

# GRAPH BOX



MINERVA

**GRAPHBOX**

**FOR THE ARCHIMEDES**

850922



**Development and Programming**

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**Documentation**

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**IMPORTANT** No support for the GraphBox application will be given unless the Serial Number is quoted AND we have received your registration form. You should contact the dealer who supplied this manual if you did not receive a form at the time of purchase.

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Since Minerva Software has no control over the circumstances in which the software is used no responsibility can be accepted for any consequential loss or damage due to the use or presence of the software.

Within this manual the term BBC is used as an abbreviation for British Broadcasting Corporation.

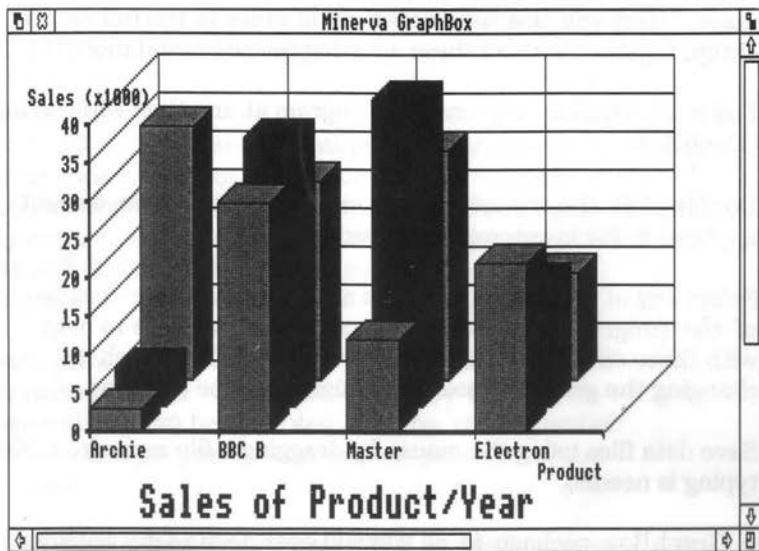
GraphBox is an impressive data presentation package for the new generation of multitasking computers. GraphBox allows data to be imported directly from other packages while it has its own GraphEdit utility to allow data to be entered directly. The days of wrestling with a calculator and graph paper are over - existing company sales data can be used directly to produce the graph most suited to a sales seminar, or the managing director. Statistical data can be displayed to suit the scientist, the teacher, or the accountant. Now professional graphs can be produced in minutes, rather than hours. There are twenty styles of graph available in the package to suit different types of data and different ways of displaying it.

GraphBox makes full use of the Archimedes RISC OS multitasking environment providing users with a friendly, easy to operate package. Users will now have access at all times to the full Acorn Desktop, together with all these amazing features (and more !):

- ◇ Full multi-tasking : run another program at any time while using GraphBox.
- ◇ Double-click the mouse pointer on a data file and the correct application file is automatically loaded.
- ◇ Select any of the desktop utilities at any point in the middle of the program. Not only is the calculator available to help with those difficult calculations, but now, facilities such as changing the graphics mode and palette may be accessed.
- ◇ Save data files using the mouse by dragging a file name icon. No typing is needed.

The GraphBox package is all you will ever need to display your figures graphically. Your statistical data can be imported effortlessly, and stored on hard disc or on a single floppy disc, ready for instant display. With this new system, you need never lose track of a single figure. Plotting graphs for any purpose whether scientific, educational or commercial can be easily achieved with these specially designed features:

- ◇ Drag CSV, TSV, ASCII and other files from almost any suitable application and just drop it into GraphBox.
- ◇ Select the graph type from a comprehensive list of twenty, ranging from a straight forward bar chart to a polar graph.
- ◇ Allows multiple graphs on one axis.
- ◇ Choose whether any of the X, Y or Z axis is to be linear, logarithmic, squared or a function of your choice.
- ◇ All mathematical functions are accepted as input including COS, SIN, RAD, ACS, LN etc.
- ◇ Manipulate the graph by dragging the save icon into any other application such as Draw. You are then able to change the size, add more graphs, design fancy titles etc.



- ◇ Drag the graph to the printer icon to obtain a hard copy of your masterpiece. All printers supported by RISC OS may be used.
- ◇ Facility to display and output a monochrome print. This may give improved results with some printers.

- ◇ Integrates with ALL suitable RISC OS applications eg. spreadsheets, databases, DTP, CAD etc.
- ◇ The following graph types are available:

Scatter Chart	3D Bar Chart
Scatter with Error Bars	Stacked Bar Chart
Line Graph	Percentage Bar Chart
Line Graph with Error Bars	Horizontal Bar Chart
Bubble Chart	Horizontal 3D Bar Chart
Polar Scatter Chart	Horizontal Stacked Bar Chart
Stacked Area Chart	Horizontal Percentaged Bar Chart
Cumulative Area Chart	Pie Chart
Bar Chart	Surface Chart
Wire Surface Chart	Polar Line Graph



### 2.1 HOW TO USE THIS MANUAL

Computer manuals by their very nature have to contain technical information, some of which may be unfamiliar to the new user. We have found over the years that problems often occur not so much because the documentation is poor, but rather because users try to run before they can walk! Failure to use documentation correctly causes great difficulty; complex information is read before the basic concepts have been understood.

Research has also shown that people do not take in vast amounts of textual information without reinforcement by actually performing the tasks detailed in that text. Minerva Software now includes, as standard, an "experimental" section, with pre-programmed data supplied on disc. This really does reduce appreciably the time taken to get to grips with the product and we suggest that you do make use of it.

This manual has been sectioned for ease of use and reference, with the aim of introducing all the main features of the software within a few hours. It has been designed so that the user is given some background information in this chapter before proceeding to the experimentation in chapter 3. The GraphBox Application is a very powerful and flexible program, but to obtain the maximum benefit from the system it is essential that the user not only understands its capabilities fully but is familiar with the principles of operation of the Archimedes RISC OS desktop and multitasking environment. Great emphasis has been placed on the experimentation and it is vital that every user works through the section thoroughly. Experience has shown that users who skip through chapter 3 generally make more work for themselves because they are unaware of the short cuts and advanced features of the system.

The section of the manual from chapter 4 onwards may be used for further reference to give a deeper understanding of the system.

The way in which the window environment operates means that many options, such as the watch or the calculator, may be accessed most of the time. It is pointless to continually document such options in each section, so users should refer to the Archimedes User Guide, until they are completely familiar with the workings of this environment.

Throughout the manual the special key presses have been highlighted in reversed type. Any characters to be input have been highlighted using Archimedes style bold type, with a hyphen indicating that two keys should be pressed simultaneously, for example :

**SEL** - press the **Select** button on the mouse.  
**CTRL-C** - press the **CTRL** key and the **C** key.

All computer prompts have been *highlighted in italics*.  
All computer entries have been shown in BBC font.

## 2.2 DISKS AND SECURITY

Always treat your disks carefully, protecting them against excessive heat, dust and magnetic fields. You should make a working copy of the original disk supplied and then use the original only on start-up. To make a copy of the floppy disk, use the Desktop copy facilities or use *\*BACKUP* from the operating system.

