MacChoro II in Brief

The Window Environment:

MacChoro II incorporates four separate windows: 1) a spreadsheet window for data entry; 2) a graphics window for the display of the map, legend and text; 3) a reduced-view graphics window; and 4) a text editor window. Any of the windows may be brought to the foreground by simply clicking within the frame of the window or selecting its title (Data, Graphics, Reduced View and Editor) from the 'Window' menu. The default arrangement of the windows is to have the graphics window in the middle occupying the majority of the screen, the spreadsheet data window on the left and the reduced-view window to the right. The editor window is hidden and can only be accessed through the window menu although it is usually brought to the foreground by a menu option that outputs text. Windows can be moved and are fully resizable and scrollable. The specific arrangement and size that you choose for the windows can be saved with the 'Save Settings' option in the 'File' menu.

The characteristics of each window are described in the 'Window' menu with a window setup command that becomes activated when the window is brought to the foreground. These are called 'Graphics Setup,' 'Data Setup,' and 'Editor Setup.' Certain aspects of each window may also be changed. For example, the graphics window can be made as large as 49 x 49 pages and the column width and text size of the spreadsheet can be changed.

Files:

MacChoro II makes use of five separate file types. All of these have separate icons and are therefore distinguishable in the Finder. A double-click on any of the files will initiate the program and display the file. Four of the five file types can be printed directly from the Finder.

The five file types are: 1) Data file (spreadsheet icon); 2) Map file (blank map icon); 3) Graphics file (shaded map icon); 4) Editor text file (text and map icon); 5) Animation file (movie projector icon with map). The data file can be thought of as a matrix with up to 50 columns. This file also contains the name of its corresponding map file as well as the text headers for each column and row and four 64-character text fields for each column of data (accessed in the 'Text' menu as 'What,' 'When', 'Legend' and 'Source'). The Map file contains the x,y coordinates that are used to define the map outline. The Graphics file (PICT

format) is the result of saving the contents of the graphics window. The Editor file represents the contents of an editor window and the Animation file contains the series of maps and animation control characteristics that are used for the map animation sequences.

Drawing Environment:

A display created by **MacChoro II** consists of five separate elements: map, legend, text, neatline and bar scale. The initial size and positioning of these elements are defined by clicking and dragging a bounding rectangle. The map, legend, neatline and bar scale are scaled to fit within these user-defined rectangles while the size of text is defined with point sizes. This bounding rectangle may be defined at any time by clicking and dragging within the graphics window (press the control key while defining a rectangle within the boundaries of another rectangle).

Map elements may also be resized by dragging outward on a corner of a bounding rectangle. However, resizing objects in this manner will sacrifice the graphic quality of the map element. It is usually best to redraw the map element after it has been resized. The resizing of the map itself is done with the 'Display in Frame...' or 'Display at Scale...' commands in the 'Map File' sub-menu so that the map scale can be recomputed.

To re-classify data, the user simply selects the number of classes and the classification method from the **Classify** sub-menu. The updating of the map is accomplished very quickly because the area outlines are kept in memory.

Data manipulation commands that work within the spreadsheet are also included. A data set may be modified by division, multiplication, subtraction or addition using another data set or a constant. An upper and/or lower threshhold may be applied to a data set to eliminate the effect of extreme outliers in the data. Non-normal distributions may be modified by the logarithm (base 10) and square root functions.

Documentation

This manual begins with a four part step-by-step section. The first step-by-step sequence of 30 steps provides a general introduction to the program. The second step-by-step sequence describes other graphic options that are available. The third sequence describes data manipulation within the spreadsheet. The fourth sequence discusses the creation of map files. A second section of the manual describes the animation control. The appendices include an example data file, a description of the format for a data file, a description of the format for the map files, an explanation of the classification methods, and an explanation of the error messages.

On-line documentation is also provided with a Help function under the Apple menu. This on-line help describes every menu item that is specific to the program. The procedure is to click on the help item in the scrolling list on the right. The corresponding information appears in the text box on the left.

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Part 1

MacChoro II
Step - by - Step

The best way to familiarize yourself with **MacChoro II** is to actually use the program. In the introductory step-by-step sequence, instructions are included for creating maps and map animations of the United States by state.

1 Step-by-Step: Introduction

Setup: The System Folder includes just the essentials. It is therefore best to copy **MacChoro II** to your hard-drive if you have one. Also, the animation sequence requires over 200k of memory. If you only have 1mb of memory, turn off Multifinder (Set Startup in the Finder's Special menu) and Ram Cache (Control Panel under the Apple menu).

The following sequence will outline the procedure for creating maps and map animations of theUnited States using the 'US48.Data' data file and the 'US48.Map' map file. Copy these to your hard-drive as well.

1.1) Double-click on the **MacChoro II** icon to start the program.

This opens the program and puts the spreadsheet window in the foreground.

1.2) Specify **Open** from the **File** menu.

Since the spreadsheet window is in the front, only data files will be displayed in the open dialog.

1.3) Double-click on 'US48.Data'

This will display the 'US48.Map' map file in the graphics window and open the data file into the spreadsheet window. The first column in the spreadsheet is enabled (blackened).

1.4) Click-on **Draw Map** in the box in the upper-left corner of the spreadsheet.

