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Report Generator

# User Manual



By Motion Lab Systems, Inc.

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# Installation

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## Installation Instructions

All Motion Lab Systems (MLS) software is available from the corporate FTP web site (<ftp.emgsrus.com>) or on the software distribution CD-ROM. The software may be installed under any 32-bit Windows™ operating system using the Windows Add/Remove Programs option in Control Panel. Refer to the following steps for guidance.

- 1.0 Close all programs.
- 2.0 Left-click on the Windows Start button, point to Settings, and then left-click on Control Panel. The Control Panel window (Figure 1) will open.



Figure 1: MS Control Panel Window – view set to small icons.

- 3.0 Double-click on the Add/Remove Programs icon. The Add/Remove Programs window (Figure 2) will open.

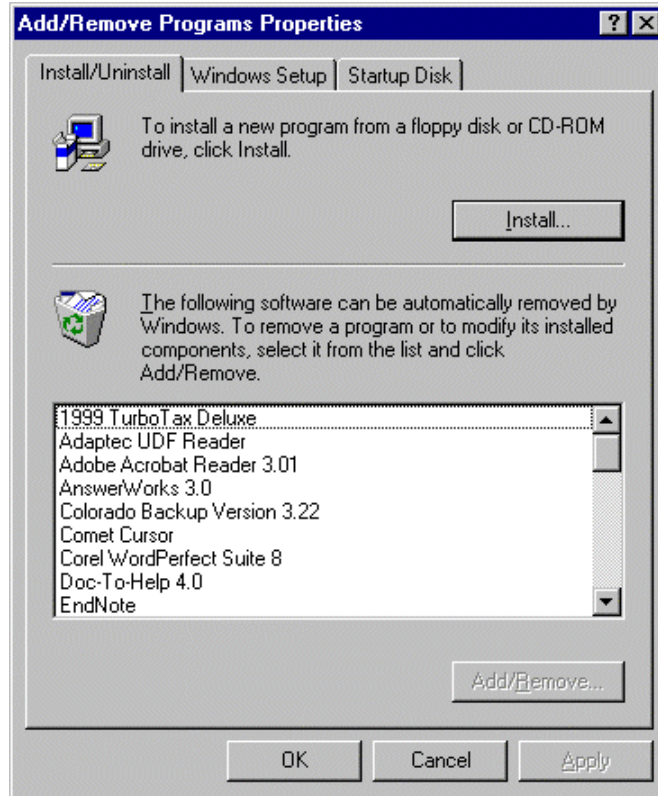


Figure 2: MS Add/Remove Programs Window.

4.0 Select the Install button.

5.0 Follow the instructions on the screen.

The Report Generator install program will place the program (approximately 5.7 Mb) and some example files (approximately 3.2 Mb), for demonstration and practice purposes, onto the system.

*Report Generator displays the entered name in the About dialog box accessible from the help drop-down menu (Help\About).*

During installation, Report Generator will prompt you to enter a license number. If you have purchased a license, you should enter the license number, the User Name, and Organization details exactly as supplied by MLS. If there is any discrepancy between the information by MLS and the information entered, the application will not install as a registered version and will run in evaluation mode.

If you have not purchased a license, then you can run in evaluation mode by entering 0000-0000-0000-0000 as the serial number. Please refer to the Evaluation Mode section below for details about this mode.

If the default options are accepted during installation, a short cut in the Gait Lab menu group called **MLS – Report Generator** and a desktop short cut will be created.

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## Evaluation Mode

Report Generator can run in an evaluation mode for an unlimited amount of time. The limitations of this mode include the following:



- The application will only print data from the first three pages. Other pages will be displayed but will not print
- The header and footer of the report will show default values set by Motion Lab Systems and can not be changed

To determine whether your copy of the RGEN software is running in evaluation mode, click on Help|About ReportGenerator. The About window will state if the copy is an “evaluation copy” (Figure 3) Figure 3or a “registered version.”

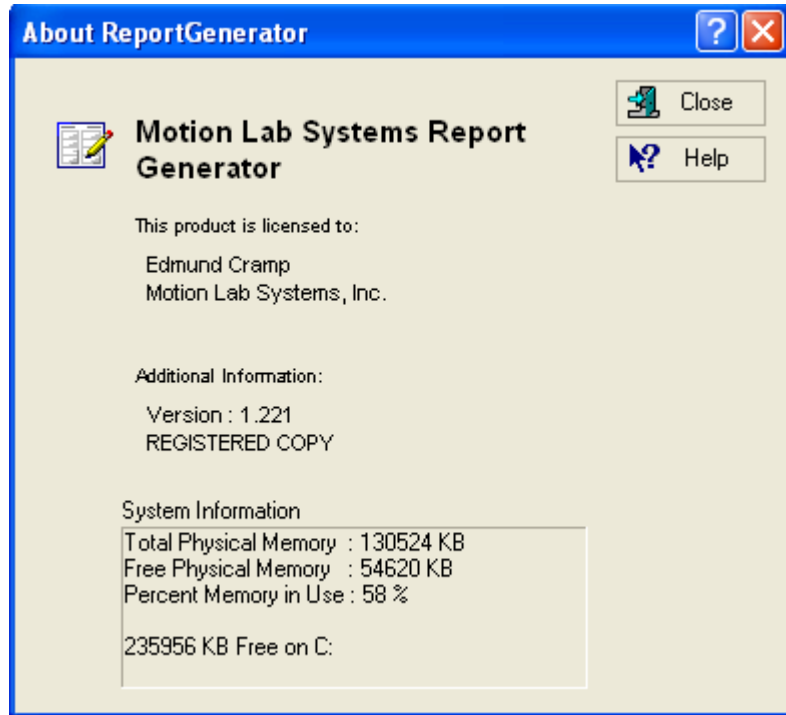


Figure 3: RGEN About window for application running in evaluation mode

Contact Motion Lab Systems, Inc. anytime during this evaluation period to purchase a registration key and manual.

## From Here.....

Once you have successfully installed the program,

<b>If you want to:</b>	<b>See:</b>
Get started processing data	Quick Results on page 8
View the program basics	Program Essentials on page 5
View specific information about menu commands	Menu Command Descriptions on page 31
Learn about file formats used by the program	File Formats on page 65

Table 1: Next steps after installation



# Program Essentials

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## Overview

*GCD files are ASCII formatted text files using the GCD lexicon defined by CAMARC. CAMARC stands for computer aided movement analysis in a rehabilitation context*

The primary purpose of the Motion Lab System (MLS) Report Generator (RGEN) software is to read data from GCD files – text files that provide gait cycle descriptions, hence the GCD acronym – and generate graphical reports. The Report Generator software is unique in that it can read data from up to one hundred and twenty (120) GCD files and plot as many data sets in a graphical report. Secondary functions of the software include controlling the presentation of data through standard report (RPT) files, providing access to data from various sources using open database connectivity (ODBC), and generating graphic files of the entire report or individual plots.

Report Generator provides the tools in a graphical report editor to create and easily edit standard RPT files. Through this tool, the user has complete control over all aspects of the report, including fonts, text colors, and a multitude of graph line attributes (16 colors, 5 line types, 10 line styles, and 5 line thickness - 4,000 unique combinations). This makes it easy to generate legible reports for both color and black-and-white (B&W) printers, as well as color reports that can be photo copied into legible reports. In addition, any graph can be enhanced with a "normal" activity bar drawn from a user-defined database.

Report Generator can access any data source that has an ODBC driver (e.g. Paradox, Microsoft Access and Excel etc) and display and perform calculations based on information obtained from these external sources. Thus, any report can read and display data items from existing databases (VICON Clinical Manager (VCM), Othotrack etc.) as well as any other custom database supported by ODBC.

Report Generator can export either an entire report or specific graphs to Windows bitmap files. These files may be used to interject graphs into a written report, or to enhance a presentation. Currently, the individual plots are saved in a 640 X 480 bitmap, while the whole page is saved in a 1024 X 768 bitmap.

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## The User Interface

*The application remembers the state in which it was last used: the size of the main window and the position of the Toolbar will be the same.*

The Report Generator program, as are all MLS programs, is a 32-bit Windows 95/NT application and will respond to all the standard commands for position and display control (refer to Application General Usage Instructions, page 87). The program can be represented on the screen in one of the three ways: full screen (maximized), as an application icon (minimized), or within a window (restored). When the Report Generator program is started the application window will appear with a menu bar and Toolbar at the top of the window. The application will try to open the last Report that had been used.

Additional information pertinent to the general characteristics of the application as a Window's based program can be found in Application General Usage Instructions, page 87.

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## Application Workspace

The primary purpose of Report Generator is to produce reports; therefore, the primary screen of the program (Figure 4) is an empty report. This view provides the means to:

- Add data to a report.
- Review data plotted in a report.
- Review a modified report.

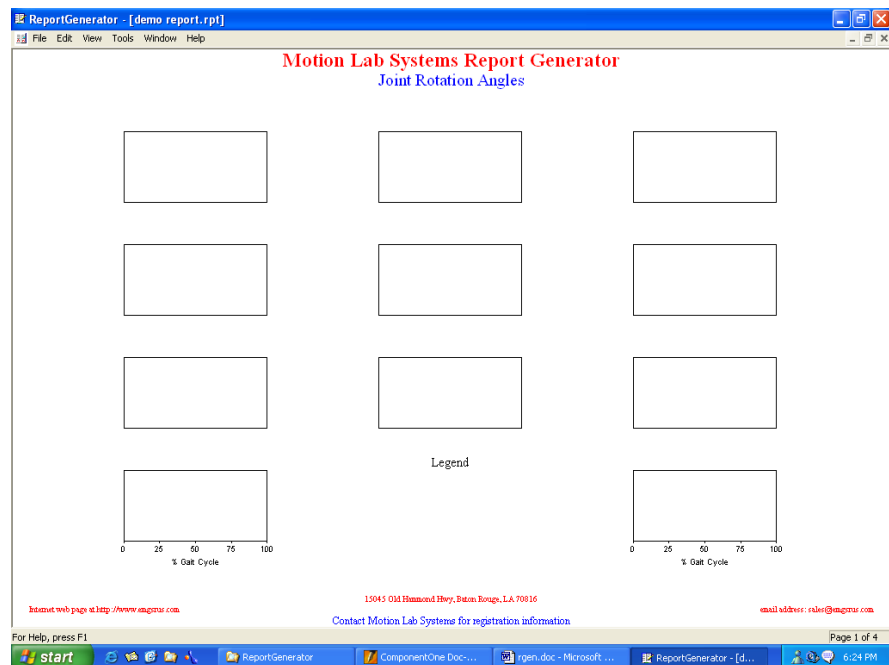


Figure 4: RGEN application window.

The Report Generator workspace provides the capability to view specific information about the plotted data, such as its data source or a specific value. To view this information, move the cursor over the data line and click on a precise point of the line; the application will open a window (Figure 5) that will show you the

source file for the data, the selected point's value, and the position of the value within the % Gait Cycle.

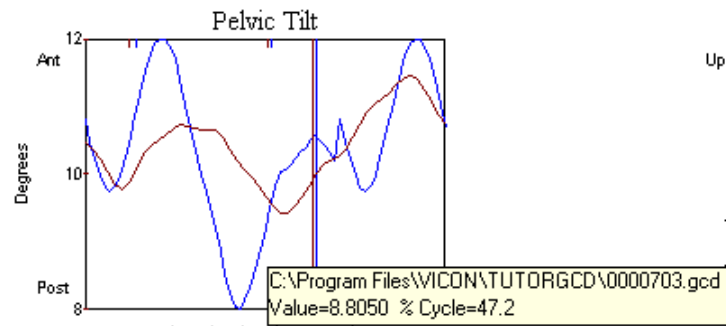


Figure 5: Tool tip showing the selected file and data values.

For additional information regarding specific commands, refer to Menu Command Descriptions, page 31.

# Quick Results

This section provides detailed instructions to guide you through the required steps for frequently used MLS RGEN activities. Unless a starting point is otherwise stated, each activity assumes that you are starting with a report open on your screen.

Note that the first time RGEN is run, a report may not be automatically displayed. During subsequent use, RGEN will automatically open with the last used Report.

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## Set Displayed Report to User's Choice

Report Generator automatically opens displaying the last used report. If this report is not the one you want to use for graphing, follow the instructions below.

- 1.0 Select Format from the Tools Menu. The standard MS Windows Open dialog box (Figure 6) will open to search for RPT files.

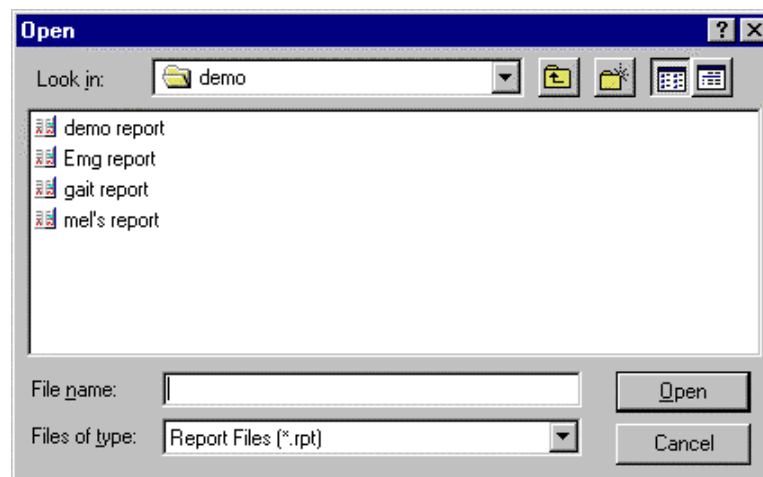


Figure 6: RGEN opens the File Open window to search for RPT files

- 2.0 Select the desired report (RPT file) and click on the Open button. You will then return to the RGEN application window.
- 3.0 Select Refresh from the View menu (or press F5) to display the new report format. If data files are open, the data will be displayed in the new format.

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## Create a New Report (Modify Existing Report)

Report Generator can only create reports based on existing report files, i.e. this program does not create report files from non-existence to existence. The instructions included herein guide you through modifying an existing report file to meet your site-specific needs.

### Create a Report Page

- 1.0 Select a data file using the Open GCD Files button. This will allow you to select file specific variable names using the drop down selection, rather than typing the names in manually.
- 2.0 Open the report file that you want to edit by selecting Format from the Tools menu.
- 3.0 From the Edit menu, select Report | Graphs. (Alternatively, select the Graphs button from the Edit Toolbar.) This opens the report Edit window to the first page of the report (Figure 7).