You should always take backups of your data files to ensure that you have a master copy, for reference in the event of accidental damage to or loss of data on your current disks. We recommend that you keep two backups and update them regularly.

## 2.3 GRAPHBOX AND RISC OS

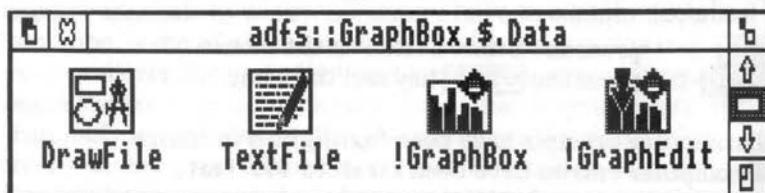
Knowledge of all the normal features of the WIMP environment (mouse, pointer, standard window icons, etc.) will be assumed. If the user is not completely familiar with them, he is directed to the Archimedes User Manual / RISC OS Manual.

The user should note in particular that GraphBox uses different types of window. Main windows contain an **X** icon in the top left corner. These will remain open until the user takes a positive action to close them (i.e., selecting the **X** icon). Other "dialogue" windows, not containing such an icon, may "pop-up" from time to time during the program. These are transient; if the user does not respond immediately to them, but instead does something else, the window will disappear, with no action taken.

GraphBox will not work under OS 1.2.

The application should be invoked from the desktop, which appears on power-up. The user should click **SEL**, with the pointer

over the icon of the disk drive where the program is to be found. This brings up a directory window of the disk onto the screen. Clicking **SEL** twice in rapid succession (we shall call this "double-clicking") on the file *GraphBox* in the directory window will load and run the application.



The program will appear as another window on the screen. The disk directory window will still be open, but may be closed at any time. This is done simply by moving the pointer out of the *GraphBox* window and selecting the **X** icon at the top left of the directory window. Of course there may be many other windows present as well, if the multi-tasking system is simultaneously running other applications.

Note that there are several possible errors which may occur when *GraphBox* is called up in a multi tasking environment. A typical cause for the program failing to load is that not enough memory is left after all the other concurrently executing tasks have been allocated their share. In such cases, a pop-up window from the operating system will appear, detailing what is wrong. The error messages contained therein will be found in an *Archimedes / RISC OS manual* and NOT in this manual.

The RISC OS user of *GraphBox* will find the multi-tasking environment of considerable use. For example, if a decision requires some complicated arithmetic to be performed, the calculator may be loaded as a second task and used for as long as necessary, before closing the window again. Similarly, the alarm clock (available on the RISC OS Welcome disk) may be loaded and remain in residence throughout the use of the program. Another feature of use might be a wordprocessor, for composing a letter to your bank manager, with all the up-to-date figures on the screen at the same time.

Needless to say, with all these features available, it is up to the user to be very careful about his or her use of the windows. There is great potential for confusion, especially since it is possible to have *GraphBox* itself running twice simultaneously, as two separate tasks!

## 2.4 SOFTWARE SUPPORT

Please complete and return your User Registration Form which is included with this GraphBox Application manual. Only registered users are eligible for software support. Support is limited to 90 days from receipt of your registration form. If you have any queries regarding the program within that time span you may write or telephone quoting your serial number. Obviously, we cannot enter into any correspondence without reference to the serial number. Support for the Archimedes computer and any products unrelated to this GraphBox Application is not included in this package. Before contacting Minerva Software with any problem please check in the Errors section for a solution.

## 2.5 USER FUNCTION KEYS

The operation of User Defined Function keys is not affected by the use of GraphBox. Many options and commonly typed text may be stored in the function keys.

## 2.6 THE **ESC** AND **BRK** KEYS

The **ESC** key on the left of the keyboard may be used to abort a print routine which is currently being executed. If the **ESC** key is used during a printing process it is advisable to reset the printer.

At no time should the **CTRL-BRK** or **SHIFT-BRK** keys be pressed except as advised.

## 2.7 LOADING GRAPHBOX AND GRAPHEDIT

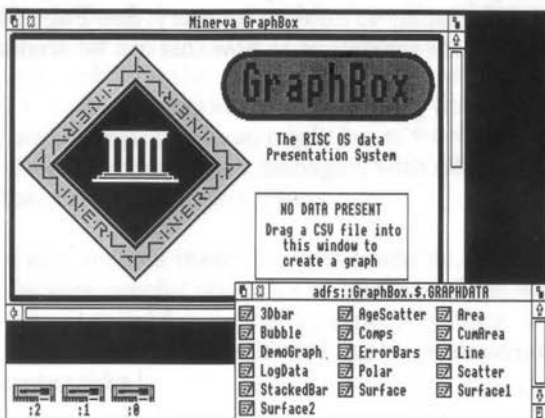
It is possible that having both GraphBox and GraphEdit active at the same time, you may run into problems. We therefore advise you to load GraphEdit first, as this does not grab so much memory. It is possible to run GraphBox first, although you need to use the task display to allocate memory. See Page 64 of the RISC OS user guide for details or how this can be accomplished.

Although GraphBox is fundamentally a data presentation graphs package, its implementation within RISC OS means that its ability to import data from other multitasking packages and export the resultant graph to disc or printer, allows a possible combination of use that could not be sensibly documented, or demonstrated in this experimental section. Therefore, this section will demonstrate the various graph types that can be produced using GraphBox and the input of data using GraphEdit. In addition, MultiStore will be used to show how the necessary CSV file can be created and exported to GraphBox.

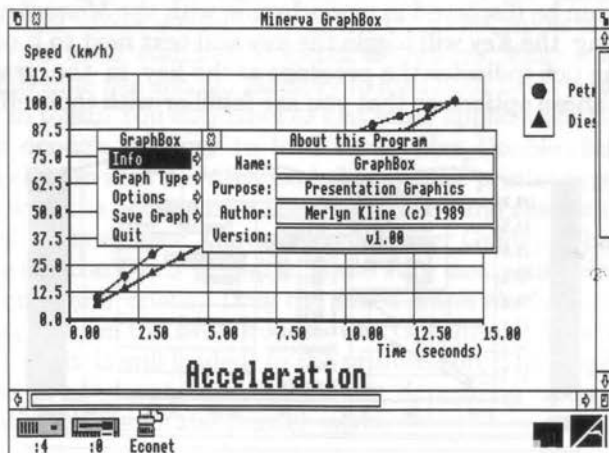
The experimental section assumes that the user knows how to use the mouse, how to select and drag icons, and manipulate windows.

### GRAPHBOX

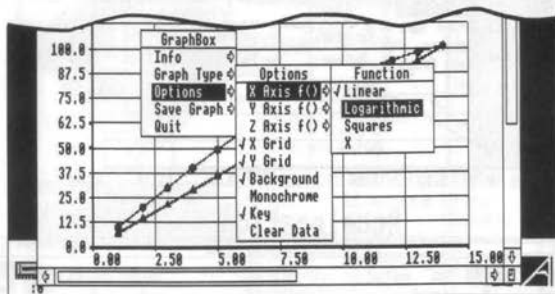
- ◇ **LOADING GRAPHBOX** - Insert the backup copy of the GraphBox disc into the drive. If you are not sure how to make a backup copy, consult the Archimedes documentation. Click **SEL** on the drive icon and double click on the *GraphBox* icon in the displayed directory. If you have a protected version of GraphBox please insert the original GraphBox disc into the drive when prompted and click **OK**. When requested replace the disc with the backup. After a short time the GraphBox window will appear. The standard RISC OS features to re-size the window, bring the window into the foreground and the scroll bars will all be present.