The outline version of the map will be erased and a choropleth map of the first column of data will be drawn using the default 'Unclassed' (16 shadings) method of assigning shadings.

Mapping another variable-

1.5) Click on the spreadsheet window.

This brings the spreadsheet window to the front.

1.6) Click-and-drag on the bottom-right corner of the spreadsheet to expand the size of this window.

Only one column of the spreadsheet was visible previously. At least three columns should now be visible.

1.7) Select another variable to map by clicking on its top header line.

The entire column should be blackened. Scroll down the spreadsheet if you wish to assure yourself that the entire column has been selected.

1.8) Click-on **Draw Map**

The data that you selected will now be depicted in map form.

Changing the Classification Method-

1.9) Select **Standard Deviation** from the **Classify** sub-menu in the **Data** menu.

This will change the classification method to 'Standard Deviation.'

1.10) Select **5** from the same **Classify** sub-menu.

This will change the number of classes (shadings) to five.

1.11) Select **Map** from the **Map** menu.

Selecting **Map** has the same function as clicking on **Draw Map** in the spreadsheet window. The advantage of selecting **Map** in this case is that the spreadsheet window does not have to be brought to the front.

Changing the number of classes-

1.12) Press 'command - 4'

Most of the options in the **Classify** sub-menu have command-key equivalents. This command key combination specifies four classes.

1.13) Press 'command - M'

This command key equivalent for the **Map** option will now create a four-class map using the previously defined standard deviation classification.

Adding a Title-

1.14) With the mouse, create a rectangular frame toward the top of the graphics window.

If the frame you are defining is within the frame of the map, press the control key while defining the new frame.

1.15) Select **What** from the **Text** menu.

This opens a dialog to change the color, font and size of the displayed text. There are seven different map-related text items that may be placed in the graphics window. The **What** item is the main title.

1.16) Make desired changes to the text and click on 'Set.'

The text will be drawn in the center of the specified frame.

Adding a Legend-

1.17) With the mouse, create a box-like frame toward the bottom-left corner of the graphics window.

1.18) Select **Legend** from the **Legend** menu.

The legend is sized to fit within the height of the specified frame. The width is a function of the numbers in the legend.

Adding a Neatline-

1.19) With the mouse, create a new frame that encompasses all existing map elements.

All existing frames will be enabled since they are now surrounded by another frame.

1.20) Select **Neatline** from the **Legend** menu.

This erases the screen and redraws all map elements. The neatline is drawn first so that it will be in the background relative to all other map elements.

Printing a Map-

1.21) Select **Page Setup** from the **File** menu. Click on 'OK.'

This command opens the Page Setup dialog. Make sure the correct printer has been selected and that the printer is on.

1.22) Select **Print** from the **File** menu. Click on 'Print.'

This opens a dialog that allows the user to print either the entire page or the contents of the currently enabled frame.

1.23) Click on 'OK' in the print dialog.

This will print the contents of the graphics window.

Creating an Animation-

1.24) Select **Animation Setup...** from the **Animate** menu.

This opens a dialog to define the classification to use for the animation.

1.25) Click-on Standard Deviation check box and the check boxes corresponding to 2, 3, 4, 5 and 6. Click-on 'Unclassed' to deactivate this classification. Click 'OK.'

This will create a classification animation by viewing one variable with one classification method but five different numbers of classes.

1.26) Select **Animate...** from the **Animate** menu.

This dialog depicts a scrollable list of the variables that are currently in the spreadsheet.

1.27) Click-on one of the variable names in the scrollable list, then on OK.

The variable that was chosen has now been selected for animation and the animation sequence begins. A 'Do It' dialog provides information about how many variables, classification methods and number of classes are being put into animation. Click on 'Do It' to proceed. If sufficient memory is not available to complete the animation, another dialog will appear in the upper-left corner. If not much additional memory is required, return to 'Animation Setup...' and deselect '6' classes and proceed to 'Animate...' command. If there is sufficient memory, the individual maps will be created as bit-maps in memory. During the creation process, each map will be displayed individually on the screen with an animation frame number in the upper-left corner. After the last map has been created the animation will begin. The five maps will now be displayed at one second intervals.

1.28) Click on the map (hold button down) to display the animation control pop-up dialog.

This dialog allows you to control various aspects of the animation.

1.29) Select 'Speed' from the pop-up dialog and specify 60 frames per second by releasing the mouse on this option.

This will change the speed of animation to 60 maps per second. This is the fastest speed; a little too fast.

1.30) Select 'End' from the pop-up dialog to stop the animation

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This ends the introductory step-by-step sequence.

2. Step-by-Step: Graphics

The instructions provided here assume an understanding of the procedures described in the introductory step-by-step. If you feel uncomfortable with those steps, you should repeat them before proceeding.

This section will explain some more-advanced techniques in creating the map display.

Setup: Create a five-class standard-deviation map of the US depicting one of the variables provided in the US48.Data spreadsheet file. Create a legend in the lower-left corner.

Legend Options: Histogram

2.1) Select **Legend Setup...** from the **Legend** menu.

The legend setup dialog provides control over various aspects of the legend. There are three basic legend types: box (default), rectangle and histogram. The rectangle option produces rectangular legend boxes. The histogram provides a graphic display of the number of observations in each class by varying the length of each legend box.