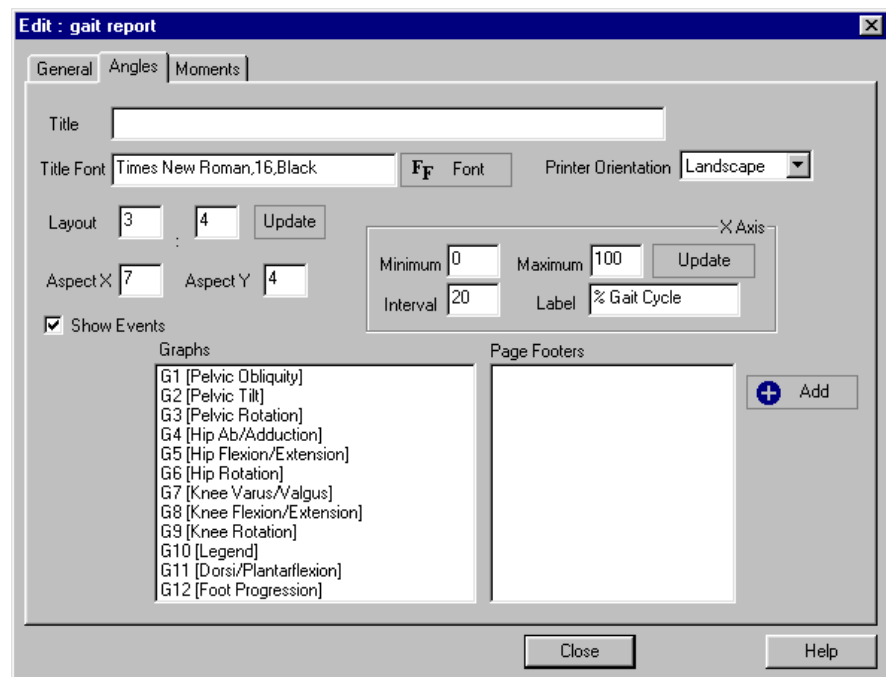


Figure 7: Default page of the Edit report window.

- 4.0 Select the General Tab. This opens the Edit report section that contains general information about the report (Figure 8).

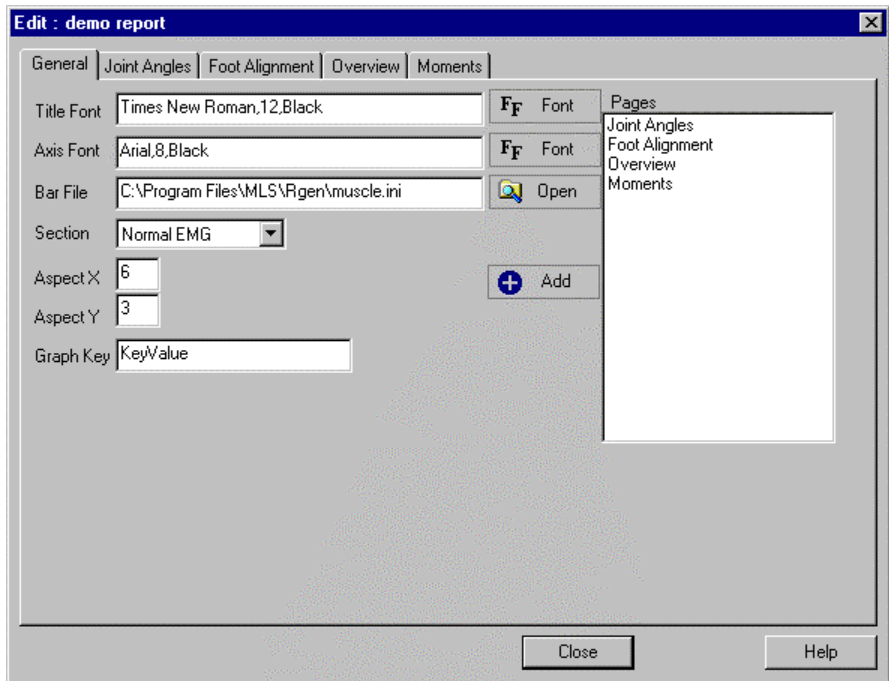


Figure 8: General section of the Edit report window.

- 5.0 Click the Add button. This opens the Page Selection dialog box (Figure 9).

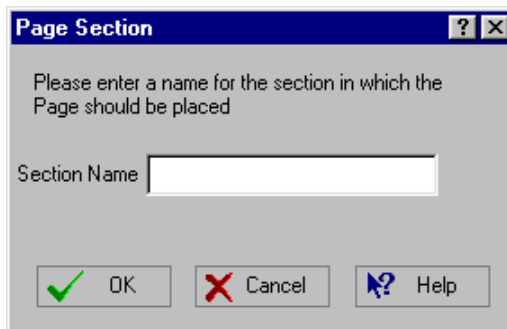


Figure 9: Page Selection dialog box.

- 6.0 Enter the appropriate page name, e.g. Kinetics, into the Page Selection dialog box and close the window. The entered name will appear in the Pages list.
- 7.0 To add graphs to the newly created page, refer to Define a Report Page, page 10.

## Define a Report Page

- 1.0 Open the report file that you want to edit by selecting Format from the Tools menu.
- 2.0 From the Edit menu, select Report | Graphs. (Alternatively, select the Graphs button from the Edit Toolbar.) This opens the report Edit window to the first page of the report (Figure 10).



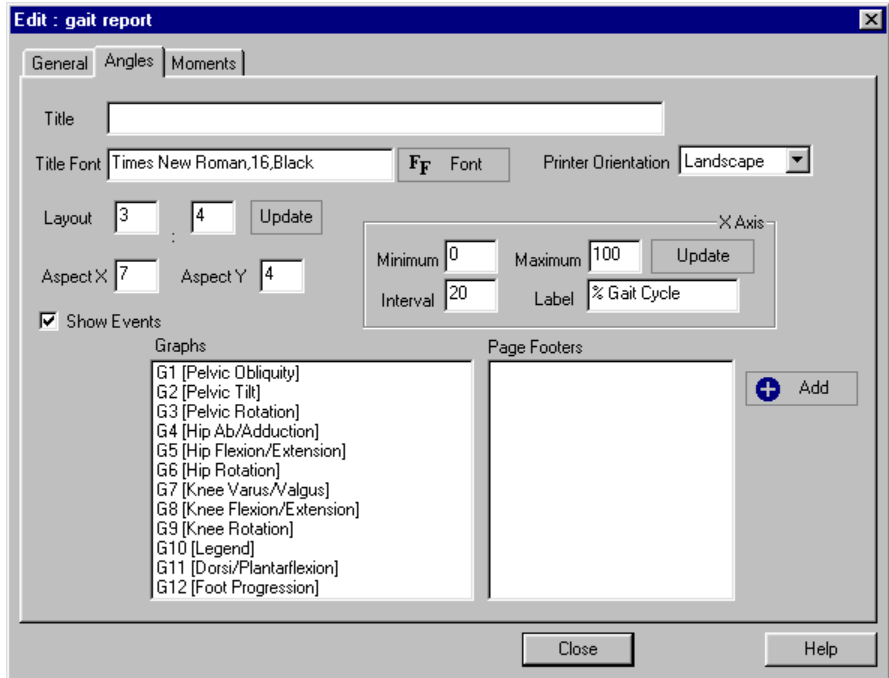


Figure 10: A specific page of the Edit report window.

- 3.0 Select the report page that you want to edit by selecting the appropriate tab, e.g. Angles.
- 4.0 Enter the number of graphs you would like displayed horizontally and vertically into the layout fields (horizontal, vertical), e.g. 4, 3 for a total of 12 graphs. Refer to Specific Report Pages, page 49, for further information.
- 5.0 Click the Update button beside the layout fields. RGEN will prompt you to continue with the update (Figure 11). If the total number of graphs was increased, a list of [Not Used] graphs will appear in the Graphs section of the window.

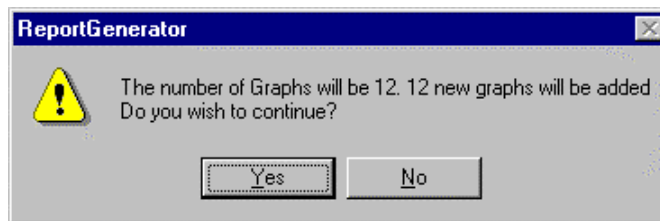


Figure 11: Graph layout update confirmation window.

- 6.0 If you wish the graphs to have an appearance different than that defined by the aspect fields in the general page, enter Aspect X and Aspect Y values. Refer to Specific Report Pages, page 49, for more information. Only enter values in this window if you want the general values (listed in the general tab of the Edit Report window) to be overridden.
- 7.0 To define the graphs, refer to Define Kinematic and Kinetic Graphs, page 12, and Define Key Tables, page 14.

## Define Kinematic and Kinetic Graphs

1.0 Open the report's specific page (Figure 12) that requires graph definition.

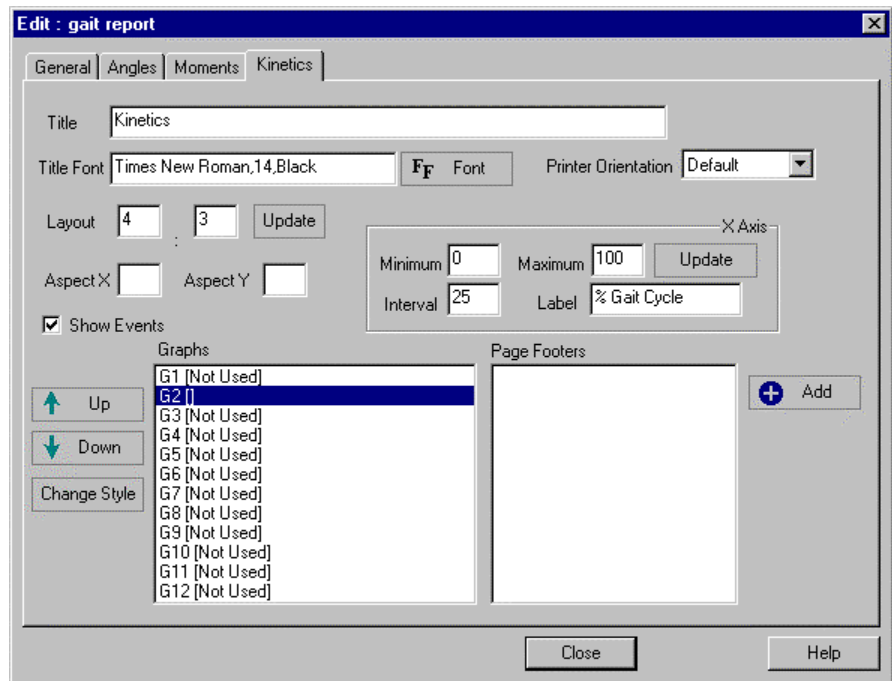


Figure 12: Edit report window, specific page.

2.0 Double click on the [Not Used] graph that you wish to define. The Graph definition window (Figure 13) opens.

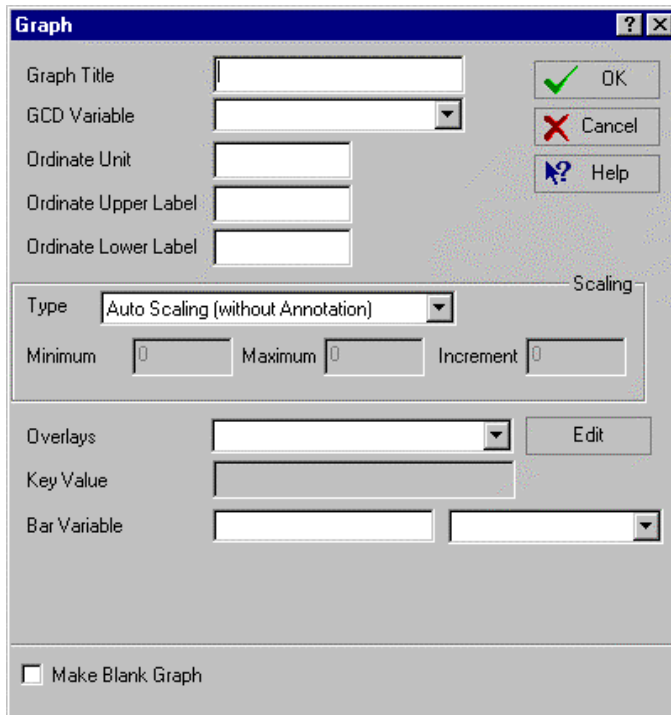


Figure 13: Graphs definition window.

3.0 Edit the graph information to produce the desired plot. Refer to Graph dialog box, page 52, for further information regarding each field in the window. Refer to Figure 14 for a completed definition.

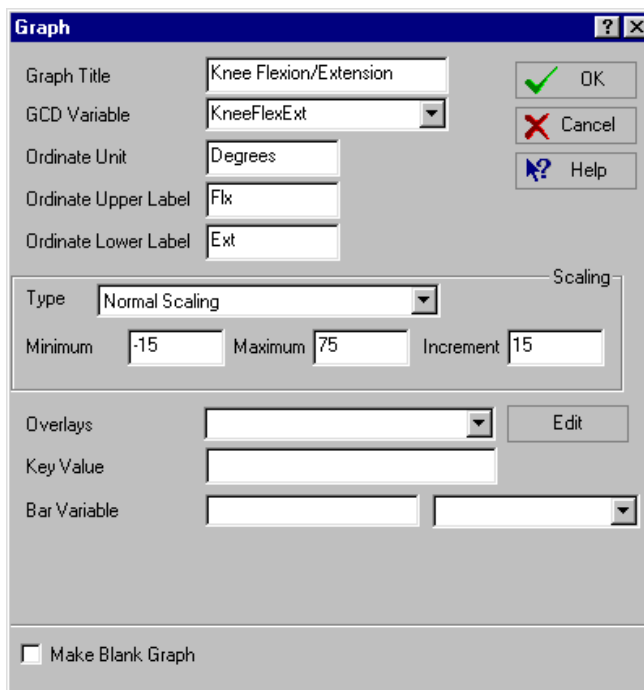


Figure 14: Graph definition window – completed definition.

## Define Key Tables

Key tables may be called G-tables in information distributed with VICON Clinical Manager.

Key tables provide the means for you to enter text information, i.e. comments and database variables, into a space allotted for a graph. This function allows pertinent trial information to appear in the body of the report amongst other graphs (Figure 15), rather than in a footer or text document associated with a graphical report.

