When mapping data files, the calculated voltage will have a color assigned, based on the range of the voltage scale you select (in EDIT). Click Apply to apply the values you have entered, or Cancel to leave the screen without making any changes.

Ranges. In this context, Ranges refers to the X,Y Cartesian coordinates used with the map file's electrode locations. The center of the map file display will have X,Y coordinates of 0,0. You may specify the maximum values for the positive and negative directions of the X and Y axes. If you enter 1000 for the X Maximum, the value at the edge of the right side of the region to be mapped will be 1000. Similarly, setting -1000 for the X Minimum, the value at the extreme left side of the region will be -1000. For the Y axis, the Minimum is toward the bottom of the display, and the Maximum is the top. Each electrode will then have an X,Y position location, and these locations can be exported (and imported), as described above under Import and Export. Click Apply to apply the values you have entered, or Cancel to leave the screen without making any changes.

2.4 Help

Clicking the Help option allows you to select the link to this manual in PDF form.