2.2) Click-on the Histogram button, then **OK.**

2.3) Select **Legend** from the **Legend** menu.

The previous legend will be erased and the histogram legend will be drawn. You may have to move the legend if the legend bars have been partly drawn off the screen.

Adjusting the histogram width-

2.4) Select **Legend Setup...**

We return to the legend setup dialog to modify the width of the histogram. Look for the histogram width scroll bar.

2.5) Click on the histogram width scroll bar until it indicates '1.0'

This changes the width of the histogram to 1 inch. The default setting is 1.5 inches.

2.6) Select **Legend**.

A histogram legend with a 1 inch width will be drawn.

Legend text font/style-

2.7) Select **Legend Setup...**

2.8) Click-on the **Font/Style** button.

This opens still another dialog that allows you to change the size, font style and the color of the lettering in the legend.

2.9) Select a different font (Helvetica, Times or whatever is available), click **OK.**

This returns you to the legend setup dialog.

2.10) Click **OK** to exit the legend setup dialog.

2.11) Select **Legend**.

The legend will be redrawn and the class break numbers will use the new font.

Legend Setup Summary:

A number of other options are available through the legend setup dialog. Legend boxes can be apart (default) or together and both the vertical distance between the legend boxes, and the horizontal distance between the legend boxes and the numbers, can be adjusted.

Bar Scale-

The bar scale is a separate map element. Compared to the map, legend and text graphics elements, the bar scale is static because it is not updated when a new variable or new classification is chosen.

2.12) With the mouse, create a new frame toward the bottom of the graphics window.

2.13) Select **Bar Scale** from the **Legend** menu.

The resulting bar scale may extend beyond the frame size specified because of the rounding of the distance. If the bar scale is too long or too short, adjust the frame, erase the existing bar scale with **Clear** (control-B) and select **Bar Scale** again.

Bar Scale in miles-

2.14) Select **Bar Scale Setup...** from the **Legend** menu.

The setup dialog allows you to modify the height of the bar scale, the font/style of the legend numbers, the font/style of the 'Kilometers' or 'Miles' text and whether the scale itself is in KM or miles.

2.15) Click-on the 'Miles' button, then OK.

2.16) Clear the existing bar scale (control-B).

2.17) Select **Bar Scale**.

The bar scale will now be redrawn in miles.

Text-

As mentioned previously, there are seven separate text elements that can be placed on the screen and updated with each new map. These are listed in the **Text** menu as **Where**, **What**, **When**, **Legend** (How), **Source** (Who), **Classification Method** and **Accuracy Index**. The **Where** text comes from the map file when it is displayed. **What**, **When**, **Legend** and **Source** are stored in the data file and may be edited with **EditText** from the **Text** menu. The Classification Method field contains the current classification method (Unclassed, Standard Deviation, Equal Interval, Quantile, Natural Breaks and User-Defined) and the Accuracy Index is a number that indicates the overall quality of the classification (the closer the number is to 1, the better the classification, see Appendix 4).

The placement of each text element is up to you but in general the Where, What and When fields should be placed near the top and the remaining text fields should be near the bottom.

2.18) Place all of the text elements on the screen.

Again, the procedure is to define a frame and select the particular text element. Change the size, font and style or color if you wish.

2.19) Select **EditText** from the **Text** menu.

This presents a dialog for the editing of the four variable-related text fields.

2.20) Change the wording of one of the text fields, click **OK**.

2.21) Press command-M to redraw the map.

The modified text will be visible on the screen.

2.22) Save the changes to the text by enabling the spreadsheet window and selecting **Save** from the **File** menu.

Map-

The map outline is stored in the file as a series of x,y coordinates and may therefore be displayed at any size. The frame that is initially defined at program start-up is used to size the initial map that is displayed when the data file is opened. In the following steps, we will redraw a map that has been cleared, re-size the map and produce a map at a particular scale.

Redraw the map

2.24) Select the map by clicking on it.

The frame of the map should be activated.

2.25) Select **Clear** from the **File** menu (or control-B).

This erases the map. If **Map** is chosen, all other map elements will be redrawn except for the map.

2.26) Define a frame where the map was located.

This frame can actually be defined anywhere on the screen and can be of any size. Only the upper-left corner point will be used to place the map.

2.27) Select **New Map** from the **Map** menu.

The blank outline map will be drawn on the screen. This map was stored in memory when the map was initially displayed and is used each time the map is updated. Move the map to the proper position once it has been placed on the screen. Since the map is now a visible map element, it will be updated with each new classification or variable that is selected.

Changing the size of the Map-

While it is possible to enlarge the map on the screen by simply enlarging its frame, this does not enlarge the map stored in memory. The next time the map is updated it will be redrawn at its original size. In order to resize the map and calculate the proper display scale, the map file must be opened and re-displayed, as follows:

2.28) Enlarge the map on the screen by enlarging its frame. Press the shift key to maintain the proper aspect ratio.

Enlarging the map in this way is the best way to estimate the proper size for the map. You can also enlarge the map in the reduced-view window if you like.

2.29) Erase the map (control-B).

The map will be erased but the frame will still be visible.

2.30) Select **Display in Frame...** from the **File** menu.

The open file dialog will only display **MacChoro II** map files.

2.31) Find the file called 'US48.Map' and click-on Open (or double-click on the file name).

The map file will be displayed in the frame.