- ◇ **DISPLAYING A GRAPH** - GraphBox allows existing data in suitable files to be imported and displayed in one of several graph formats. In the directory window of GraphBox find and double click **[SEL]** on the *GraphData* icon to display the files that have been provided to demonstrate the different graphs. For ease of use it is suggested that you select the small icon option from the directory *Display* option. (See the Archimedes Welcome Guide). Click and drag *3Dbar* to the GraphBox window. After a short time a bar chart will appear in the GraphBox window. Toggle the GraphBox window to fullsize. Notice that the bar chart is fully labelled with each 'product' occupying a set of bars, and the 'sales' quantities on the Y axis. In addition a 'title' for the chart is shown along the bottom. Use the scroll bar to reveal the 'key' to the right of the chart. The 'key' shows that the different colours of the bars relate to the sales of successive years. Redisplay the GraphData directory and drag *Polar* to GraphBox. The displayed graph shows the type of chart that would be used to show microphone sensitivity, or any data that can be measured from a polar axis. Again, display the GraphData window (click on the *Back* icon in the GraphBox window). Click and drag *Line* to *GraphBox*. This graph compares the acceleration of a petrol and a diesel engine, and is fully labelled to indicate the meaning of the two plotted lines.
- ◇ **MAIN MENU** - Click **[MENU]** with the pointer in the *GraphBox* window to reveal the main menu. This menu allows several options to be selected. Choose *Info* to reveal the standard information window for GraphBox. The name, and purpose of the program is shown, along with the name of the author and the version number. Click **[X]** to return to the main menu.



- ◇ **GRAPH TYPES** - The graph type for a given set of data can be chosen to best display the information, or to reveal different information. Examples of this are Stacked Bar Chart which will show the totals of a data set, or Percentage Bar Chart which will convert the data set into percentages. Select *Graph Type* to reveal a menu that lists the currently available graphs. Use the toggle size icon to reveal the full list of graphs. Notice the tick against the *Line Graph* option, indicating that this is the currently selected graph type. Click on *Scatter Chart* and the current graph will be redrawn as a scatter chart. Again click **MENU** over the graph and choose *Graph Type*. From the list of options click on *Bar Chart*. GraphBox will try and make sense of the data presented to it, even if it is not correct for that graph type. The acceleration chart contains both X and Y data, for presentation in a line graph. The bar chart will treat the X data as Y values and will therefore display four bars instead of the expected two. Return to the *Graph Type* menu and select *Line Graph* again.
  
- ◇ **CHANGING THE DISPLAY** - Having selected and screened a graph, you may decide to change the way it is displayed in some way. GraphBox allows such changes to be made and displayed very easily, before the graph is saved to disc or printed. Select *Options* from the main menu. The *Options* menu contains nine options to allow the graph to be changed. To remove the markings for the X co-ordinates, click **SEL** on *X Grid*. After a short wait, the graph will be redrawn without the vertical X grid. Notice that the tick next to the *X Grid* option in the *Options* menu has disappeared, indicating that the option is no longer selected. The *Y Grid* can be similarly removed. The grey background to the graph can be removed by clicking on *Background*, while the whole graph can be displayed in monochrome with the *Monochrome* option. Selecting the *Key* will toggle the key and text next to it on or off. The tick indicates the presence of the key in the graph. Select these options so that you are familiar with their effect.








Click on both the *X Grid* and *Y Grid* options if they are not already toggled on. Select the option *X Axis f()* from the *Options* menu to pop up the *Function* menu. The *Linear* option which should be ticked, indicates that the spacing on the X axis is equal, or linear. Click on *Logarithmic* and the graph will be redrawn with the X axis a logarithmic scale. This may be useful if there is important detail contained at the end of a dataset that also contains a wide range of data, or the data conforms to a logarithmic function. Drag the file *LogData* from the directory window into GraphBox. Notice in the resultant graph, that the points on the X axis up to a value of approximately 100 lie roughly in a straight line. Click **MENU** with the pointer on the GraphBox window and choose the *Options* menu. Move the pointer to the right of *Y Axis f()* and select *Logarithmic*. The graph will be redrawn with the Y axis as a logarithmic scale. Notice that the apparent straight line has some hidden changes of value in the Y values.

The Z axis runs from the front to the back of a three dimensional graph. Examples are the Surface and Wire Surface Chart. The Bubble Chart also uses Z data.

- ◇ SAVING - Drag the file *3Dbar* to GraphBox. When loaded, move the pointer to the right of *Save Graph* in the main menu. Enter a new name at the caret and drag the file icon to the *GraphData* directory. The graph will be saved as a graph file and will be given the appropriate icon.
- ◇ PRINTING - Multitasking applications can now use the same printer drivers and save on many of the compatibility problems that have caused problems with printers in the past. The *PrinterDM* which is found on the Archimedes Applications disc will drive most standard dot matrix printers. Make sure that your machine has enough memory to load both *Draw* and *PrinterDM* (320k in total). You may have to exit some applications if there is not enough memory to load these files. Double click on *PrinterDM* to load it. When loaded select the printer type (click **SEL** with the pointer over the *PrinterDM*) and resolution in the normal manner (see the Archimedes User Guide). When complete, double click on *Draw* to load it. Make sure that your printer is connected and online. Drag the saved graph file from the last section, or from the save icon in the GraphBox *Save Graph* option (if it is still loaded) to the printer icon. The graph will be printed out, the time taken depending upon the resolution chosen in the printer menu.

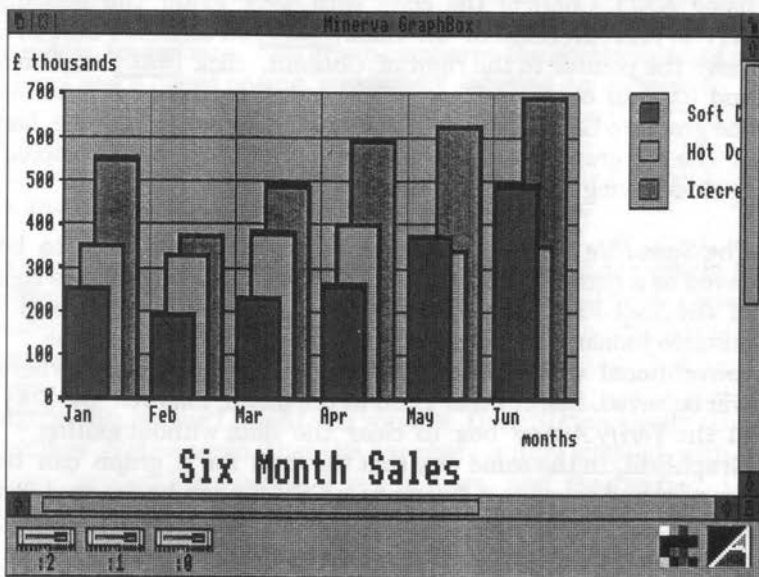


*GraphBox* will allow data to be imported from other applications, so long as the file is a CSV or Comma Separated Value type. An example of this will be covered at a later stage. However, *GraphBox* has its own data entry and edit utility called *GraphEdit*, which allows data to be entered, saved and displayed as a chosen graph. This section will demonstrate how this is done using some dummy data relating to the sales of a fast food company. Those users who have a machine with one megabyte of memory or less should click on the  icon of the *GraphBox* window to exit, before loading *GraphEdit*. *GraphBox* can be reloaded after *GraphEdit*.