Patient Number	L/R trial walk #7
Cadence	105.882
Step Length	77.681
Patient Number	L/R trial walk #6
Cadence	104.348
Step Length	77.777

Figure 15: Key table information plotted in a report.

- 1.0 Open the report's specific page (Figure 16) that requires graph definition.

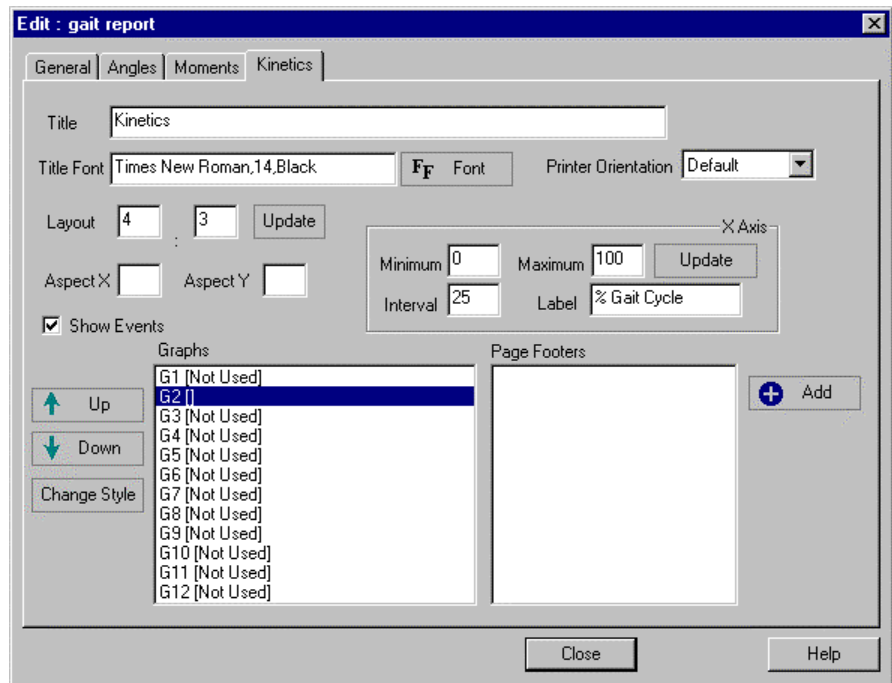


Figure 16: Edit report window, specific page.

- 2.0 Select the graph number that you wish to define as a key table and press the Change Style button. RGEN will prompt you (Figure 17) to confirm that you wish to change the style of the graph. Note that once you change the style of a graph, the graph will no longer display [Not Used].

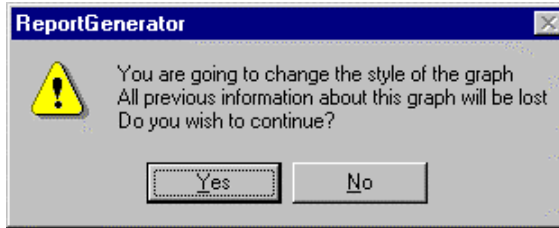


Figure 17: Graph style change confirmation window.

3.0 Double click on the key table graph number. The Key Table dialog box (Figure 18) opens.

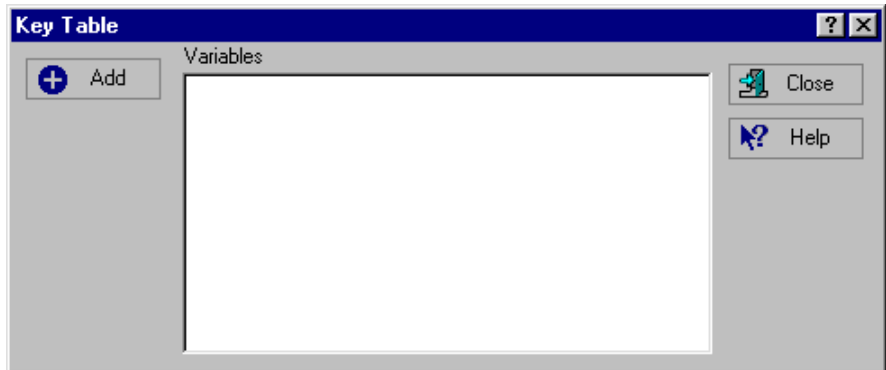


Figure 18: Key Table dialog box – blank for fresh data entry.

4.0 Select the Add button. A red “#” appears with a zero beside it (Figure 19) for you organize the presentation of the text information in conjunction with the presentation of the GCD files.

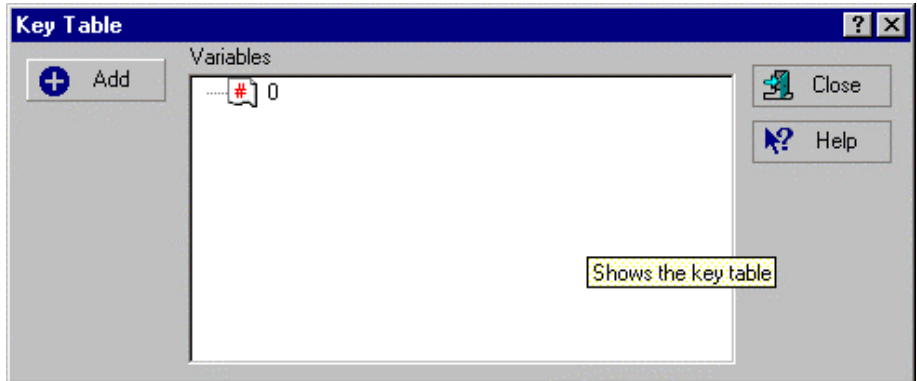


Figure 19: Key Table dialog box – line data entry.

5.0 Change the number by the red # to match the number of the display GCD file (i.e., if you wish to display temporal data for the first GCD file displayed, enter the number 1).

Highlight the organization line (#) and select the Add Line button

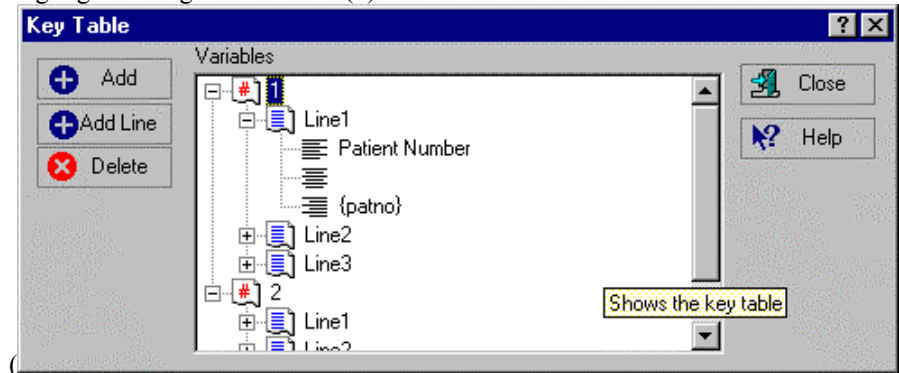


Figure 20: Key table dialog box – an example.

).

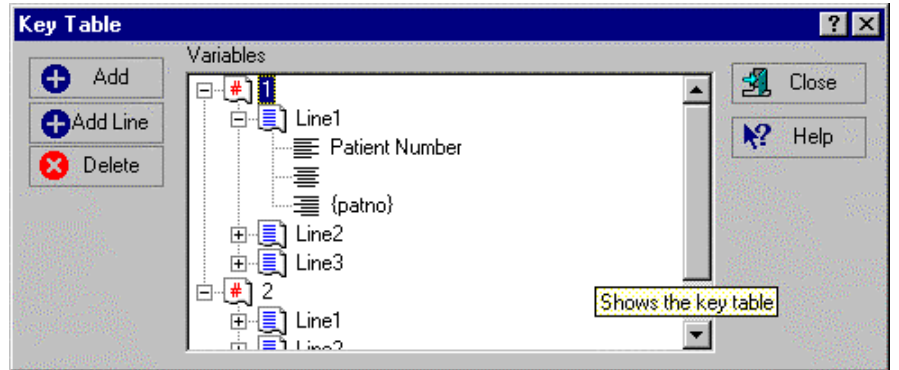


Figure 20: Key table dialog box – an example.

- 7.0 Click the “+” by the Line 1 to display spaces to enter information for display.
- 8.0 Enter the desired information into the left, center, and right justified lines.  
 E.g.:  
 {Name}  
 {PatientNo},{Side}  
 {Date}
 

or

 Cadence  
*leave blank*  
 {Cadence}
- The results of information entered into this example are displayed in Figure 15.
- 9.0 Select the Add Line button to add another variable, e.g. step length, to display for the selected GCD file in the same text box.
- 10.0 Select the Add button to display data for another GCD file. Be sure to change the number by the red # to match the number of the order in which the GCD file is listed.

---

## Display a Data File in a Report

Report Generator allows you to display up to 120 data (GCD) files. To open a GCD file:

- 1.0 Select the Open GCD Files button. The RGEN-specific GCD file open window (Figure 21) will open.

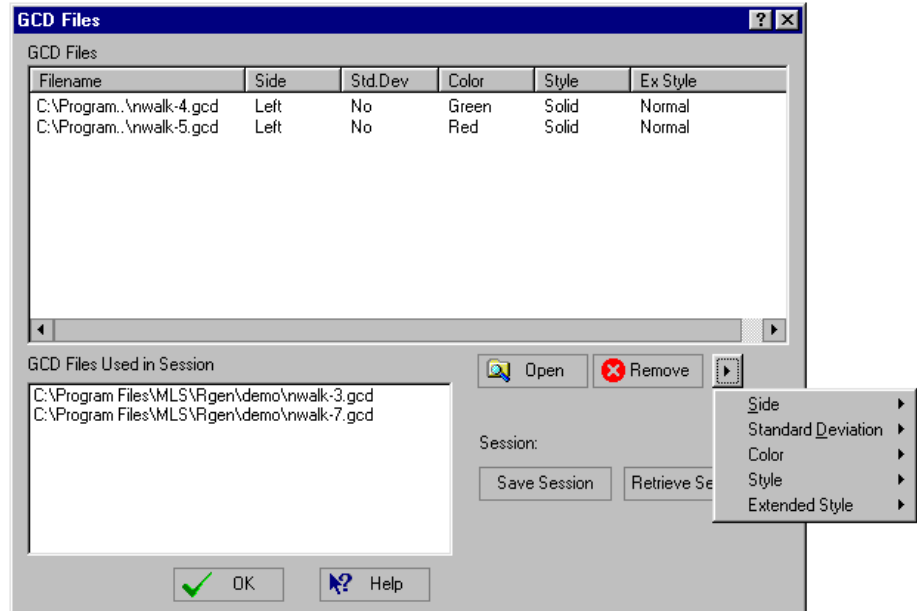


Figure 21: GCD Files window.

Note that if files were previously selected, the filenames will be displayed in the GCD Files Used in Session section of the GCD Files window. Any of the files may be selected for display by double-clicking on the filename.

- 2.0 Select the Open button.
- 3.0 Select the appropriate filename using the standard MS Windows Open dialog box. The filename will be listed in the GCD Files section of the GCD Files window.
- 4.0 Modify the display properties of the data file (side, standard deviation, color, style, ex style) for report-specific requirements.
- 5.0 Repeat steps 2 – 4 for each data file to display.

Note that to display both left and right side data stored in the same data file, the data file must be listed in the GCD Files section twice and modified to reflect the different data.

- 6.0 Select the OK button when all data files are selected. The selected data will be displayed in the active report.

Note that if the “Prompt for Missing Variables” option is turned on and there is a mismatch between variable names in the GCD and RPT files, the Missing Variables dialog box will open. Refer to Missing Variables dialog box, page 33, for more information.

---

## Save a Data-Filled Report (Session) for Future Reference

Report Generator allows you to save a precise list and its order of display to a Session file so that the exact report may be easily duplicated at any time.

The following steps assume that you have selected the files you wish to display and that the GCD Files window (Figure 22) is open.

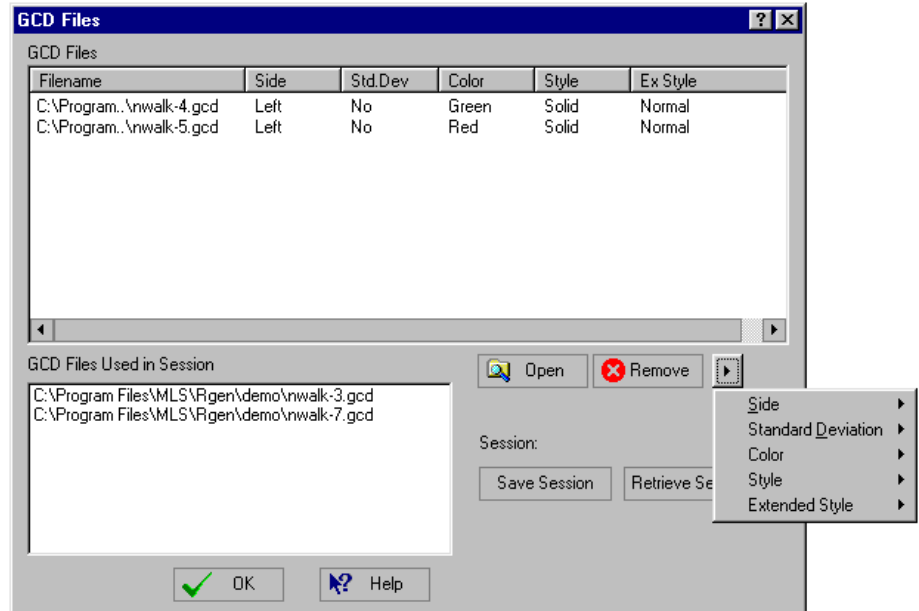


Figure 22: GCD Files window.

- 1.0 Select the Save Session button. The Save Session dialog box (Figure 23) opens.

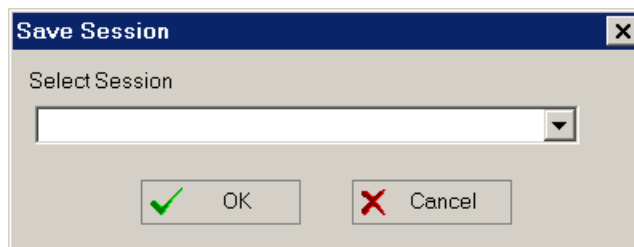


Figure 23: Save Session dialog box

- 2.0 Enter the desired filename into the Save Session dialog box. Note that spaces are permissible in the naming convention.
- 3.0 Click the OK button.
- 4.0 Close the GCD Files window to return to the RGEN application window.