Displaying the map at a specified scale-

2.32) Erase the map by selecting **Clear** (control-B).

2.33) Select **Display at Scale...** from the **Map File** sub-menu.

An open file dialog will display only **MacChoro II** map files.

2.34) Open the US48.Map file.

A dialog will then appear requesting a display scale for the map as the denominator of a representative fraction. This scale can be computed by finding the ratio of map distance to ground distance. Suppose one wanted a map of the US that was approximately four inches across. The corresponding ground distance for the US is approximately 3000 miles. We can express the desired scale as 4inches : 3000 miles or 1 inch : 750 miles. The representative fraction is computed by making the units equal on both sides. To convert 750 miles to inches, we multiply by 63,360 (5280 ft in a miles X 12 inches in a foot). This gives us 47,520,000 inches. The representative fraction for the map we want is 1:47,520,000. We might want to round to 1:50,000,000 which would give us a map slightly smaller than four inches.

2.35) Enter 50,000,000 and click **OK**.

The map will be displayed in the upper-left corner of the graphics window. To verify that the scale is correct, create a bar scale that is approximately four inches wide. The total distance represented by the bar scale should be 3000 miles.

Change Shadings-

2.36) Select **Change Shadings...** from the **Window** menu.

This is a special dialog that makes it possible to create new shading sequences.

2.37) Click-on the 'Shadings' button.

This creates two columns of shadings. The column on the left is the shadings that are currently defined and used in the current map and legend. The column on the right depicts the 24 shadings that are available. To change a shading, enter its number and the number to which it is to be changed.

2.38) Enter the number corresponding to the black shading in the left column and '22' under the second column, click on the 'Update' button.

We are changing the black shading in the map to a dark-grey shading (22). After the 'Update' button is hit, the left column of shadings will be redrawn to reflect the change. Make another shading change if you wish by following the same procedure.

2.39) Click-on **OK** to exit the change shading dialog.

The map display will be redrawn and the shading change will be evident in the map and

legend.

2.40) Select **Default Shadings** from the **Map** menu.

This returns the shadings to their default setting.

2.41) Select **Map** to redraw the display.

The black shading will again be incorporated in the map.

Creating a high-quality printed map-
The resolution of the Macintosh screen is approximately 72 dots/inch while the Laserwriter can produce 300 dots/inch. To take advantage of the higher resolution of the Laserwriter, a map must be produced on the screen that is four times larger than the desired size. The map is then printed at 25% of the original size.

2.42) Select **Graphics Setup...** from the **Window** menu.

This option is only available when the graphics or the reduced-view graphics window is in the foreground.

2.43) Enter '2' for the number of pages across and down.

The graphics window will now consist of four pages.

2.44) Click the **Page Setup** button within this dialog.

Page Setup may also be accessed through the **File** menu.

2.45) Select landscape orientation by pressing the icon of a page on its side.

Since the map of the U.S. is wider than it is long, the map will be drawn with this orientation.

2.45) Enter '25' in the percent reduction field, click **OK** to exit.

Return to the graphics setup dialog.

2.46) Click **OK** to exit the graphics setup dialog.

The reduced-view graphics window will depict the page-breaks for the four pages.

2.47) In the reduced-view window, create a frame for the map. Select **Display in Frame...** to display the US48.Map file.

2.48) Add legend, text and neatline.

The option key can be used to zoom into a portion of the display. See the explanation of these options in the **Graphics Setup** dialog.

This ends the graphics step-by-step section.

3.1 Step-by-Step: Data manipulation

The **Data** menu provides a variety of options for the manipulation of data. Most of the options create a new column of data. The general procedure is to enable a blank column and select one of the menu items.

Setup: Open the US48.Data data file. Enlarge the spreadsheet window to the maximum size possible on your screen.

3.1) Enable a blank column by clicking on its header.

The entire column should be blackened.

3.2) Select **Modify by Data** from the **Data** menu.

This presents a dialog with two scrollable lists showing the headers from every column in the data file. Between the two scrollable lists are buttons for the mathematical operations that may be performed.

3.3) Select 'Per Capita Income 1983' from the first scrollable list. Select 'Per Capita Income 1980' from the second scrollable list. Click-on the button corresponding to the minus sign ('-'), then **OK**.

By subtracting the 1980 per capita income data from the 1983 data, we find the absolute difference in per capita income during this time period. The column should immediately reflect the subtraction.

3.4) Select **EditText** from the **Text** menu.

The **What** field shows how this variable was calculated.

3.5) Enter the header line for this column by clicking on the header portion of the column and typing 'Change in Income.'

3.6) Click-on **Draw Map** to depict this new variable.

3.7) Enable the next blank column by clicking on its header.

We now want to create a variable that reflects the percent change in per capita between 1980 and 1983. This will be done by dividing the absolute change data, just computed, by the 1980 per capita income data which is the 'base' data.

3.8) Select **Modify by Data** from the **Data** menu.

In the first scrollable list, select the 'Change in Income' variable. In the second scrollable list, select 'Per Capita Income - 1980.' Click-on the button corresponding to '/' (division) and click **OK**. The result of the division will appear in the selected column. This data will be in decimal form. We still must multiply by 100 to create the proper percentages.

3.9) Select **Modify by Constant** from the **Data** menu.