- ◇ **LOADING GRAPHEDIT** - Double click on the *GraphEdit* icon in the *GraphBox* directory. After a few moments the *GraphEdit* window will appear. This window will grow as you enter your data, and allow the data to be changed or removed as necessary. We will enter data for three products, ice cream, hot dogs and soft drinks. The time scale for the sales will be a six month period starting in January.
- ◇ **ENTERING DATA** - Move the mouse pointer over (*Column 1*) and click  to pop up the main menu. Choose *Column* and move the pointer to the right of *Add*. Delete the default 1 at the caret and enter 2 for the number of columns to be added and press . Two columns for products two and three will be added into the window. Adjust the window to full size. Double click with the pointer over (*Column 1*) and enter *Soft Drinks* at the caret followed by . The caret will position itself ready for the next entry in (*Column 2*). Enter *Hot Dogs* in (*Column 2*) followed by *Icecream* in (*Column 3*). Notice how the caret is positioned ready for the next entry after you press . In the three empty columns enter the data 250, 350 and 550 respectively. After the last entry a second row will be added with the caret waiting for a figure to be entered in the first column.

Minerva GraphEdit			
	Soft Drinks	Hot Dogs	Icecream
(Row 1)	250	350	550
(Row 2)	190	330	370
(Row 3)	230	380	490
(Row 4)	260	400	590
(Row 5)	370	340	625
(Row 6)	490	350	690
(Row 7)	0	0	0

Enter the figures in the table to create the full set of data for GraphBox. If you should find that a figure has been entered incorrectly, you can cursor up and down the columns with the up and down arrow keys. Pressing **CTRL-SHFT** and the left or right arrow key will allow you to move across the rows. In this way you can change any data entry at will. Moving the pointer over an entry and double clicking will also allow that entry to be altered. On the last entry press **RET** to bring up the seventh row. Click **MENU** to display the menu, and choose *Options*. This new window allows various options for the graph to be set. For the moment, move the pointer over the box next to *Type:* and click. Enter at the caret bar **RET**. The *Options* menu will disappear. From the GraphEdit menu click on *Save File*. GraphBox will be loaded and your graph will be displayed with the sales over six months shown for each product. However, the chart needs some meaningful labels, and the empty column on the right could be removed.



- ◇ **ADDING LABELS** - If necessary, bring the GraphEdit window to the foreground. To delete the last column on the graph, click **MENU** with the pointer over (Row 7) and select *Row* from the menu. Click *Delete* and confirm **OK** to remove the row. To add the various labels, choose *Options* from the menu. To give the Y axis, or sales in money a label, click the pointer over *Label:* in the Y-Axis box and enter **£ Thousands** **RET** at the caret. Click

the pointer on the *X-Axis* box *Labels*: and enter Months **[RET]**. The graph should be given a name, so enter in the *Title*: box the name *Six Month Sales*. Notice that options exist in the *Options* menu to change various aspects of the graph display in the same way as in the *GraphBox* *Options* menu. These are explained fully in the reference section. Click on **[OK]** to confirm the changes to the graph. To display the months of the year under the correct bar in the chart, double click the pointer over (*Row 1*) and enter *Jan* at the caret. Add the other five months to the appropriate row in the same way. Notice that the graph title *Six Month Sales* entered in the *Options* menu now appears in the box above the rows.

- ◇ OTHER FACILITIES - *GraphEdit* will allow a complete column to be copied or moved. With the pointer over any column, click **[MENU]** and choose *Column*. Click **[SEL]** on *Add* and a (*Column 4*) will be added. Move the pointer over *Soft Drinks* and drag it to (*Column 4*) using **[ADJ]**. Confirm the copy with **[OK]**. Enter the heading *Soft Drinks* in (*Column 4*). Click **[MENU]** on column 1 *Soft Drinks*, move the pointer to the right of *Column*, click **[SEL]** on *Delete* and **[OK]** to confirm. Click **[MENU]** and click on *Save File* to send the graph to *GraphBox*. *Soft drinks* will now appear at the back of the bar graph. Note that a column of data can also be copied to save having to enter the same data twice.

The *Save File* option in the menu allows the graph data to be saved as a named CSV file on disk. Move the pointer to the right of the *Save File* option and a window will appear. Enter a suitable filename at the caret, and drag the file icon in the conventional way to the *GraphData* directory window, where it will be saved. Select *Clear Data* in the menu, followed by **[OK]** in the *Verify Action* box to clear the data without exiting *GraphEdit*. In the same way that the data for a graph can be dragged and saved to a directory, a CSV file can be dragged from a directory on to *GraphEdit*. Drag the file *GraphDemo* from the *GraphData* directory window to the *GraphEdit* window. This data should be the same as the sales graph you have just created. Drag the graph from *GraphEdit* to *GraphBox*, to compare this graph with your own.

- ◇ MULTITASKING - Using both *GraphBox* and *GraphEdit* together is in fact multitasking. However, *GraphBox* can import suitable data from other applications while they are resident in memory at the same time. If *MultiStore* is taken as an example, the reports option can be set to extract data for the graph, which

## GRAPHBOX OVERVIEW

### LOADING GRAPHBOX

- ◇ Insert a backup copy of the GraphBox disc into the drive. Click **SEL** on the drive icon and double click on the *GraphBox* icon in the directory. If you have a protected version of GraphBox please insert the original GraphBox disc into the drive when prompted and click **OK**. When requested replace the disc with the backup. After a short time the GraphBox window will appear.

### DISPLAYING A GRAPH

- ◇ In the directory window of GraphBox double click **SEL** on the *GraphData* icon to display the files that have been provided to demonstrate the different graphs. Drag *Line* to *GraphBox*. After a short time a line graph will be drawn in the window. Toggle the window to full size. This graph compares the acceleration of a petrol and a diesel engine, and is fully labelled to indicate the meaning of the two plotted lines. In addition there is a title for the graph. Use the scroll bar to reveal the 'key' to the right of the chart. The 'key' shows that the different colours of the lines relate to the two engine types.

Redisplay the *GraphData* directory (click on the *Back* icon in the GraphBox window) and drag *Polar* to GraphBox. The displayed graph shows the type of chart that would be used to show any data that can be measured from a polar axis.

Again, display the *GraphData* window Drag *3Dbar* to the GraphBox window. Notice again, that the bar chart is fully labelled with each 'product' occupying a set of bars, and the 'sales' quantities on the Y axis.