---

## Retrieve a Report that was Saved as a Session

To open a report that was previously saved using the Save Session option:



- 1.0 Select the Open GCD Files button. The GCD Files window (Figure 24) opens.

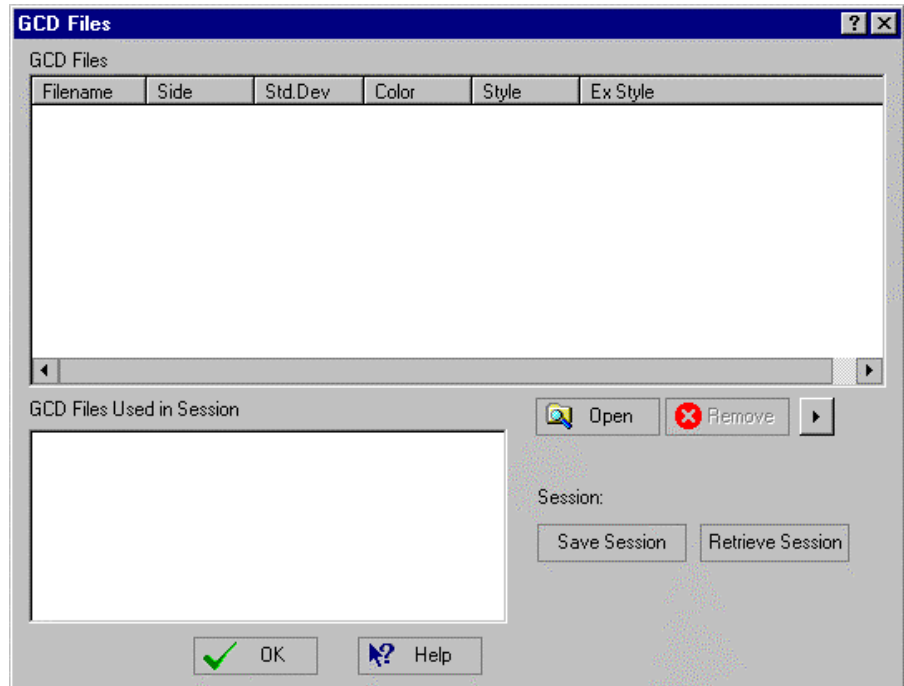


Figure 24: GCD Files Window.

- 2.0 Select the Retrieve Session button to open the Retrieve Session dialog box (Figure 25).

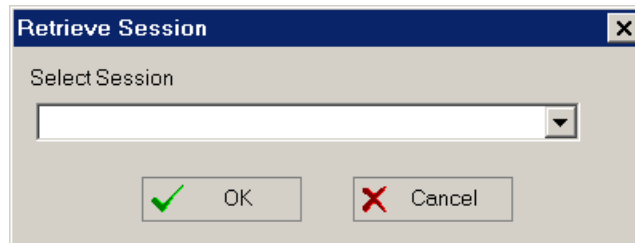


Figure 25: Retrieve Session dialog box.

- 3.0 Enter the appropriate filename manually or by selecting it from the drop down list.
- 4.0 Click the OK button.
- 5.0 Close the GCD Files window to return to the RGEN application window.

---

## Modify a Graph

To modify an existing graph:

- 1.0 Open the report file that you want to edit by selecting Format from the Tools menu.

2.0 From the Edit menu, select Report | Graphs. (Alternatively, select the Graphs button from the Edit Toolbar.) This opens the report Edit window to the first page of the report (Figure 26).

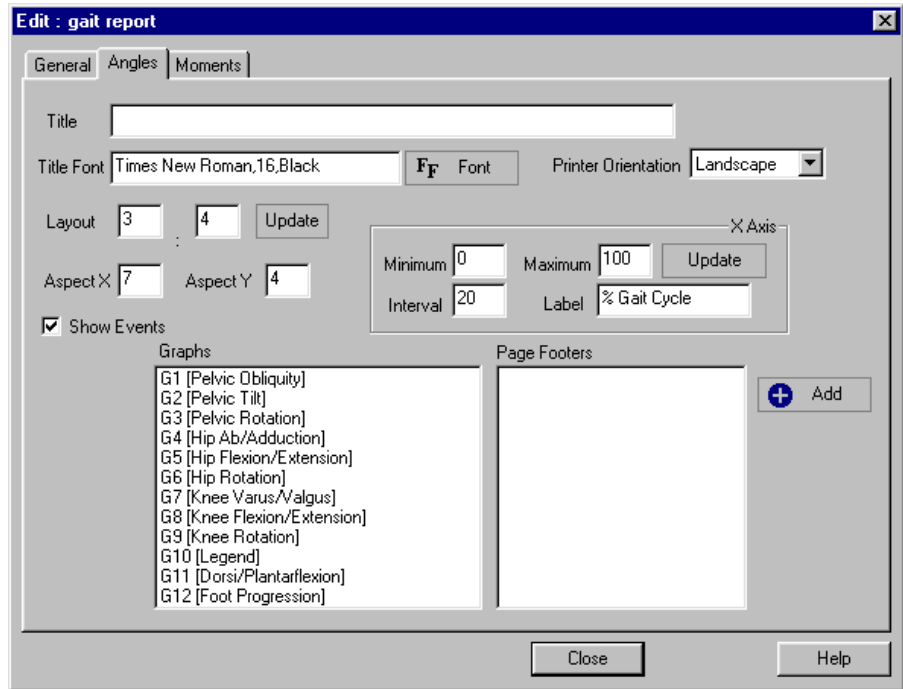


Figure 26: Default page of the Edit Report window.

- 3.0 Select the report page that you want to edit by selecting the appropriate tab, e.g. Moments.
- 4.0 Double click on the graph that you wish to edit. The Graph definition window opens (Figure 27).

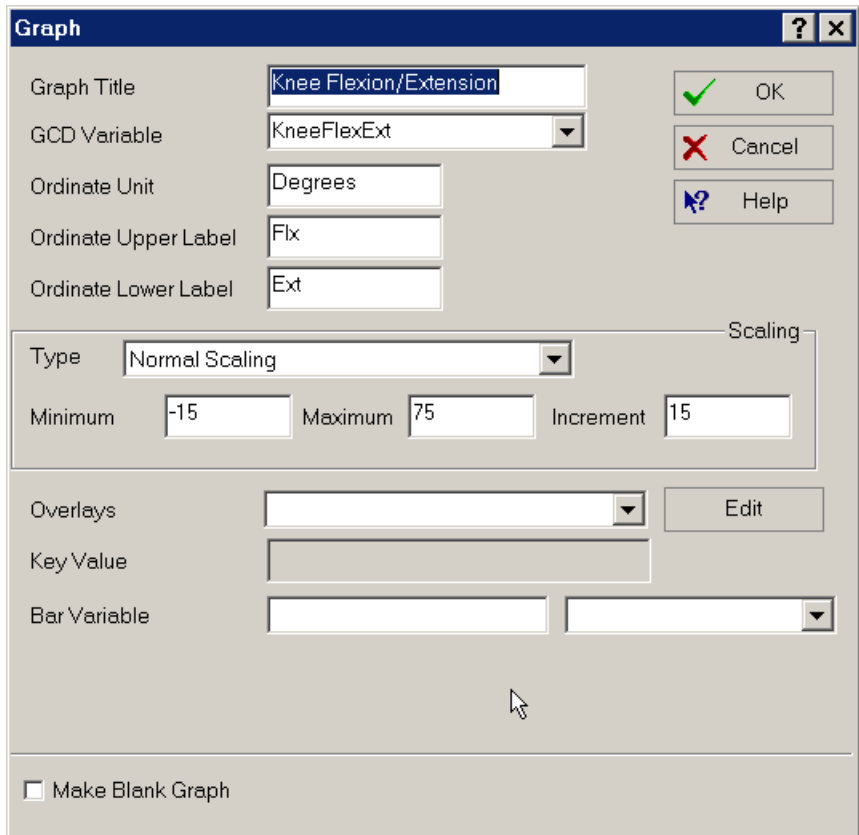


Figure 27: Graph definition window – completed definition.

- 5.0 Edit the component of the graph, such as Minimum and Maximum values, as needed.
- 6.0 Select the OK button to close the Graph definition window.
- 7.0 Select the Close button. Your changes will be automatically applied.
- 8.0 If you wish to save these changes to the report format permanently, select either File | Save or File | Save As.

---

## Place Report Graphics into a Word Processing Document

These steps begin after the user has displayed the desired data in a report.

- 1.0 Select the Export option on the File Menu. The Export to Bitmap window (Figure 28) opens.

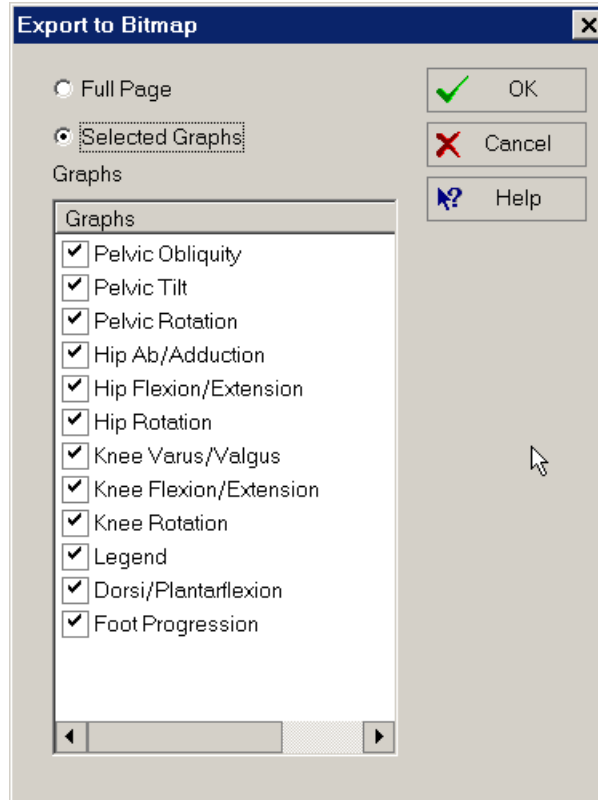


Figure 28: Export to Bitmap window.

- 2.0 Select the graphs to export to a bitmap file and click on the OK button. A standard MS Windows file selection dialog box opens.
- 3.0 Select the folder in which to place the bitmap files. RGEN automatically assigns graph specific names, e.g., JointRotationAngles\_AnkleDorsiPlantar, to the graphics files.
- 4.0 Place the graphic files (.BMP) into the desired document using the package-specific steps, e.g., Insert|File.

---

## Display File Specific GCD variables

RGEN provides the option to add file specific GCD variables to the database of variables maintained by the program. To invoke this option:

- 1.0 Select the GCD Variables option from the Edit menu. When this command is selected, the GCD Variables dialog box (Figure 29) is opened.

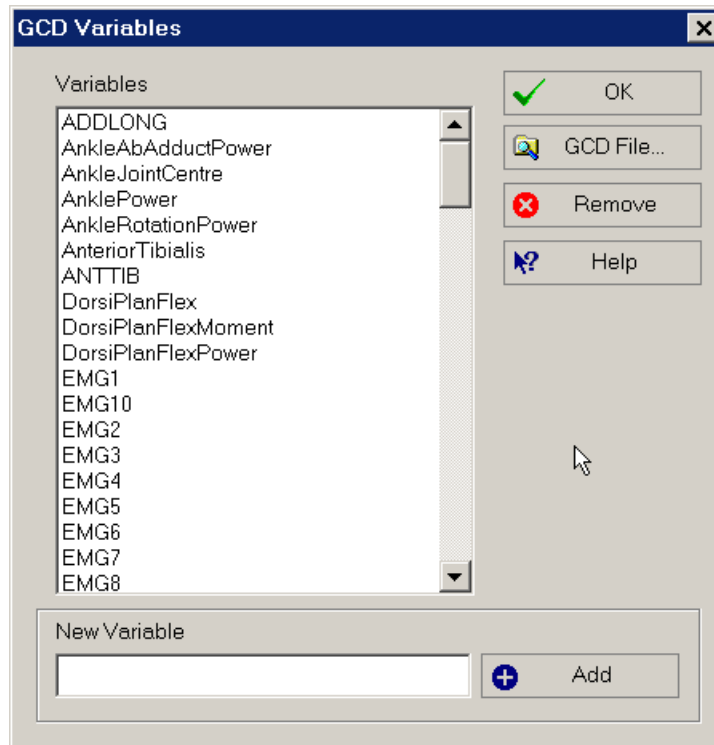


Figure 29: GCD Variables dialog box.

- 2.0 Select the GCD file button. The standard MS File Open dialog box opens.
- 3.0 Select the GCD file that contains the variables you would like added to RGEN's database.
- 4.0 The variables will be added to the database and will be available for future use, unless you choose to manually remove them.

---

## Display Temporal Data from Selected GCD Files (Key Table)

Refer to Define Key Tables, page 14, for information.

---

## Display Standard Deviation Data

RGEN provides two options for displaying standard deviation data: as a shaded area (Figure 32) or a data line that encompasses the region. You may make and change your selection through the Options window, as directed below:

- 1.0 Select Options from the Tools menu. The Options window (Figure 30) opens.

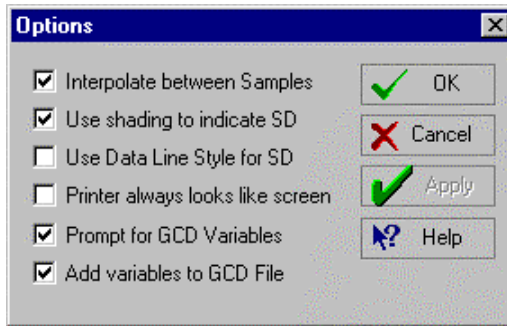


Figure 30: Options dialog box.

*The standard deviation display option may also be selected from the Tools Menu.*

- 2.0 Select either the box for shading or data line style. As this is not an automatic toggle, deselect the option that you do not wish to use.
- 3.0 Apply your changes by selecting the Apply button, if any were made, and close the Options window by selecting the OK button.
- 4.0 Open the GCD Files Window (Figure 31) and select the desired data files. Refer to Display a Data File in a Report, page 17, for more information.
- 5.0 For those files that contain standard deviation data that you would like displayed, highlight the filename by selecting the line and then click on the “No” option under the “Std. Dev” column. This will change the response to “Yes.” Selecting the “Yes” response will change it to “No.”