Because a blank column has not been selected in which to place the results of this operation, the program will ask whether this is really what you want to do - write over the existing data. There is no reason to save this data, click-on 'Do It.'

3.10) Select 'Change in Income' from the single scrollable list in this dialog, click on the button corresponding to '*' (multiplication) and type '100' into the constant field, then **OK**.

The multiplied data will appear in the same column.

3.11) Click-on **Draw Map** to display the 'Percent Change in Per Capita Income 1980-1983' map.

3.12) Select **Modify non-linear...** from the **Data** menu.

Data that has a non-normal distribution (skewed) can often be normalized by applying a log base 10 or square root function. This dialog gives you the option of converting a data set with either of these two functions and reverting back to the original data. A 'Do It' dialog will ask you whether you really want to write over the data you have selected - click on 'Do It.'

3.13) From the scrollable list, select 'Change in Income.' Leave the log base 10 button enabled and click **OK**.

The converted data will appear in the same column.

3.14) Update the map and legend to verify the conversion.

3.15) Select **Modify non-linear...**

3.16) Select 'Change in Income' from the scrollable list. Click-on the button for 10**x conversion and on **OK**.

This will convert data back to the original, unlogged form.

3.17) Select **Modify by Threshold...**

This option makes it possible to adjust the upper and lower boundaries in the data. The dialog presents a scrollable list of the variable names and the minimum and maximum data values of the current data set.

3.18) Select 'Change in Income' from the scrollable list, enter a smaller number for the upper threshold and a larger number for the lower threshold, click **OK**.

The effect of thresholding is to emphasize differences in the middle values within the distribution. The extreme values are grouped. Thresholding cannot be undone. Don't threshold into an existing column.

3.19) Update map and legend to verify the conversion of the data set.

Creating a new data file-

3.20) Select **Select All** from the **Edit** menu.

This will enable all graphic elements on the graphics screen.

3.21) Select **Clear** (control-B).

Erase all of the elements.

3.22) Select **CreateDataFile** from the **File** menu.

A data file is tied to a map file. The dialog presented here will ask you to open a map file.

3.23) Open the 'US48.Map' file.

The map file will be displayed on the graphics window. Another dialog will ask you to specify a name for the new data file.

3.24) Type 'myUS48.data' for the name of the new file.

A spreadsheet will be displayed with 50 columns and 48 rows.

3.25) Type in your data.

Reading a MacChoro v.1 data file-

MacChoro v.1 text files were single variable files. **MacChoro II** converts this file into a single column of a spreadsheet.

3.26) Select **ReadOldData** from the **File** menu.

3.27) In the open file dialog, select a MacChoro v.1 data file.

The data will be inserted in the current column of the spreadsheet. The header from the file will also be inserted in the corresponding text fields.

How to enter missing data-

3.28) In the spreadsheet, enter a missing value for a cell by typing '999999999' (nine nines).

The number will be rounded to 1,000,000,000. Any number above this value will be designated as missing data.

3.29) Enable the column and click on 'Draw Map.'

The corresponding polygon will have a diagonal shading and an extra 'missing data' box will appear in the legend.

4.0 Map File Creation and Manipulation

Map files contain the x,y coordinates that define the outlines of the areas to be mapped. **MacChoro II** map files can be created in one of several ways:

1. From a MacChoro v.1 text map file.
2. From a MapMaker text map file.
3. From a PICT file containing polygons (through Postscript)
4. From the USCounties coordinate file with **polyEXTRACT**

(This command is part of **MacChoro II** but the USCounties file is not. Instructions on using this option are provided with the file).

Once the map file has been created in **MacChoro II** format, polygons may be deleted, the numeric and text id's may be changed, a scale designation can be added or computed and the maps may be rotated.

Converting from a MacChoro v.1 map file-

Setup: You will need a MacChoro v.1 map file. If none is available, you may skip this section.

4.1) Select **to MacChoro II** from the **Convert** sub-menu in the **Map File** sub-menu of **File**.

Select and open a MacChoro v.1. map file.

4.2) Specify a new file name in the new file dialog, click OK.

The map file will be displayed on the screen.

Converting from a MapMaker Text File-

Setup: You'll need the MapMaker program and a MapMaker map file to create the MapMaker text map file.

4.3) In the MapMaker program, select 'Convert Boundary Files...' from the 'File' menu.

4.4) In the next dialog, click-on 'MapMaker Boundary to Text.'

4.5) In the next dialog, click-on 'Written out in projected form.'

4.6) In the open file dialog, select a MapMaker map file.

The map file will be converted to a text format. The map will not appear on the screen.

4.7) In the new file dialog, type a name for the text map file.

4.8) From **MacChoro II**, select **MapMaker to MacChoro** from the **Convert** sub-menu.

This will open an open file dialog.

4.9) Select the MapMaker text map file.

4.10) Enter a name for the new map file in the open file dialog.

This will be the name for the **MacChoro II** map file. A dialog will provide information concerning the status of the conversion.

Conversion from a PICT file with polygons-

Setup: You'll need a file in PICT format that contains polygon objects. This can be created in almost any graphic program such as MacDraw or SuperPaint. You may have to explicity save the file in PICT format.

A good source of map files in PICT format is MicroMaps (New Jersey). They provide PICT map files of most areas of the world.