### MAIN MENU

- ◇ Click **MENU** with the pointer in the *GraphBox* window to reveal the main menu. This menu allows several options to be selected.

## GRAPH TYPES

- ◇ The graph type for a given set of data can be chosen to best display the information, or to reveal different information. Select *Graph Type* to reveal a menu of the available graphs and toggle the menu window to full size. There will be a tick against *3D Bar Chart*. Click on *Stacked Bar Chart* and the current graph will be redrawn showing the sales for each year stacked one on another. From the *Graph Type* menu select *Horizontal Percentage Chart*. This shows the same data as a set of three pie charts. Toggle to full size and scroll around the screen to reveal all three pie charts.

## CHANGING THE DISPLAY

- ◇ Choose the *Options* sub menu from the main menu. This menu contains options to allow the graph to be changed. To remove the markings for the X co-ordinates, click **[SEL]** on *X Grid*. The graph will be redrawn without the vertical X grid. Remove the grey background by clicking on *Background*. The other options in this menu can be selected at your leisure.

## CREATING A GRAPH

- ◇ *GraphBox* will allow data to be imported from other applications, so long as the file is a CSV (Comma Separated Value) type. *GraphBox* has its own data entry and edit utility called *GraphEdit*, which allows data to be entered, saved and displayed as a chosen graph. Close *GraphBox* by clicking **[X]** and double click on the *!GraphEdit* icon in the *GraphBox* directory. After a few moments the *GraphEdit* window will appear. Drag *Line* from the *GraphData* directory to the *Graphedit* window. The data for this graph will be displayed. Double clicking with the pointer over any field will allow the field to be edited. Change some of the values, click **[MENU]** and click *Save File* to send the graph to *GraphBox*. Note that *GraphBox* will auto load.

To see more of the different graph types and the ways of presenting them, feel free to drag them into *GraphBox* and to re-display them using the *Graph Type* menu and the *Options* menu.

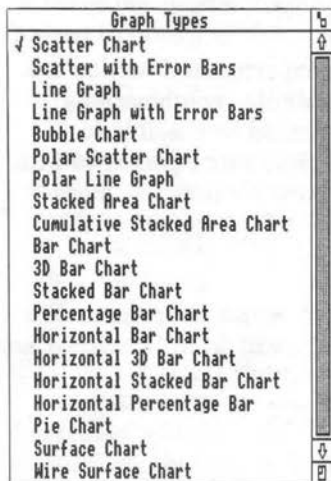
The different combinations of software that can import data to *GraphBox* is enormous. Spreadsheets, databases and other packages can all be utilised to create data. Therefore, only the real graphs of the user can fully demonstrate *GraphBox*'s capabilities.

is then immediately imported to GraphBox. From within MultiStore, using the *Demo* file, select the *Reports* option, followed by *Sheet*. Click on *Set Up* and drag, for example, the *age* and *salary* fields from the record into the window. Toggle the *Totals* and *Dashes* options off, and click . Go to *Export* and drag the file to *GraphBox*. A scatter graph of age against salary will be immediately displayed, without using a single keypress. For those who do not at present have a copy of MultiStore, drag the file *Demo* from the *GraphData* directory window to GraphBox to see the result of the above export from MultiStore to GraphBox.

GraphBox is capable of far more than this experimental section has demonstrated. Because of the almost infinite combinations available with multitasking software, it should be possible to create complex multiple graphs using data from other packages with the minimum of effort. Consult the reference section for more detail regarding the different graph types and the format of the data that they require.

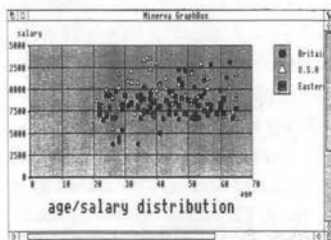
Select the *Clear Data* option in the *Options* menu to clear the present graph from GraphBox. If you wish to exit from GraphBox and GraphEdit click  in each window.

There are twenty different graph types currently available in GraphBox. Select *Graph Type* from the main menu to display the *Graph Type* menu. If you have the Help application installed, moving the pointer over each option will give a brief description of the option, and how the data should be entered into GraphEdit and Edit.



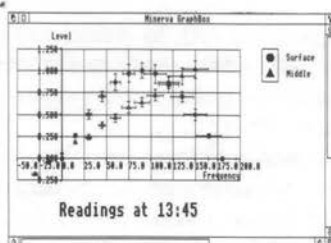
#### 4.1 GENERAL

Data can be taken from many sources including spreadsheets, databases etc. The data does not necessarily have to be separated by commas, it can also be separated by spaces and tabs etc. GraphBox will do its best to convert the files into a format that it can read. It is important to realise that data that contains both X and Y values is suited to one type of graph while other graphs may need just Y values, X, Y and Z values or X and Y values with error values. Also, the longer the file, the longer that GraphBox will take to process the data.



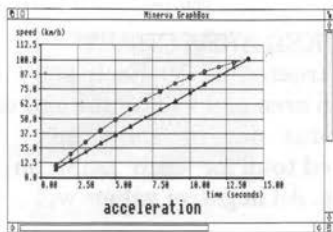
#### 4.2 SCATTER CHART

Data should be entered in the straight forward X,Y format. Each column of X,Y pairs will be allocated a different colour and shape on the chart for clarity.



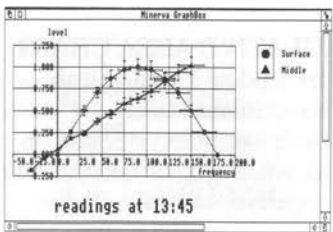
#### 4.3 SCATTER WITH ERROR BARS

Enter data as X,Y,eX,eY. Error values are absolute, not percentages. This works like the scatter chart but the eX and eY co-ordinates are used to indicate the error factors for each point.



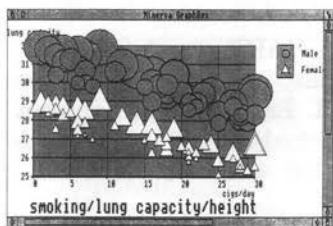
#### 4.4 LINE GRAPH

Data entered as X,Y co-ordinates. This is plotted like a scatter chart but points from the same set are joined in order of X value by an appropriately coloured line.



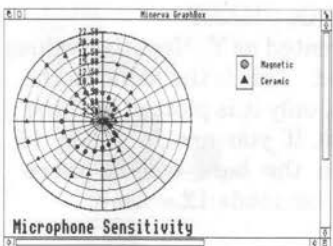
#### 4.5 LINE GRAPH WITH ERROR BARS

Enter data as X,Y,eX,eY. Error values are absolute, not percentages. This is similar to a line graph but the eX and eY values indicate error factors.



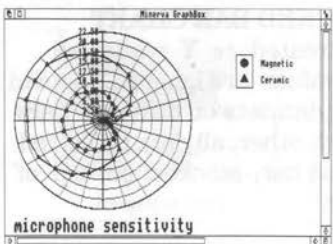
#### 4.6 BUBBLE CHART

Data entered as X,Y,Z. The Z co-ordinate controls the point size of the bubble, otherwise this works like the scatter chart. Points are plotted in reverse order of Z to avoid large points obliterating small ones. ie small points are placed on top of the larger ones.