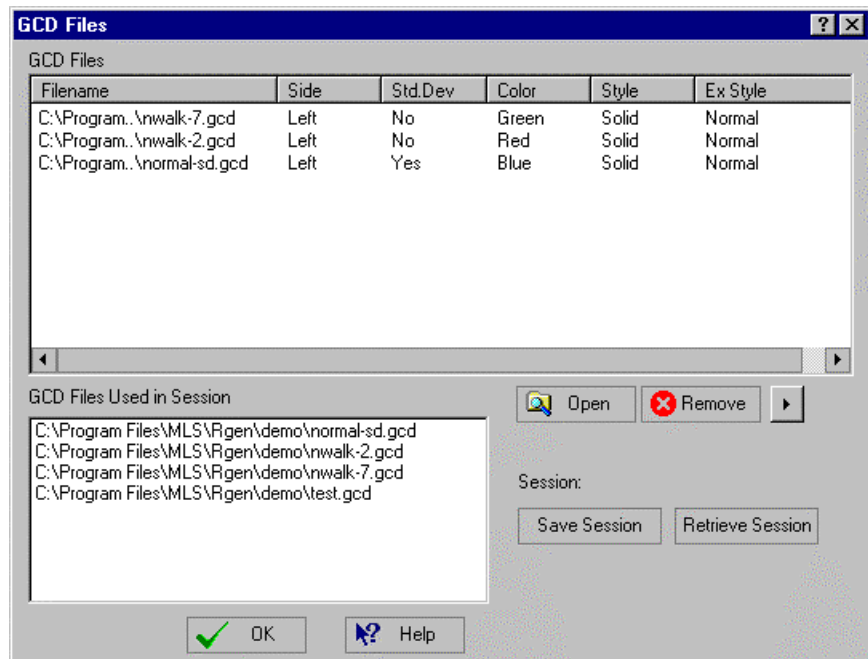


Figure 31: GCD Files window – select “Yes” to display standard deviation data

- 6.0 Close the Open GCD Files window. The report will display the standard deviation data as either a shaded region (Figure 32) or an encompassing line, as setup by the program’s options.

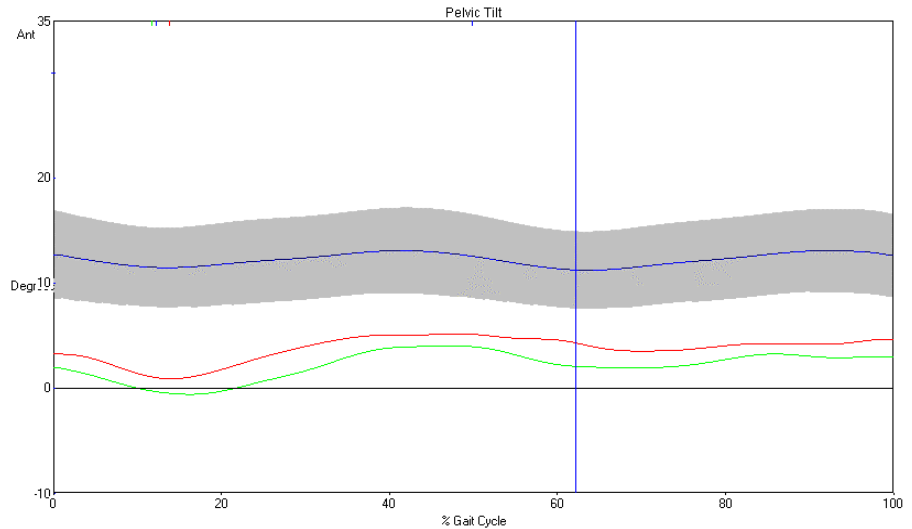


Figure 32: Graph with a shaded area representing the standard deviation

## Apply a Different Report (RPT) Format to Displayed Data

RGEN provides the means to change a format of data displayed without having to recreate an entire report.

- 1.0 Select Format from the Tools menu.
- 2.0 Select the desired report (RPT) format from the file selection window.
- 3.0 Close the file selection window.
- 4.0 Select Refresh (F5) from the View menu. The selected report will be displayed.

## Display Kinematic Data over an EMG Plot

RGEN provides the means to overlay kinematic or kinetic data with EMG plots, e.g. (Figure 33).

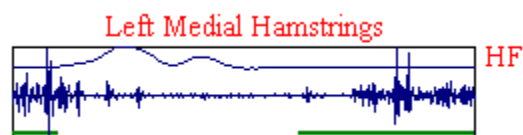


Figure 33: Example of an overlay plot.

- 1.0 Open a report formatted to display EMG data (e.g., EMG.rpt). If the EMG report is not the open report, refer to Set Displayed Report to User's Choice, page 8, for instructions.
- 2.0 Open a GCD file that contains EMG data (e.g., emg data.gcd). Refer to Display a Data File in a Report, page 17, for instructions.

3.0 Select the Graphs button (or right-click on the screen and select Graphs from the menu). The Edit report window opens.

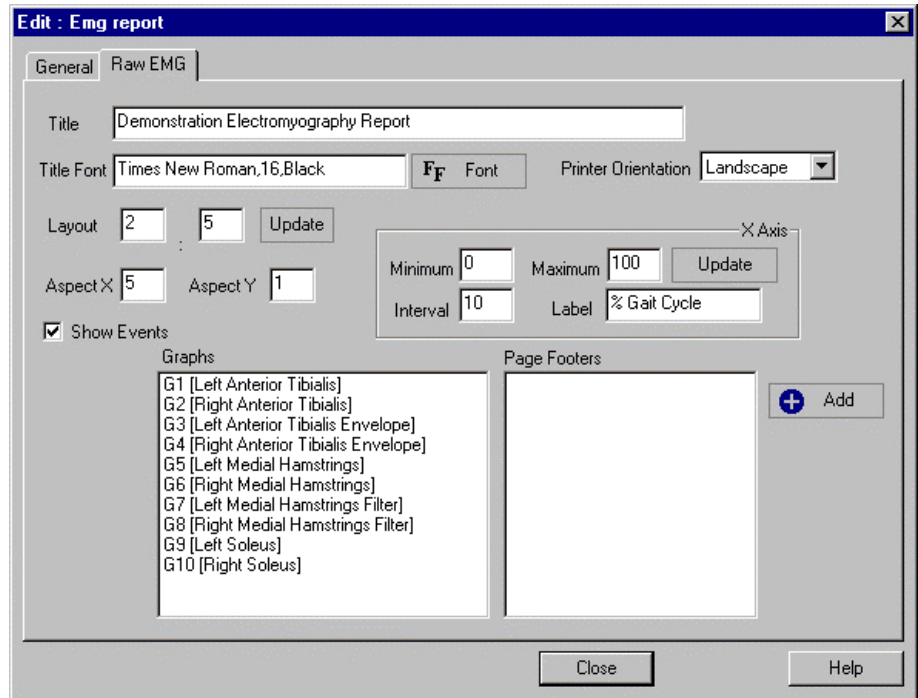


Figure 34: Edit report window.

4.0 Select the tab for the page that contains the graph to be edited.

5.0 Double-click on the graph name that you wish to overlay with kinematic data. The graph definition window (Figure 35) will open.



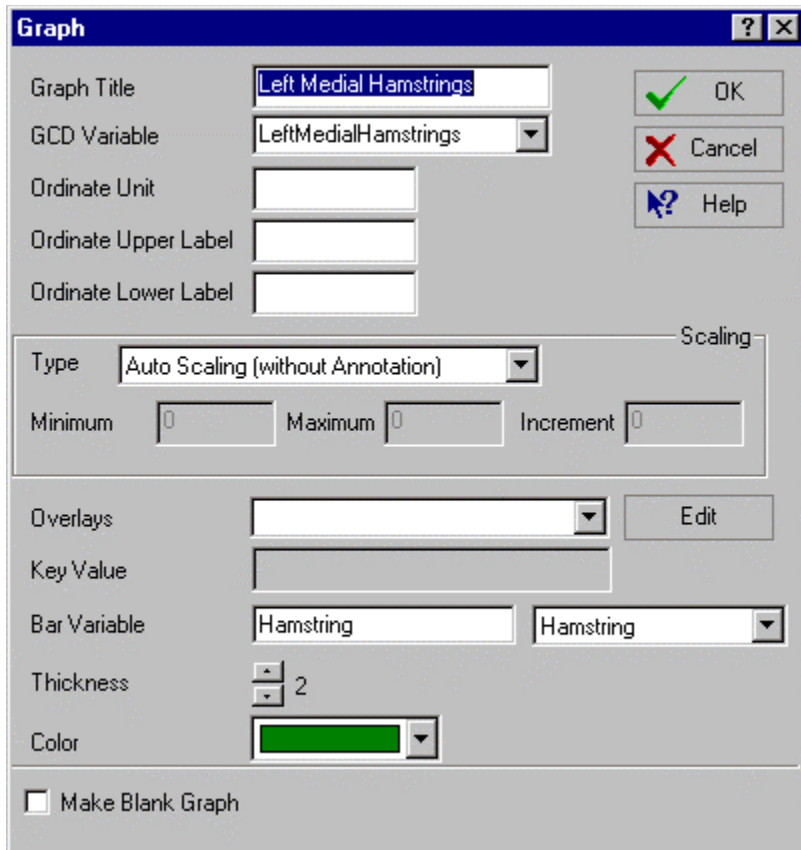


Figure 35: Graph definition window.

6.0 Select OverlayA from the Overlay dropdown list. Note that four kinematic plots (overlay A, B, C, and D) can be displayed for each EMG graph.

7.0 Select the Edit button. The Overlay dialog box (Figure 36) opens.

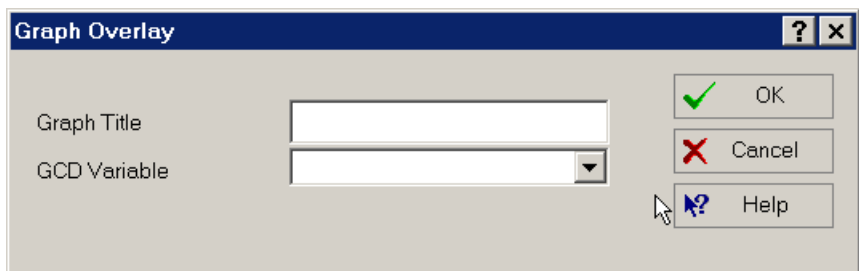


Figure 36: Overlay dialog box.

8.0 Type in a name for the Graph Title (e.g., KneeFlex). Refer to Graph Overlay dialog box, page 54, for instructions.

9.0 Select the GCD variable (e.g., KneeFlexExt) that is to be displayed with the EMG plot.

10.0 Repeat steps 6 - 9 for each graph that you want to be represented against kinematic data.

---

## Create Event-Specific Reports

RGEN provides the means to automatically display only those data files which are labeled with an event specific label, so the user may simply select all of a patient's files, but limit the display to those of a certain constraint, e.g. with crutches. In order to perform this advanced function, three distinct steps, editing the GCD file, defining the specific event, and displaying the new report, must be performed as described below.

### Edit the GCD files to contain event specific labels.

- 1.0 Open a subject's GCD file using MLS Edit GCD or a text-editing program. Edit the file to contain a comment line, e.g. pre-op (Figure 37).

```
#!DST-2.0 GCD Motion Lab Systems
$KeyValue
Pre-op
```

Figure 37: Sample GCD file text for an event-specific report

- 2.0 Edit each GCD for a subject as desired.

### Create an event-specific report.

- 3.0 Open the report format, using the following steps, which you want to use as the basis for your event-specific report.
  - Select Format from the Tools menu.
  - Select the desired report (RPT) format from the file selection window.
  - Close the file selection window.
  - Select Refresh (F5) from the View menu. The selected report will be displayed.
- 4.0 Save the report file to a user-defined name, such as "pre-op data only."
  - Select File|Save As
  - Enter a user-defined name, such as "pre-op data only." Include the .RPT extension after the filename.
- 5.0 Select the Graphs button - the Edit: RPT Format dialog box (Figure 38) will open.
- 6.0 Select the General tab for the report.
- 7.0 Enter the section name of the GCD file, e.g. Key Value, which contains the event-specific variables, e.g. pre-op or crutches, into the Graph Key box (Figure 38).

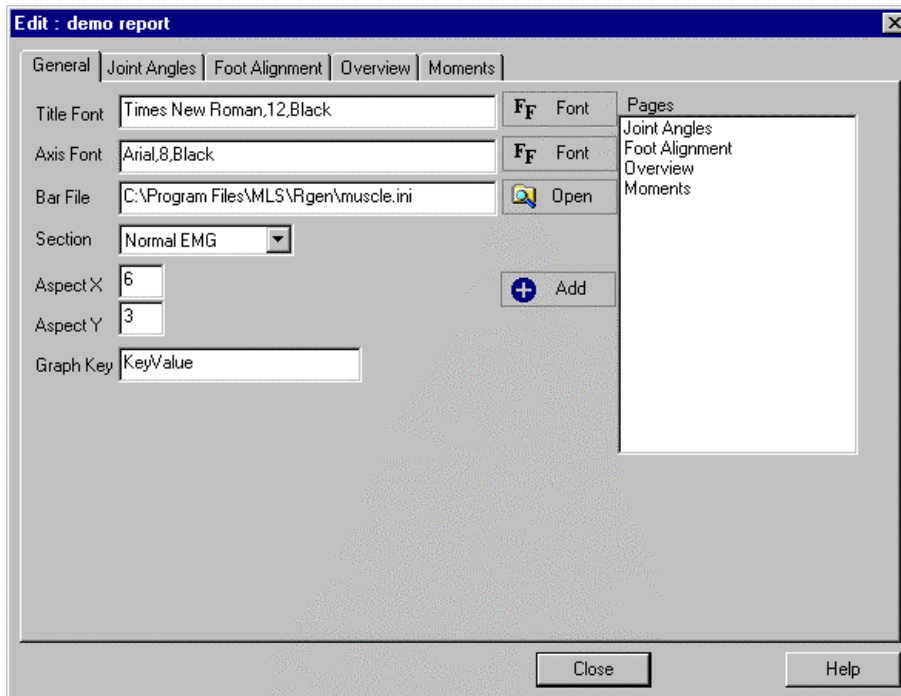


Figure 38: Sample graphs setup, for a report's general page, for an event-specific report.

8.0 Go to each graph page and edit each individual graph that you want to display the event-specific data. Enter the event-specific identifier, e.g. pre-op, into the field Key Value (Figure 39).