If you cannot find the map that you need in PICT format, you might try to create it yourself. A data tablet would make the task easier. Select the polygon tool and begin to define the individual polygons. The snap-to-grid option would make it easier to match polygon sides. Remember to save the file in PICT format.

4.11) From **MacChoro II**, open the PICT file that contains the polygon objects.

The graphics window should be in the foreground. Select **Open** from the **File** menu to open the file. The map will appear in the graphics window.

4.12) If the map exceeds one page, reduce its size by reducing the size of its frame. Use the shift key to maintain the aspect ratio.

4.13) Select **Chooser** from the **Apple** menu. Select the LaserWriter as the printer.

If the LaserWriter icon is not present, you will have to install the LaserWriter Prep and LaserWriter files on the System Folder.

4.14) Select **Print** from the **File** menu. Click 'Print' in the first dialog.

We are <u>not</u> printing the map. The purpose here is to create a Postscript file. This is a text file that contains the actual instructions that are sent to the LaserWriter. The procedure to produce a Postscript file is to press control-F just as the OK button is selected in the print dialog.

4.15) Prepare to press control-F, click on **OK**, press control-F immediately.

This is a tricky procedure but a dialog will immediately inform you whether you were successful with 'Creating Postscript file...' If this message does not appear, CANCEL the print command and select **Print** again. It is important to press control-F immediately after clicking **OK** in the print dialog. This procedure will create a file called 'Postscript0.' These files are numbered consecutively if more than one is created.

4.16) Select **Postscript to MacChoro** from the **Convert** sub-menu.

An open file dialog will appear with only Postscript files listed.

4.17) Open the 'Postscript0' file.

4.18) Enter a name for the new **MacChoro II** map file in the open file dialog.

The conversion process begins at this point. The postscript file is first scanned to determine how the polygons have been formated. In the second pass, the polygons are actually extracted and written to the file. A dialog informs the user of the current status. At the end of the conversion process, the map is displayed on the screen.

Editing a map file-

The **EditID** option makes it possible to add ID's to the polygons and delete polygons that you do not wish to use. For example, the result of the Postscript to MacChoro conversion above created a map file that does not have ID's. ID's must be added to the file before it can be used for mapping. Also, extraneous polygons may also have to be removed from this file.

EditID opens and displays a map file in the upper part of the graphics window. Each polygon is shaded black in succession and a dialog is presented to enter the character and numeric id. One can also click on the **Delete** button to remove the polygon.

4.19) Clear the graphics window and move to the top-left portion of the page.

4.20) Select **EditID** from the **File** menu and open a **MacChoro II** map file such as the one created in the last step.

The map will be displayed in the lower part of the window, the first polygon will be shaded black and a dialog will appear above the map.

4.21) Enter character ID and numeric ID in the dialog window, click **OK**. Continue the process until every polygon has been labeled.

The character ID is useful when printing data. The numeric ID shown is the number of the particular polygon. You should enter the proper numeric ID for the area so that it will appear in the correct order in the spreadsheet. Also, polygons belonging to the same statistical unit, such as the lower and upper portions of Michigan, must have the same numeric ID.
If the polygon is not needed (perhaps a small island that may not even be visible), click 'Delete' to purge it from the map file. Polygons that are deleted will be shaded with a lined shading pattern. If 'Quit' is clicked, the procedure stops and changes are <u>not</u> saved.

Map File Information-

The **MapInfo** option displays information about a map file. The information listed includes:

1. the scale of the map;

2. the number of polygons;
3. the number of statistical units;
4. the number of x,y coordinates;
5. the name of the area represented.

4.22) Select **MapInfo** from the **MapFile** sub-menu.

The map file will be displayed and a dialog will include information about the map file.

Map Name-

MacChoro II map files include a name to describe the area represented. This name is used as the **Where** text field. The **MapName** command is used to change the name of the map.

4.23) Select **MapName** from the **MapFile** sub-menu and specify a map file.

The map will be displayed and a dialog will appear with the current map name.

4.24) Enter a new name (or leave it) and click **OK.**

The new map name will be inserted in the map file.

Scaling a Map-

There are two ways to add the scale to a map file. The first is simply to enter the scale number - representative fraction - with **DefineScale**. This is possible when you know the scale of the map. For maps of US counties produced with **polyEXTRACT** the scale is 1:50,000,000 (only the second number is stored in the map file. If you don't know the name of the map, **ComputeScale** can be used to associate a distance on the displayed map with a ground distance.

DefineScale-

4.25) Select **DefineScale** from the **Map File** menu and open a map file from the open file dialog.

The map file will be displayed and a dialog will ask for the map scale.

4.26) Enter the map scale, if known, and click **OK**.

The number that was entered will be added to the map file.

Compute Scale-

The general procedure is to define two points on the map with the mouse and then provide a ground distance.

4.27) Select **ComputeScale** from the **Map File** menu and open a map file from the open file dialog.

The map file will be displayed and a dialog will ask you to click on the first point.

4.28) Click on the first point, then the second point.

4.29) Enter the ground distance in the following dialog.

The scale will then be computed based on the information provided (map distance/ground distance). This scale will be added to the map file.

Rotate Map-

Maps often need to be rotated slightly especially if they have been projected with one of the conic class of projections. Most maps of the United States have been projected with the Albers Equal-Area conic projection. The eastern and western states are usually shifted to the side. The **Rotate** option can be used to rotate a map file.