#### 4.7 POLAR SCATTER CHART

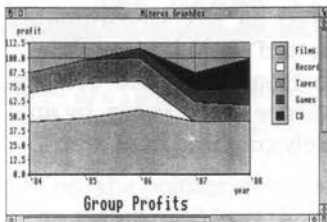
Data entered as A,R. The angle in degrees, is A, while R is the radius. The Y axis function will affect the radius plot, the Y scale values calculated in relation to the data entered. Each dataset will be given a different colour and shape.



#### 4.8 POLAR LINE GRAPH

Data entered as A,R. The angle in degrees is A, while R is the radius. The Y axis function will affect the radius plot, the Y scale values calculated in relation to the data entered.





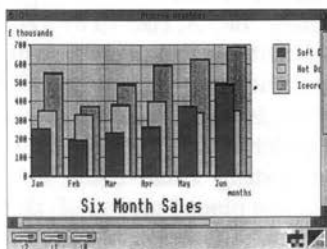
#### 4.9 STACKED AREA CHART

All data is treated as Y. Each set becomes an area and will be stacked on the previous set to show an accumulated total for each point on the X axis. All negative values will be ignored.



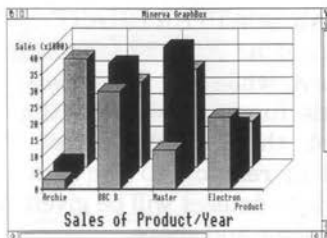
#### 4.10 CUMULATIVE AREA CHART

All data is treated as Y and will show a running accumulated total for each data set, each set being stacked on the previous set. Each set becomes an area. All negative values will be ignored.



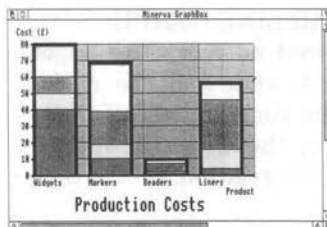
#### 4.11 BAR CHART

All data treated as Y. Negative values are plotted. Each separate dataset will be stacked behind the previous one. Each bar will be a different colour.



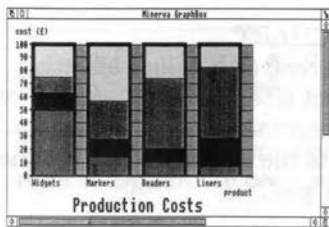
#### 4.12 3D-BAR CHART

All data treated as Y. Negative values are plotted. This is the same as the Bar Chart, only it is plotted in three dimensions. If you are in Mode 15 shading on the bars will be more effective than mode 12.

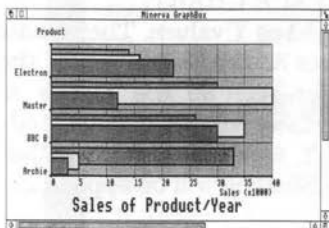


#### 4.13 STACKED BAR CHART

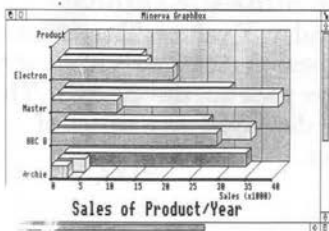
All data treated as Y while all negative values are ignored. Instead of plotting datasets on different bars behind each other, all data is plotted on the same bar, stacked on top of each other.



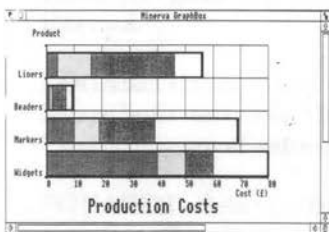
**4.14 PERCENTAGE BAR CHART**  
 All data read as Y values and then converted to percentages. All negative values are ignored. This option will display the total value of the datasets as 100%. Each dataset will be represented as a percentage of the total. You will get no idea of values, but you will get the percentage.



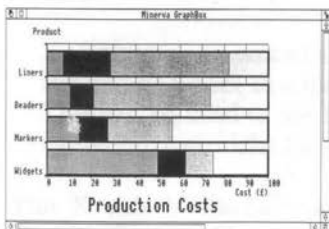
**4.15 HORIZONTAL BAR CHART**  
 All data read as Y values. Negative values are plotted. Each dataset will be stacked behind the previous one. Exactly the same as the ordinary bar chart, but the chart is displayed horizontally instead of vertically.



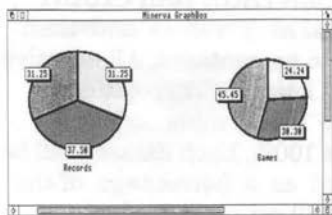
**4.16 HORIZONTAL 3D-BAR CHART**  
 All data read as Y values. Negative values are plotted. Data is plotted the same as the 3D bar chart, but drawn horizontally with the Y scale running from left to right.



**4.17 HORIZONTAL STACKED BAR**  
 All data read as Y values. Negative values are ignored. The same as the stacked bar chart, but displayed horizontally with the Y scale running from left to right.

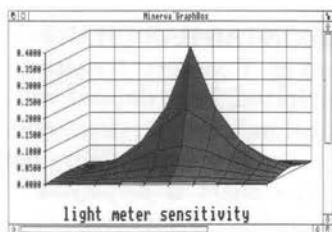


**4.18 HORIZONTAL PERCENTAGE BAR**  
 All data read as Y values and then converted to percentages. All negative values are ignored. The same as the percentaged bar chart, but displayed horizontally with the Y scale running from 0% to 100% and from left to right.



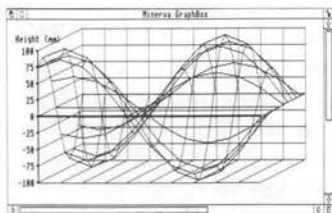
#### 4.19 PIE CHART

All values read as Y values affecting the segment size. Datasets appear on separate charts. The total value of a dataset sets the radius and hence the size of the 'pie'.



#### 4.20 SURFACE CHART

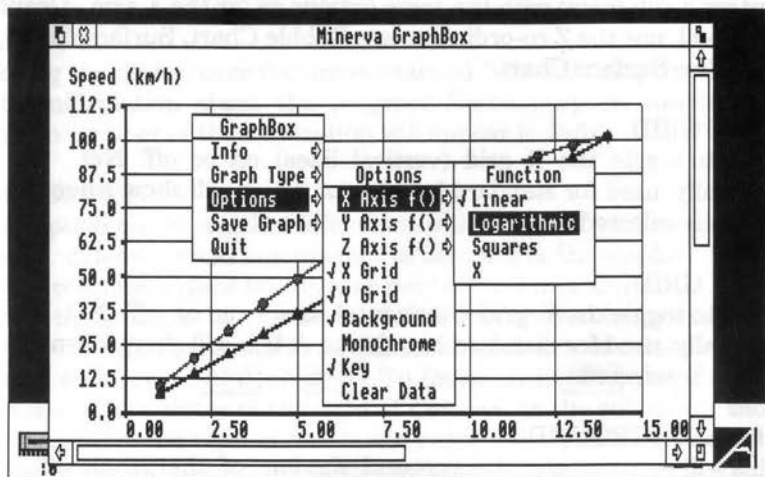
All data read as Y values. The column number goes on the Z axis while the row number goes on the X axis. A shaded surface will be constructed using the Y values imposed on the (X,Z) grid. Shading will be applied in Mode 15.