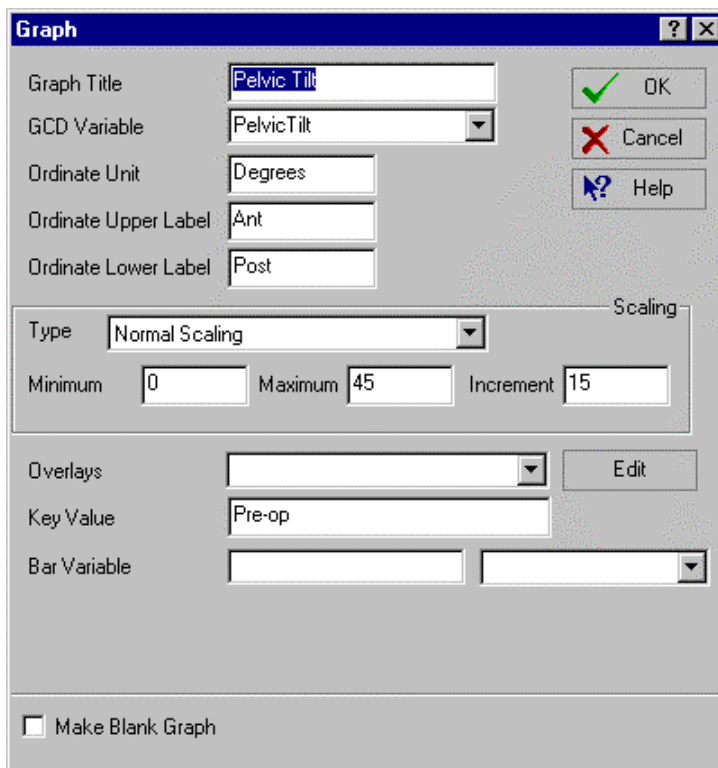


Figure 39: Sample graph setup for an event-specific report

9.0 Close the Edit window.

10.0 Save the changes to the new report, using File|Save.

11.0 Repeat these steps for each event specific report that may be used.

### **Display the GCD files in each event-specific report.**

12.0 Select the appropriate report format, such as pre-op or crutches.

13.0 Open all of a subject's GCD files using the Open GCD Files dialog box (Figure 40). Be sure to select the files twice if they include data for both left and right sides.

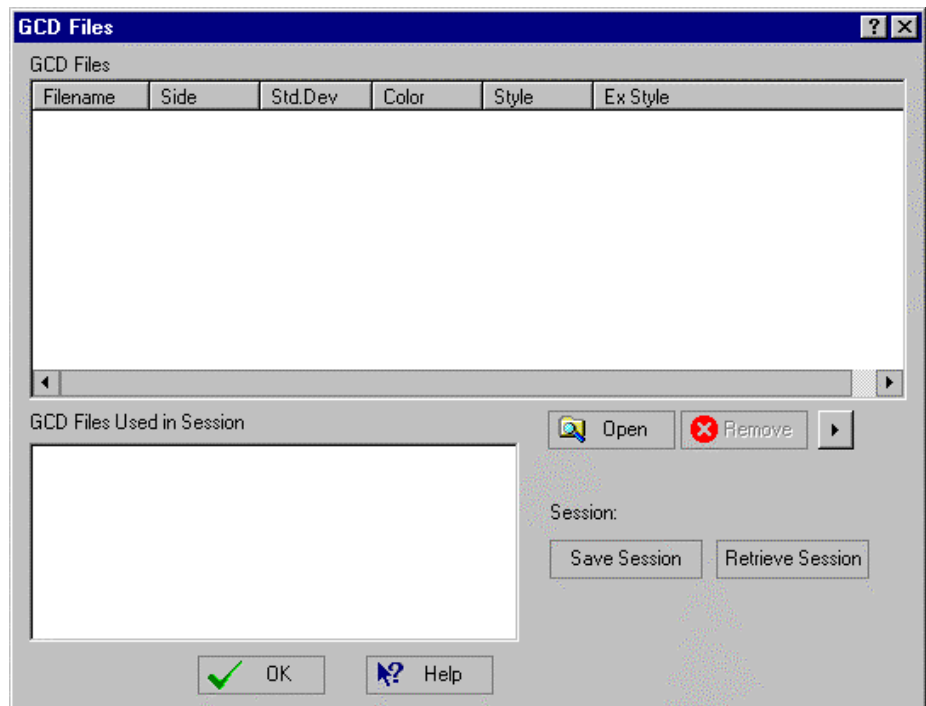


Figure 40: GCD Files (plots) dialog box.

14.0 Close the Open GCD Files dialog box.

# Menu Command Descriptions

---

## File Menu

The File Menu can always be selected from the left side of the Menu Bar. This menu contains commands that open, print, save, and export reports. Additionally, data files may be opened from this menu.



*Shortcut – C TRL+N*

*To select data for display, refer to the Open GCD Files command on the File menu.*

### New

The New Report command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command allows you to choose a report to open, using the standard MS Windows File Open dialog box. The selected report will be opened in a new window



*Shortcut – C TRL+R*

*To select data for display, refer to the Open GCD Files command on the File menu.*

### Repeat

The Repeat report command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command opens a new copy of the last report file that was opened. This blank report will be opened in a new window.



*Shortcut – C TRL+O*

*You can display up to 120 data sets (GCD files) in one report.*

### Open GCD Files

The Open GCD Files command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command is used to open GCD files and to add the data within to the active report via the GCD Files dialog box (Figure 41). If all data within the GCD file matches up to the variables requested by the active report, the data will be applied to the active report without user interaction.

However, if there is a mismatch between the data and requested variables, the Missing Variables dialog box (Figure 42) will open for user intervention before processing can continue. Refer to Missing Variables dialog box, page 33, for further information.

## GCD Files dialog box

*You can open GCD files stored in many different locations, such as your computer hard disk or a network drive to which you are connected.*

This dialog box (Figure 41) allows you to choose the GCD files, up to 120 files, to be plotted on a report. Additionally, this box provides the ability to select the specific data contained in the GCD file (left versus right and standard deviation data) and formats the plotting style.

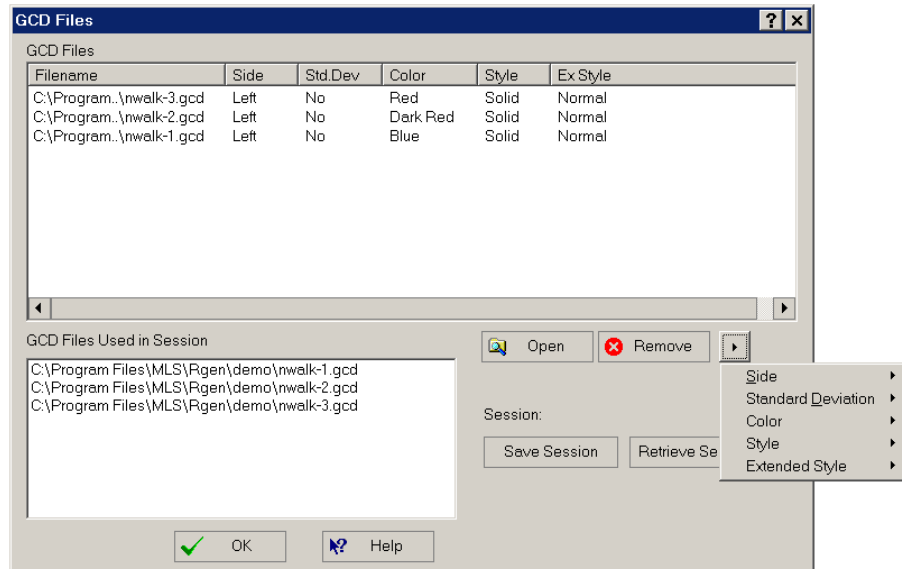


Figure 41: GCD Files (plots) dialog box.

This dialog box has the following controls:

### GCD Files

This window section shows a list of GCD files that are presently being plotted in the active report. Additionally, this box shows you and allows you to select the side for plotting, if standard deviation data is to be plotted, and the color, style and extended line styles for each plot.

You can change the order of the files by dragging and dropping the filename.

Note that Report Generator will only open 120 GCD files. Once 120 files are selected, Report Generator will gray the data displayed in the GCD Files Used in Session and the Open button will not be available for selection.

### GCD files used in Session

This box contains a list of all the GCD files that have been opened during a session. Any file from this list can be added to the GCD Files box by double clicking on the filename.

### Open

This command allows you to choose a new GCD file to plot in a report. It opens the standard MS Windows File Open dialog box from where you can choose the GCD files. The application allows you to choose multiple GCD files by using a combination of the SHIFT and CTRL keys.

### Remove

This command removes a GCD file from the plotted

report. One or more files must be selected before this button is available for selection.



This button opens a menu that allows you to change any of the attributes – side, standard deviation, color, or style – associated with one or more files. You can select one or more files from the GCD Files box and then choose the appropriate menu item.

**Save Session**

This command allows you to save a history of the GCD file list and its order to the application database, so a duplicate report can be created at a later date. Refer to Edit|Session, page 41, for more information.

**Retrieve Session**

This command allows you to retrieve a session record from the application’s database in order to duplicate the report that was originally created. Refer to Edit|Session, page 41, for more information.

When the OK button is selected, Report Generator will process the data and display it in the active report. If all data within the GCD file matches up to the variables requested by the active report, the data will be applied to the active report without user interaction. However, if there is a mismatch between the data and requested variables, the Missing Variables dialog box (Figure 42) will open for user intervention before further processing can continue.

**Missing Variables dialog box**

If Report Generator cannot find variables in the GCD file requested by the report while opening a GCD file, the Missing Variables dialog box (Figure 42) will open. This dialog box is used to enter variables that are present in the report file but could not be found in the GCD file being plotted.

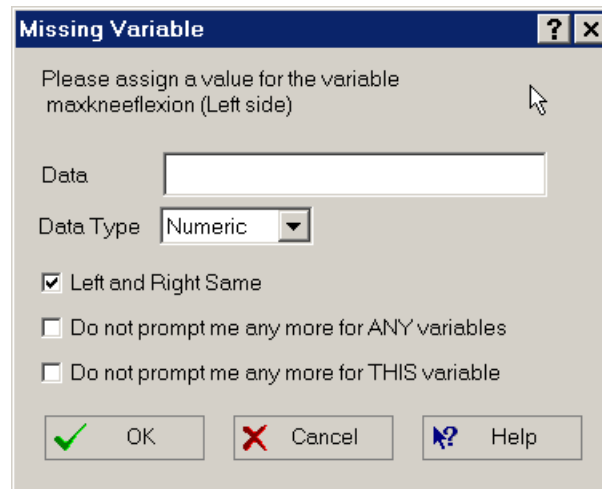


Figure 42: Missing Variables dialog box.

The dialog box will tell you which variable it is asking for and the side for which the information is needed.

This dialog box has the following fields:

**Data**

Enter the name of the variable in the GCD file that equates to the requested data in the RPT file.



<b>Data Type</b>	This is a drop list that you can use to describe the type of data you are entering.
<b>Left and Right side same</b>	Clicking on this check box ensures that the application will assume that the value of the variable requested is the same on both sides. This box should be checked for variables like Mass, Height and Date while it should be left unchecked for variables like Cadence.
<b>Do not prompt me anymore for ANY variables</b>	Selecting this box ensures that you will not be prompted for missing variables anymore.
<b>Do not prompt me anymore for THIS variable</b>	Selecting this box ensures that you will not be prompted for the particular variable anymore.

## Close



The Close command is available on the Report Generator toolbar at the top of the application window. Additionally, you can close a report by using the Close icon on the document's window.

This command closes the active report. If changes were made to a report during a session, Report Generator will automatically prompt you to save changes to your report before you close it. If you close a report without saving, you will lose all changes made to that report since the last time the document was saved.

## Save



*Shortcut – CTRL+S*

The Save command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command opens the standard MS Windows dialog box for saving; through this box, the active report can be saved to its current name and location. To change the filename of the report or its location use the Save As command.

## Save As

This command opens the standard Windows dialog box for saving a file to a custom name and location; through this box, you may save the open report to a user-defined name and location. Report Generator displays the Save As dialog so you can name your report.

To save a document with its existing name and directory, use the Save command.

## Export

*Individual plots are saved in a 640 X 480 bitmap, while the whole page is saved in a 1024 X 768 bitmap.*

This command allows you to save the active page or select plots from the page to a bitmap. You can specify the location where the images should be saved, but the program will automatically name the files with graph specific names:

- The whole page will be saved with the page title as the name of the file.
- If you selected to save individual plots, one file will be generated per individual plot and its name will be the same as the title of the plot.

Upon selection, this command opens the Export to Bitmap dialog (Figure 43) box where you can make your selections and complete this operation.

### **Export to Bitmap dialog box**

The Export to Bitmap dialog box (Figure 43) allows you to choose whether to export the whole page or specific plots to a bitmap.

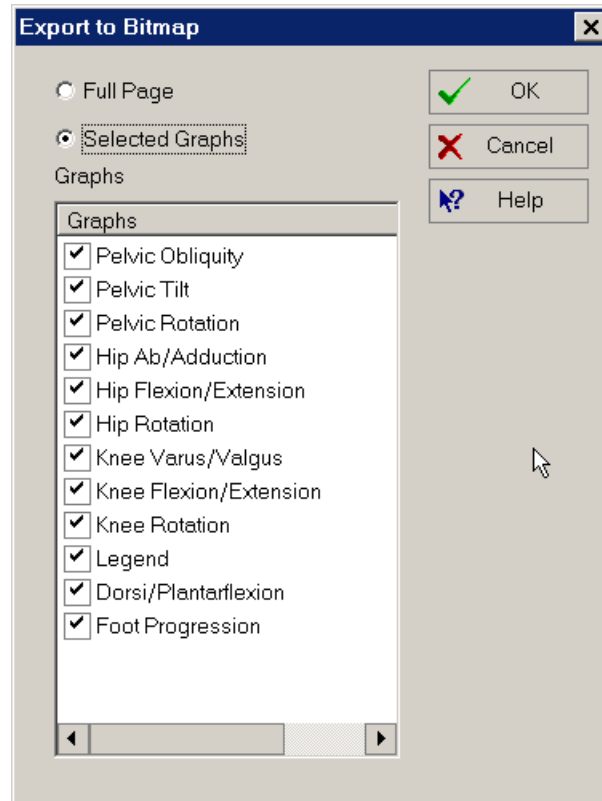


Figure 43: Export to Bitmap dialog box.