4.30) Select **Rotate** from the **Map File** sub-menu and open a map file.

The map file will be displayed in the current frame. A dialog will ask for the angle to rotate the map file.

4.31) Enter a number between -360 and +360 and click **OK**.

The map will be rotated, saved in the original file and displayed on the screen. At this point, you can enter another rotation or **Cancel** to stop. It may take several tries to achieve the best rotation.

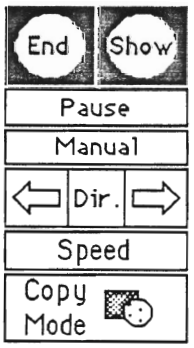
Part II

Animation Control

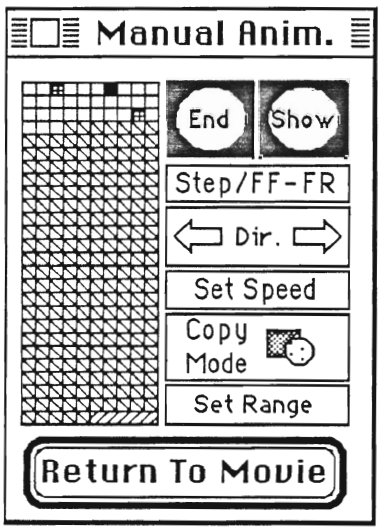
There are two main controls for map animation: 1) the pop-up menu palette; and 2) the control panel dialog that is accessed through the manual button in the pop-up menu palatte.

Both the palette and the dialog are pictured below. You will notice similarities between the two, with many of the functions the same. The major distinction is that the pop-up menu palette only accepts one command at a time. The control panel dialog can be placed off to the side of the animation for a continuous control of the animation.

Pop-up Menu Palette



Control Panel Dialog



We will first discuss the shared options between these two controls.

1) **End**: Terminates the animation. (Also possible by clicking in the menu bar).

All animation pictures will remain in memory until that memory is required for another operation. The animation can be easily restarted from the beginning by selecting **Rerun** from the

Graphic modification of the map file-

To create a map with a perspective view or to smooth the outline of a polygon, the general procedure is to save the map as a PICT file, make the modifications with an object-oriented, graphics program like MacDraw or SuperPaint and convert back to a **MacChoro** map file through the postscript file. The problem with this approach is that the PICT file does not include the ID's for each polygon. With the **SaveID's** option it is possible to save the ID's in a file. The **Combine with ID's** option recombines the ID's with the map file created with the postscript file procedure.

4.32) Select **Display in Frame** to display the US48.Map file on the screen.

4.33) Save this blank outline map as 'US48.PICT' by selecting **Save** from the **File** menu.

4.34) Select **SaveID's** from the **Convert** sub-menu. Specify 'US48.Map' as the map file. Save the ID file as 'US48.Map.ID'

The editor window will be opened and a dialog will ask whether the existing text in the editor can be deleted. Click 'Do It.' The ID file will then be displayed in the editor window. This file has already been saved as 'US48.Map.ID'

4.35) With a graphics editing program, convert the map file and save as a PICT document. Return to **MacChoro II** and open this document into the graphics window. Produce a Postscript file with **Print** and use **Postscript to MacChoro** to create a map file.

At this point, we have modified the map and converted from PICT back to a MacChoro II map file. The only problem with this file is that it does not contain the ID's.

4.36) Select **Combine with ID's**. Open the map file created with the Postscript option. Then open the ID file created with the **SaveID's** option.

If the number of polygons are identical, the ID's will be recombined with the map file.

Animate menu.

2) **Pause**: Pauses the animation.

The current frame will continue to be displayed until Show is selected. Selecting Pause while already in pause mode will have no affect.

3) **Show**: Restarts the animation at the point at which it was last paused.

Selecting Show while the animation is not Paused has no effect.

4) **Direction**: Changes the direction of the animation sequence.

The left pointing arrow is backward and the right pointing arrow is forward. Selecting either while already running in that direction has no effect.

5) **Speed**: Activates a pop-up palette to change the speed between 60 frames a second to one frame every 60 seconds.

The upper 16 buttons control the number of frames per second and the lower 16 buttons control the number of seconds per frame.

6) **Copy Mode**: Activates a pop-up palette to select the copy mode.

The copy mode specifies how the drawing will appear on the screen relative to the background. For example, 'Copy' is the default black on white drawing while 'Not Copy' draws the animations in white on a black background. Selecting a mode which is already in effect produces no change in operation.

The **Manual** button opens the control panel dialog. This dialog remains open until the **Return to Movie** button is clicked, the close-box is clicked or the "Return" key is pressed. Any of these will return control to the animation and the pop-up menu palette. We will now discuss the options available from the control panel dialog.

1) **Show**: This option is functionally similar to the Show item in the pop-up menu. When Show is selected from the control panel dialog, the cursor changes to a hand help up in the Halt position. This is a reminder that you can only exit Show mode by stopping the animation. You do not need to click in any particular place, simply click the mouse and you are back in control panel pause mode.

2) **Step/FF-FR**: The animation will advance by one frame each time the mouse is clicked on this item. If the mouse is clicked and held for more than 3/4 of a second, the animation will proceed at the fastest possible speed in the currently selected direction.