#### 4.21 WIRE SURFACE CHART

All data read as Y values, The column number goes on the Z axis while the row number goes on the X axis. The surface is displayed as a series of wire frames.

The Options sub-menu has nine options. Move the pointer to the right of *Options* to pop up the menu.



### 5.1 X AXIS

Enters a sub-menu with the following options available:

**LINEAR** - Sets the spacing of the axis at a fixed linear interval.

**LOGARITHMIC** - Sets the spacing of the axis to that of a logarithmic interval. Can be used for data which shows a logarithmic set of values.

**SQUARES** - Sets the spacing of the axis to that of a square function. Can be used for data which shows a squared set of values.

**X** - This may be edited at the caret, and allows the intervals of the axis to be set to a mathematical function such as  $ASN(X)$ . This can be used to see if a curve fits a particular function by returning a straight line graph.

The X axis is the horizontal co-ordinate which is used in Line Graphs, Scatter Charts etc.

## 5.2 Y AXIS

Enters a sub-menu with the same options available as the X axis. Typical graphs that will use the Y co-ordinates are Bar Charts, Percentaged Bar Chart, as well as those using X,Y co-ordinates.

## 5.3 Z AXIS

Enters a sub-menu with the same options as for the X axis. Graphs that will use the Z co-ordinates are Bubble Chart, Surface Chart and Wire Surface Chart.

## 5.4 X GRID

Used to toggle the X grid (vertical lines) on or off. Not generally used for standard bar charts. A tick will show when the option is selected.

## 5.5 Y GRID

Used to toggle the Y grid (horizontal lines) on or off. Not generally used for standard bar charts. A tick will show when the option is selected.

## 5.6 BACKGROUND

This will turn the grey background shading of the graph off. Clicking will toggle the option on and off. A tick will show when the option is selected.

## 5.7 MONOCHROME

This option will turn the graph to black and white. It is sometimes useful for printers that do not produce an adequate result with a colour screen. A tick will show when the option is selected.

## 5.8 KEY

Selecting *Key* from will enable you to display the key on the graph. This option will toggle on and off, a tick showing when it has been selected.

## 5.9 CLEAR DATA

This option is used to completely clear the data from the computers memory. It should be used with extreme care as you cannot get the data back again unless you have saved it either to disk or into another application.

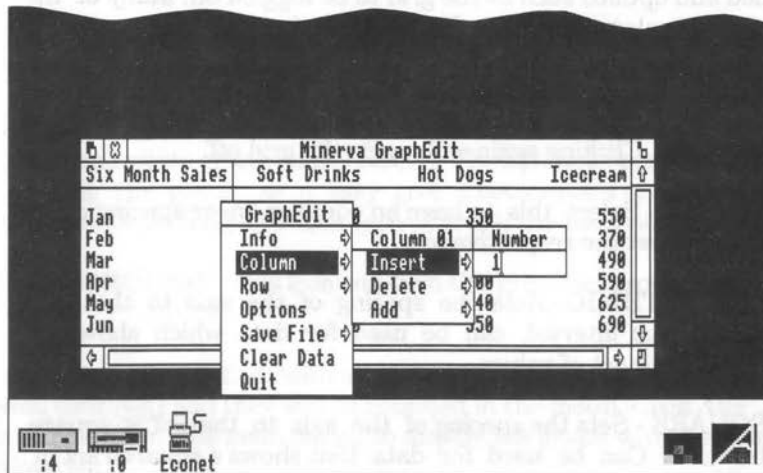
GraphEdit is a utility that enables you to prepare data for importing into GraphBox. The familiar layout of rows and columns resembles that of a spreadsheet.

### 6.1 INFO

Moving the mouse over the arrow marked *Info* will bring up a box with information about the program. Name, purpose, author, and version number of the application will appear in *Info*.

### 6.2 COLUMN

This option enters another sub-menu which allows you to either insert, delete, or add any number of columns to the display. To *Add* a column(s) place the pointer over any column and click **SEL**. Move the pointer to the right of *Column* followed by moving it right over *Add* in the sub-menu. Enter the number of columns to be added and press **RET** or **SEL**. To *Delete* click **SEL** over the column and move the pointer to the right of *Column*. In the sub-menu move the pointer to the right of *Delete* and enter the number of columns followed by **OK** to be deleted, GraphEdit will delete to the right of the selected column.



To *Insert* a column(s) click **MENU** with the pointer over the first column to the right of where you wish to insert them. Move the pointer to the right of *Column* followed by moving it to the right of *Insert*. Enter at the caret, the number of columns to be inserted and press **RET** or **SEL**.

### 6.3 ROW

The row option allows you to insert, delete or add rows. To *Add* a row(s) place the pointer over any row and click **[SEL]**. Move the pointer to the right of *Row* followed by moving it right over *Add* in the sub-menu. Enter the number of rows to be added and press **[RET]** or **[SEL]**. To *Delete* click **[SEL]** over the row and move the pointer to the right of *Row*. In the sub-menu move the pointer to the right of *Delete* and enter the number of rows followed by **[OK]** to be deleted, GraphEdit will delete to the right of the selected row.

To *Insert* a row(s) click **[MENU]** with the pointer over the first row to the right of where you wish to insert them. Move the pointer to the right of *Row* followed by moving it to the right of *Insert*. Enter at the caret, the number of columns to be inserted and press **[RET]** or **[SEL]**.

A whole column with its contents can be dragged to another column, simply by placing the pointer over the header of the column to be moved and dragging it using **[ADJ]** to the desired column header. A *Verify Action* box will ask for confirmation of the move with **[OK]**.

### 6.4 OPTIONS

Click **[SEL]** over *Options*. A window appears which allows labels to be added and options such as the grid to be toggled off. Many of the options are also available in GraphBox and are self explanatory.

**SHOW GRID** - Clicking over the X, Y or Z axis will set a star symbol showing that the graph will display the respective grid markings. Clicking again will toggle the grid off.

**LINEAR** - Select this to have an equal or linear spacing on the grid against the respective axis.

**LOGARITHMIC** - Sets the spacing of the axis to that of a logarithmic interval. can be used for data which shows a logarithmic set of values.

**SQUARE** - Sets the spacing of the axis to that of a square function. Can be used for data that shows a squared set of values.

**FUNCTION** - This allows the intervals of the axis to be set to a mathematical function such as  $ASN(X)$ . Can be used to see if a curve fits a particular function such as  $SIN$ , by returning a straight line graph.

**LABEL** - Enter the label to be displayed against the respective axis. Each label may be up to 40 characters in length.