This dialog has the following controls:

- |                        |  |
|------------------------|--|
| <b>Full Page</b>       | Select this button to export the whole page to a bitmap.   |
| <b>Selected Graphs</b> | If this button is selected, only the graphs that have been selected in the <b>Graphs</b> box will be saved as individual bitmap files. |
| <b>Graphs</b>          | This list control shows you all the graphs on the active page. You can select or deselect the graphs that you want to export.          |
| <b>Help</b>            | This button opens help text pertinent to the Export command.   |
| <b>OK</b>              | This button closes the dialog box and asks you to choose a location where the bitmap files can be saved.                               |
| <b>Cancel</b>          | This button closes the dialog box without creating bitmap files.   |

## Print

This command is used to print the report to the selected printer. This command opens the standard MS Windows Print dialog box where you may specify the range of pages to be printed, the number of copies, the destination printer, and other printer setup options.

### **Print Dialog box**

The following options within the standard MS Windows Print dialog box (Figure 44) allow you to specify how the report should be printed by the application.

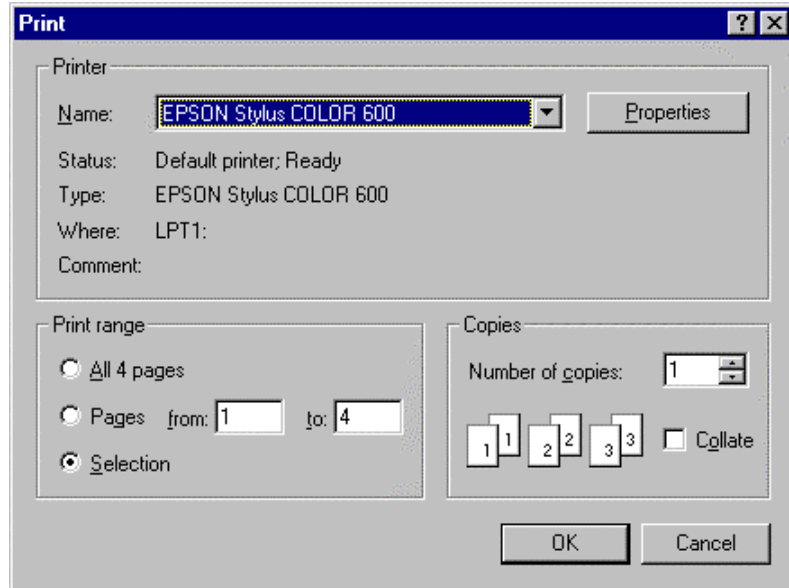


Figure 44: Print dialog box

<b>Printer</b>	This is the system's name for the active printer and printer connection. Select the appropriate printer from the dropdown list.
<b>Setup</b>	Displays a Print Setup dialog box (Figure 45), so you can select the appropriate print options, e.g. orientation. Refer to Print Setup, page 37, for more information.
<b>Print Range</b>	Specify the pages you want to print:
<b>All</b>	Prints the entire document.
<b>Selection</b>	Prints the currently selected text.
<b>Pages</b>	Prints the range of pages you specify in the From and To boxes.
<b>Copies</b>	Specify the number of copies you want to print for the above page range.
<b>Collate Copies</b>	Prints copies in page number order, instead of separated multiple copies of each page.

**Print Quality**      Select the quality of the printing. Generally, lower quality printing takes less time to produce.

## **Print Preview**

Use this command to display the report, as it would appear when printed. When you choose this command, the main window will be replaced with a print preview window in which one or two pages will be displayed in their printed format. The print preview toolbar offers you options to view either one or two pages at a time, move back and forth through the document, zoom in and out of pages, and initiate a print job.

### ***Print Preview toolbar***

The print preview toolbar offers you the following options:

<b>Print</b>	Bring up the print dialog box, to start a print job.
<b>Next Page</b>	Preview the next printed page.
<b>Prev Page</b>	Preview the previous printed page.
<b>One Page / Two Page</b>	Preview one or two printed pages at a time.
<b>Zoom In</b>	Take a closer look at the printed page.
<b>Zoom Out</b>	Take a larger look at the printed page.
<b>Close</b>	Return from print preview to the editing window.

## **Print Setup**

The Print Setup command can be used to select a printer and a printer connection. This command opens the standard Windows Print Setup dialog box (Figure 45), where you can select the printer and its connection and select the appropriate print options, e.g. orientation.

### ***Print Setup dialog box***

The following options within the standard MS Windows print setup dialog box (Figure 45) allow you to select the destination printer and its connection.

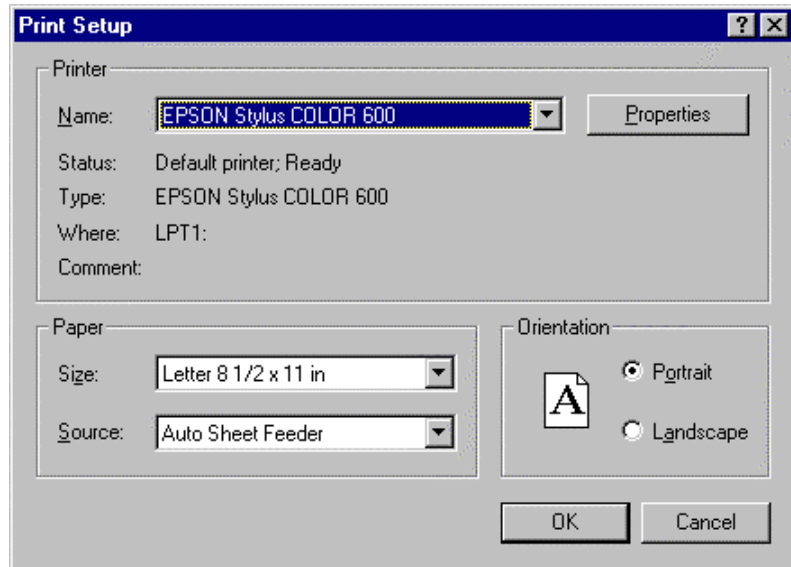


Figure 45: Standard MS Windows print setup dialog box

<b>Printer</b>	Select the printer you want to use using the dropdown list. Note that you install printers and configure ports using the standard MS Windows Control Panel.
<b>Orientation</b>	Choose Portrait or Landscape.
<b>Paper Size</b>	Select the size of paper that the document is to be printed on.
<b>Paper Source</b>	Some printers offer multiple trays for different paper sources. Specify the tray here.
<b>Properties</b>	Displays a dialog box where you can make additional choices about printing, specific to the type of printer you have selected.
<b>Network...</b>	Choose this button to connect to a network location, assigning it a new drive letter. Note that this option appears only if your computer is on a network.

## Page Setup

This command allows you to specify the type of paper to which the report should be printed and choose the paper margins. When selected this command opens the standard Windows Page Setup dialog box (Figure 46).

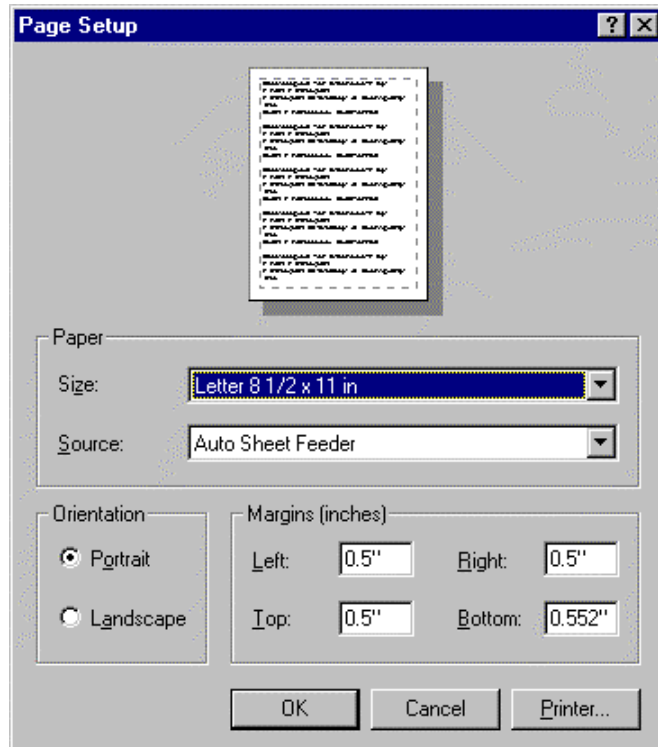


Figure 46: Standard MS Windows page setup dialog box

This box has the following controls:

<b>Size</b>	This is the size of the paper that is present in the printer
<b>Source</b>	This is the tray in the printer from which the paper should be used.
<b>Orientation</b>	You can choose Portrait or Landscape for the orientation of the paper.
<b>Margins (inches)</b>	There are four boxes where you can specify the top, bottom, left and right margins -all in inches.
<b>Printer</b>	The Printer option takes you to a secondary Page Setup screen where you can select the printer that will be used.

## Exit

Use this command to end your Report Generator session. You can also use the Close command on the application Control menu. Report Generator prompts you to save reports with unsaved changes.

---

## Edit menu

The Edit menu provides commands to edit a report's format and to control automatic data processing, specifically means to automatically call GCD variables and duplicate data processing steps.

## GCD Variables

This command allows you to read variables from any GCD/DST file and store them within the application's database so that they are automatically called when a GCD variable list is available for use, e.g. within the Graphs dialog box. When this command is selected, the GCD Variables dialog box (Figure 47) is opened.

### GCD Variables Dialog Box

Upon opening, the GCD Variables dialog box (Figure 47) displays all the variables that are stored by the application. From this box you can:

- Remove variables from the application's database.
- Add variables to the database by typing in the new names.
- Add variables to the database from an existing GCD/DST file.

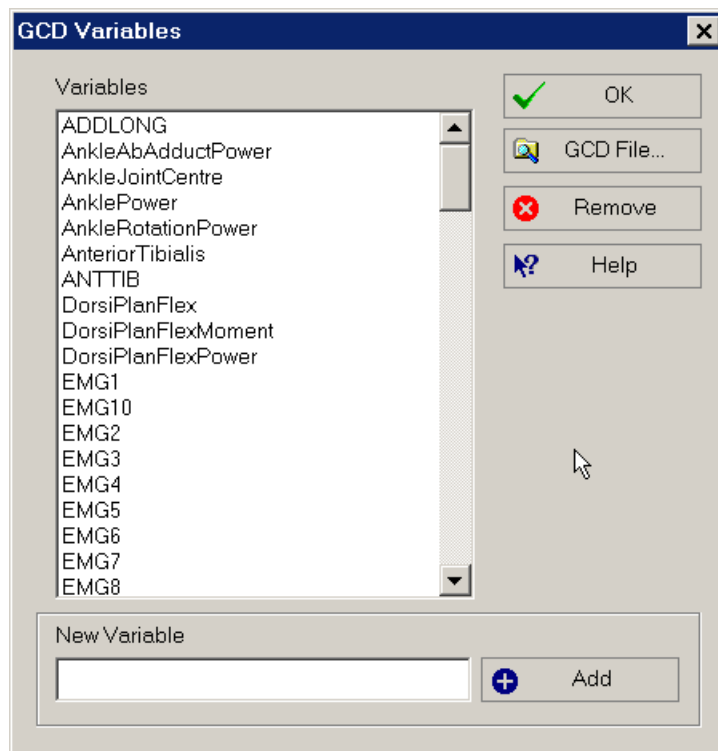


Figure 47: GCD Variables dialog box.

This dialog box has the following fields:

<b>Variables</b>	This list box shows you all the variables stored by the application, not the variables found in the open GCD files.
<b>GCD File</b>	This button allows you to select a GCD/DST file, in order to add any additional variables that are present in the GCD file, but not the application. When a GCD file is selected, the application reads the name of numerical variables that contain more than one sample (i.e. variables excluding temporal variables) and adds them to the application list.
<b>Remove</b>	This button allows you to remove the selected variable from the list and application's database.
<b>New Variable</b>	This edit box allows you to enter the name of a variable you want to add to the list. You then need to click on the Add button to add

this variable to the list.

### Add

This button adds the variable you entered in the New Variable edit box to the list of variables.

## Source

This command opens the code for the active report in Notepad or your default text editor.

## Session

Report Generator provides the ability to save report information, the data files displayed, and the order in which they were displayed to the application's database as a session. This enables the user to duplicate a report - the format, the specific data, and the order of the data display - in the future with minimal effort.

### Save

This command allows you to save a history of the GCD file list and its order to the application database, so a duplicate report could be created at a later date. When selected, the Save Session dialog box (Figure 48) opens. Enter a name for the session. Note that spaces are permissible in the naming convention.

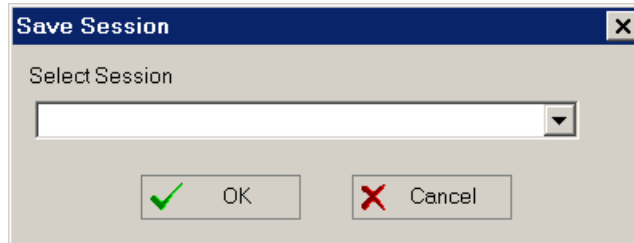


Figure 48: Save Session dialog box

### Retrieve

This command allows you to retrieve a session, record from the application's database in order to duplicate the report that was originally created. When selected, the Retrieve Session dialog box (Figure 49) opens. You may select the preferred session from the drop list box, or type the session's name into the command line.

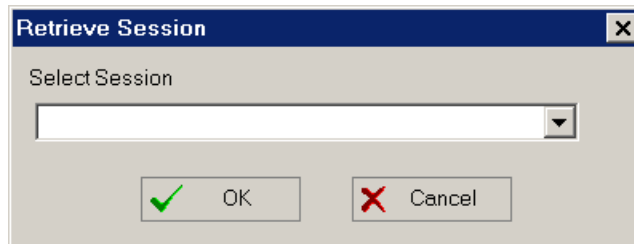


Figure 49: Retrieve Session dialog box.



## Report

This command provides several options for editing the active report format: Header, Footer, Line Attributes, and Graphs. These options provide the means to customize every aspect of a report to meet the specific needs of an individual report.

### Header



*The size of the header will vary with contents.*

The Edit: Header command is available on the Report Generator toolbar at the top of the application window.

This command allows you to create a header section within a report and edit its contents. When this command is selected the Header dialog box (Figure 50) opens, so you can customize the contents and format of the header information for the active report.