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3) ***The cells***: The matrix of cells on the left provides a visual indication of the available frames in the map animation. Those that have lines through them are not defined and do not contain a picture. The white cells and those with a horizontal and vertical cross contain a valid frame.

Numbering of the cells starts in the upper left hand corner and progresses right. Each row contains 10 frames. There are a total of 260 cells of which 255 may be assigned an animation frame (the last 5 cells on the botton with a single slash can not be defined).

Clicking and dragging within the active cells will display the corresponding cell. Moving the mouse within the active cells while holding the button will show each frame in rapid succession. This can be used to find a particular map or to move quickly back and forth between two adjacent frames.

4) **Set Range**: Sets the first and last frame to display in a sequence. When selected, the cursor changes to indicate two frames of a strip of film. Once selected, a range of frames to show is chosen by clicking on the beginning and endings cells. If the first frame selected is after the last frame selected, the direction of animation will be updated to keep track of the proper direction. If the other direction was actually desired, this may be changed by clicking on one of the direction arrows.

If **Set Range** has been chosen but you do not wish to proceed with selecting the first and last frame, click anywhere outside the cell structure. This will de-active the **Set Range** command.

This ends the Animation Control section.

Image Mapping Systems

MacChoro II
with Map Animation

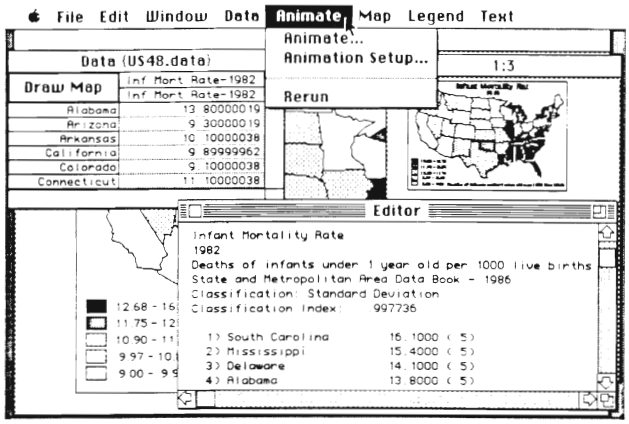
516 S. 51st Street Omaha, NE 68106

What is MacChoro II?

A computer mapping, data classification, map design and map animation program for the Apple Macintosh computer. **MacChoro II** uses the excellent user-interface and graphics capabilities of the **Mac**intosh for the creation of **choro**pleth maps. The choropleth method uses shadings to represent values by area and is one of the most common methods of statistical mapping.

Map Animation -- The program creates map animations by placing a series of maps in off-screen memory. The more memory you have, the more frames you can create - up to 255. These maps may depict different variables and/or different classifications of the same variable and can be used to examine the effect of data classification or the change in the distribution of a variable over time. The animation sequences may be displayed at speeds up to 60 frames per second and saved to disk and later re-played.

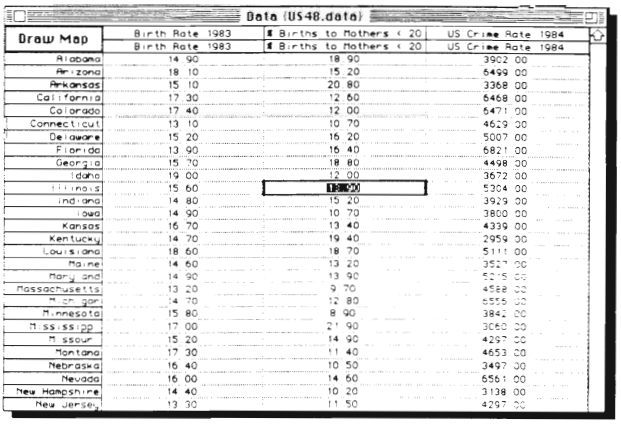
Windows and Menus -- The program includes four separate windows: 1) a graphics drawing window that can be as large as 39 by 49 pages; 2) a fully functional reduced-view graphics window; 3) a spreadsheet data window and; 4) a text-editor window for output of classification statistics. The program consists of eight menus (File, Edit, Window, Data, Animate, Map, Legend, Text) and four sub-menus (Map File, Convert, polyExtract, Classify).



How does MacChoro work?

A **MacChoro II** display consists of the map, legend, neatline and seven text elements. The user defines a rectangle for each element by moving and 'clicking' the mouse at opposite corners. Once an element has been placed on the screen, it is updated with each new classification or variable.

Spreadsheet -- The **MacChoro II** spreadsheet displays area names in the first column and editable variable names across the top. Four separate text fields may be defined for each column of data. A column of data may be modified through division, multiplication, subtraction or addition by another column or by a constant. Logarithm or square root transformation of data is also possible. Data may be copied from a spreadsheet program such as Excel.



Four Methods of Data Classification -- Four standard methods of data classification in addition to an unclassed option are included:

- standard deviation
- quantile
- equal-interval
- natural breaks

A user-defined classification option is also available. Each of these classification methods may be displayed with between 2 to 16 classes.

Transfer Map to other Programs -- Once a map is created, it may be transferred via the Clipboard to other programs such as MacDraw II, SuperPaint II, MacWrite II, Word and PageMaker.