**TITLE** - Enter a title of the graph of up to 40 characters in length. It will appear at the bottom of the graph.

**TYPE** - Enter the type of graph from any of the following types:

Scatter Chart	3D Bar Chart
Scatter with Error Bars	Stacked Bar Chart
Line Graph	Percentage Bar Chart
Line Graph with Error Bars	Horizontal Bar Chart
Bubble Chart	Horizontal 3D Bar Chart
Polar Scatter Chart	Horizontal Stacked Bar Chart
Stacked Area Chart	Horizontal Percentage Bar
Cumulative Area Chart	Pie Chart
Bar Chart	Surface Chart
Wire Surface Chart	Polar Line Graph

When entering the type of graph, it should be entered exactly as shown, though abbreviations may be used. eg Horizontal 3D. If the type is not recognised, the last selected graph type will be plotted.

**KEY** - This icon will toggle the key displayed to the right of a graph on (star) or off.

**MONOCHROME** - This option (star) allows the user to obtain a black and white graph on the screen. The option is useful when printing the graph, as it may give a better print on some printers depending on which type of graph has been selected.

**BACKGROUND** - This icon will turn the grey background on (star) or off.

When you are satisfied with all the options set in the Options menu, click **OK** and they will be retained in the menu. Click the *Save* icon from the main menu, to display the graph with the new options set.

If you decide not to change the options after all, click **Cancel** to restore them to their previous values.



### 6.5 SAVE FILE

There are a number of ways in which the *Save File* option may be used. Simply clicking **SEL** on the option will immediately plot the graph data into GraphBox. Providing that there is enough memory and the system can find GraphBox, it will be loaded on clicking **SEL** on *Save*. To save the file to a directory, simply move the pointer to the right of the option *Save*, type in the required filename and drag the icon into the required directory window. Similarly, the graph data may be dragged directly into another application such as Edit.

### 6.6 CLEAR DATA

If you have edited the data in any way at all, when you select this icon, you will be prompted with the message *:Data altered but not saved. Really erase data?* If you are sure, click **OK**. If you wish to save the data first click **Cancel** to return to GraphEdit.

### 6.7 QUIT

As above, selecting this option will ask you to verify your action if you have not saved your data. If you have already cleared the data from memory, the program will be terminated.

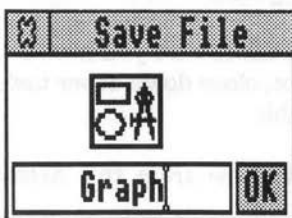
**FILING**

Selecting the *Save Graph* icon from the main menu in GraphBox brings up a simple prompt, allowing the data to be saved.

RISC OS does not maintain a current drive or directory and for this reason, it is not possible to type just a filename when saving or loading data. If the user wishes to use the keyboard to enter the name, then he or she will have to type the *full* name, including the drive and directory.

But, of course, this is generally a waste of time! RISC OS is designed to make things simpler, not more complicated. If a file already exists, it can be saved or loaded by using the mouse on its own.

## 7.1 SAVE - GRAPHBOX



The save option shows the icon for the type of file you are going to save. To save the file, the following steps should be taken:

- 1 Click **SEL** on the icon at the bottom left of the screen, corresponding to the disc drive on which the file is to be saved. This will cause a window to appear, on which is displayed a directory of all the current files. Some of these may be represented with special icons, (Step 1 may be unnecessary, because the window might not have been closed from when GraphBox was initially loaded.)
- 2 Move the pointer over the GraphBox icon in the save window and, with **SEL** kept pressed down, drag this icon over to the destination directory. Releasing **SEL** will cause the file to be saved in the right place with the name shown in the save window.

If a *new* file is being created then the user may type just the file name, then at stage 2, drag the GraphBox icon onto the destination directory.

## 7.2 SAVE - GRAPHEDIT


GraphEdit is exactly the same except the save option is called *Save File*. A saved GraphEdit file is a CSV format file and will print out as the data entered into GraphEdit and not as a graph.

## PRINTING

### 7.3 SINGLE GRAPH

Once your graph is plotted on the screen, you are probably likely to want to print it out onto paper. With a standard Archimedes 310, you may run into problems with memory shortage. Therefore we advise you to take the following steps to overcome this before trying to print on a 310.


Note: Users with a 440 need only to carry out sections 4 and 5.

- 1 Save your graph from GraphBox by dragging the save icon into a directory window.
- 2 Exit from GraphBox by clicking the  icon.
- 3 Enter the Task Display window and make sure you have at least 320K available for the next task. If not, close down other tasks until you have enough memory available.
- 4 Load the applications PrinterDM and Draw from the Archimedes application disk 1.
- 5 Drag your file from the directory window, onto the icon, PrinterDM at the bottom of the screen.

Providing that you have set the correct printer specifications, your graph should now print out sideways to the paper.

### 7.4 USING DRAW

The above will work for a straight forward print of a graph, but if you wish to have more than one graph printed together or have a fancy text etc, you should do the following.

- 1 Save your graph from GraphBox by dragging the save icon into a directory window.
- 2 Exit from *GraphBox* by clicking the  icon.

- 3 Load *Draw* from your application disk.
- 4 You can drag your graph or graphs into *Draw*, and manipulate them in any way that you require. Consult the *Archimedes* user guide for more information on using *Draw*.
- 5 Load *PrinterDM*.
- 6 Drag the save icon from *Draw* to *PrinterDM* to obtain a printout, or use the print option for more control of the printer.

If the GraphBox package detects an error, then it will display a message, advising the user of this fact.

RISC OS provides error-message windows as a special resource to the programmer. This ensures that such inconveniences as described above will not affect the RISC OS user.

Many of the error messages which may be displayed are standard BASIC / ADFS messages. For further details on these, you should refer to the Archimedes user manual. The following messages are those specific to this GraphBox program. The message will be displayed in the GraphBox window, and will take the form : Data OK, plotting : (error message.)

*Axis functions must not affect signs of data.*

A function must not attempt to change any of the signs of data present. This occurs when you input a mathematical function for a specified axis.

*Can't decode file.*

GraphBox is unable to convert the data into a format suitable for plotting the graph. The file is probably not a CSV file.

*Division by Zero.*

Trying to divide by zero is impossible, even for the Archimedes! This error may occur when working with very small numbers like 0.0000000001, the number may be taken as a 0 as it is so small.

*File too large to import*

The file that you are trying to import into the GraphBox will not fit into the memory allocated to the GraphBox program. To cure this program first enter the Task Display from the desktop and see how much memory is allocated to GraphBox. Then close GraphBox, and increase the allocation of 'Next'. Try to import the file again into Graphbox. If you are still getting the error message, increase the memory again.

*No Room for draw file*

Another message associated with the allocation of memory. See above error for a cure.

*Not enough data statements for a (graphtype)*

The file that you are trying to import into GraphBox, contains insufficient data statements for the specified graph to be plotted.

*No useful data in file.*


GraphBox cannot make use of the file that you have tried to import. The file is possibly not a CSV file.

*String too long (loading 'adfs:GraphBox.\$filename')*

A statement of data is too long to be imported into GraphBox. More likely, the file is not a CSV file.

*Too many nested structures evaluating n axis function (where n is either X, Y or Z)*

The memory limit has been reached. See above.

Clicking the  icon, after any error will continue the program as before.

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