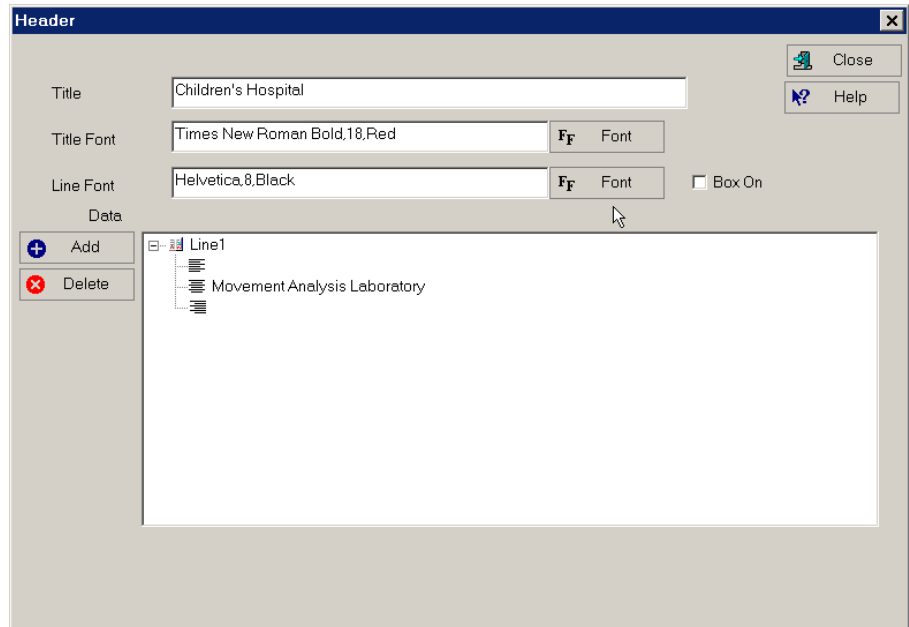





Figure 50: Edit Report Header dialog box.


This page has the following controls:


- |                   |   |
|-------------------|---|
| <b>Title</b>      | This control allows you to set the title for the report.  |
| <b>Title Font</b> | This control shows you the font name, style, size, and color with which the title of the header/footer is written. This is a read only box. To change the selected font click on the  button. This will open the standard Windows Font dialog box where you can make your choices. |
| <b>Lines Font</b> | This control shows you the font name, style, size, and color with which the lines of the header/footer of the report are written. This is a read only box. To change the selected font click on the  button. This will open the Font dialog box where you can make your choices.     |
| <b>Box On</b>     | If this box is checked, a box is drawn around the header/footer.  |

## Data

This tree control with two levels is displayed once information is added using the Add button. The first level shows you the line number and the second level shows you the text which is to be displayed

Left Justified 

Right Justified 

Center Justified 

### Level 1

This level shows you the line number. You can perform the following operations at this level.



Allows you to add a new line.



Allows you to delete the selected line.



Allows you to move the selected line up by one as long as it is not the first line.



Allows you to move the selected line down by one as long as it is not the last line.

### Level 2

You cannot perform any of the operations mentioned above at this level. However, you can edit the items by just clicking on it entering new values in the edit box. To perform this editing, click on the text once to select the item. Once the item is selected, click on it again and an edit box will open and you can edit the item.

## Footer



The Edit: Footer command is available on the Report Generator toolbar at the top of the application window.

This command allows you to customize the contents and format of the footer in the active report. When this command is selected the Footer dialog box (Figure 51) opens, so you can customize the contents and format of the footer information for the active report.

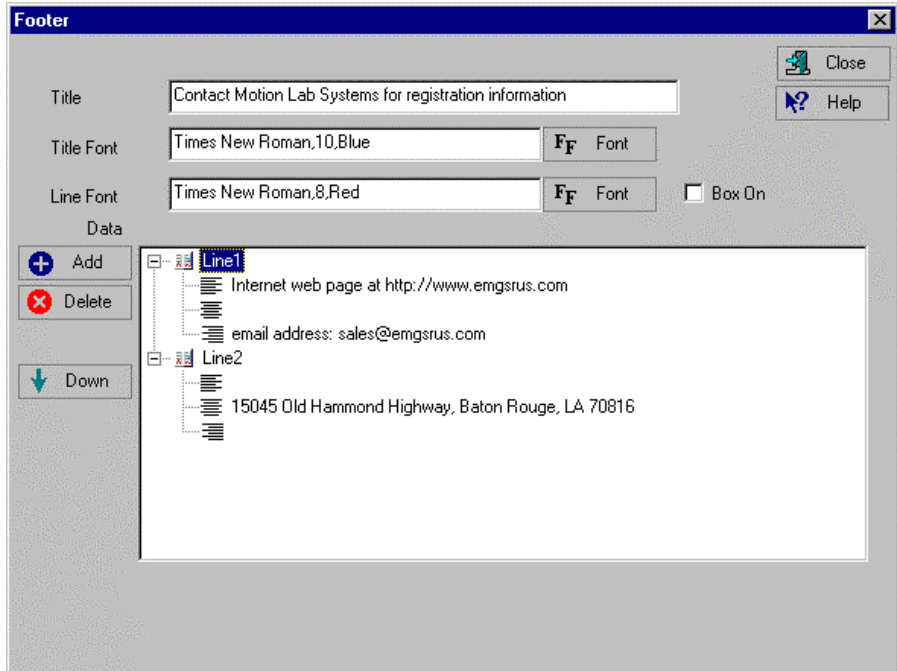







Figure 51: Edit Report Footer dialog box.

This page has the following controls:

- |                   |   |
|-------------------|---|
| <b>Title</b>      | This control allows you to set the title for the report.  |
| <b>Title Font</b> | This control shows you the font name, style, size, and color with which the title of the header/footer is written. This is a read only box. To change the selected font click on the  button. This will open the standard Windows Font dialog box where you can make your choices. |
| <b>Lines Font</b> | This control shows you the font name, style, size, and color with which the lines of the header/footer of the report are written. This is a read only box. To change the selected font click on the  button. This will open the Font dialog box where you can make your choices.     |
| <b>Box On</b>     | If this box is checked, a box is drawn around the header/footer.  |
| <b>Data</b>       | This is a tree control with two levels that displays information added using the Add button. The first level shows you the line number and the second level shows you the text which is to be displayed   |
- Left Justified 
- Right Justified 
- Center Justified 

## Level 1

This level shows you the line number. You can perform the following operations at this level.



Allows you to add a new line.



Allows you to delete the selected line.



Allows you to move the selected line up by one as long as it is not the first line.



Allows you to move the selected line down by one as long as it is not the last line.

## Level 2

You cannot perform any of the operations mentioned above at this level. However, you can edit the items by just clicking on it entering new values in the edit box. To perform this editing, click on the text once to select the item. Once the item is selected, click on it again and an edit box will open and you can edit the item.

## Line Attributes



The Edit: Line Attributes command is available on the Report Generator toolbar at the top of the application window. Note that if you access this command by right clicking on a plotted line, the elements displayed in the dialog box (Figure 52) will belong to that of the selected line.

This command provides the means to change the Line Attributes of the printer or the screen. When selected, this command opens the Line Attributes dialog box (Figure 52), which allows you to make the required changes.

The Line Attributes dialog box allows you to customize how the lines are drawn on the Screen or Printer. There are two columns of controls, one for Printer and one for Screen. The controls in both columns behave in similar manners. However, the Printer settings include options for automatically matching the screen settings or for preparing a black and white report.

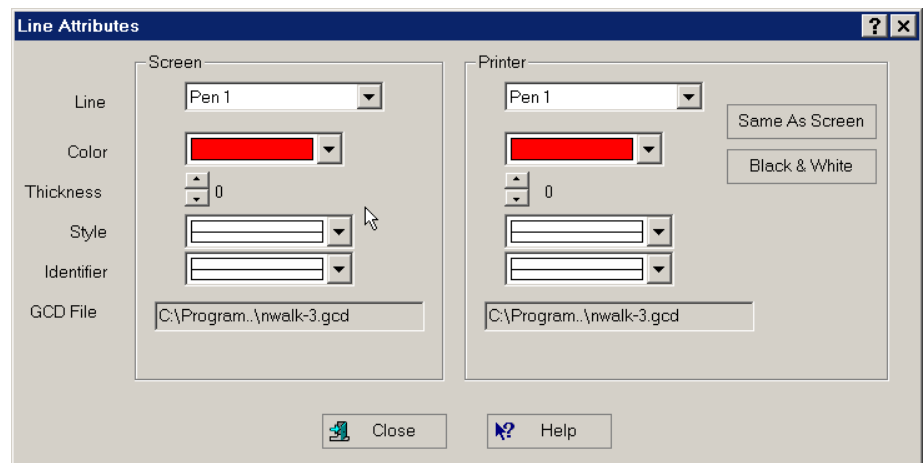


Figure 52: Edit Line Attributes dialog box.

This dialog box has the following controls.

<b>Line</b>	Select the Line (called a Pen in the window) to display or edit. Upon selection, the other controls will automatically display the current properties of this line. There are 120 possible Pens to draw the permitted maximum number of GCD files, plus there is a selection for box that is used to draw a graph's frame.
<b>Color</b>	This is a drop list box. It shows the color with which a line is drawn. This list has the 16 standard Windows colors. These colors are:  Black, Red, Green, Yellow, Blue, Magenta, Cyan, White, Dark Red, Dark Green, Dark Yellow, Dark Blue, Dark Magenta, Dark Cyan, Light Grey, Dark Grey.
<b>Thickness</b>	This is a spin button that allows you to choose the thickness with which a line is drawn. Note that a value of 0 and 1 both will draw a line with a width of one pixel.
<b>Style</b>	This drop list box allows you to choose the style – dashed, dotted, etc. – with which a line is drawn.
<b>Identifier</b>	This allows you to choose a geometrical shape that is drawn at equal intervals on the line.
<b>GCD File</b>	This shows you the GCD file for which the line that is selected is applicable. If there are no GCD files being plotted for the selected line number, this box will display “No GCD File”.
<b>Same As Screen</b>	This command sets all Printer Pen settings - color, thickness, style, and identifier - for all Pens to the same settings as those selected for the Screen Pens.
<b>Black &amp; White</b>	This command changes the Printer Pen color setting for all Pens to black. The style and identifier settings will be set to default values.

## **Graphs**

This command can be used to edit all the pages in the report and can be used to change all the defining information on a specific page to include font styles, graphs, and key tables.

This command opens the General Page (Figure 53) of Edit Property Sheet, which encompasses several pages that are used to edit a report. Refer to General Page, page 46, for more information.

## **General Page**

The General Page contains the information that is applicable to all the pages of the report and it lists all pages defined within the report, so you can add or delete pages to the report.

Additionally, it contains a one-property page (tab for each page (Figure 55) that is present in the report.

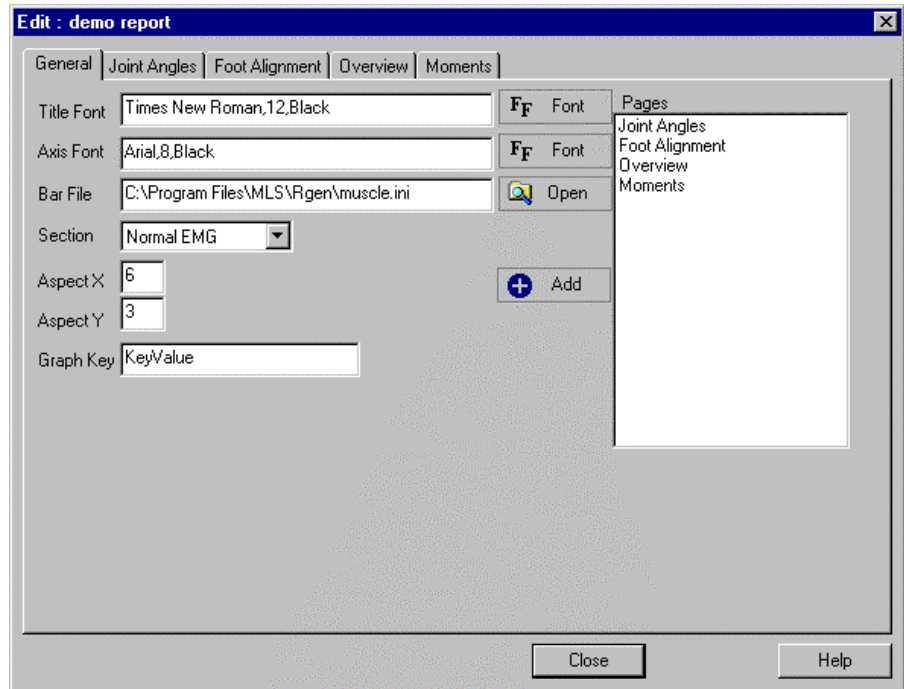







Figure 53: General Page of Report Graphs.

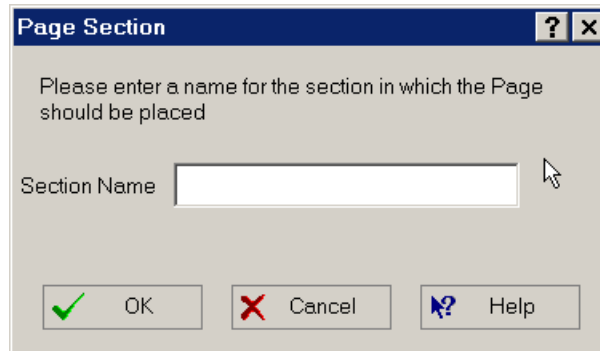
The controls within this dialog box include the following:

- |                    |  |
|--------------------|--|
| <b>Title Font</b>  | This font is used to write the Title of each page in the report. This is a read only box. To change the selected font click on the  button beside the Title Font line. This will open the standard MS Windows Font dialog box where you can make your selection.  |
| <b>Axis Font</b>   | This font is used to write on the axes of each graph that is present in the report. This is a read only box. To change the selected font click on the  button beside the Axis Font line. This will open the standard MS Windows Font dialog box where you can make your selection.  |
| <b>Bar File</b>    | This is a read only control that allows you to select a text file (extension .INI) which contains details about the ON and OFF state of included variables. Each file may contain several sections; each section may contain a various number of variables with the associated ON and OFF data. Refer to Muscle File, page 79, for more information about the file and its format.<br><br>Click on the  to change the selected file. |
| <b>Bar Section</b> | This drop list box displays the sections present in the chosen Bar file. Choose the section from which the variable should be read.  |
| <b>Aspect X</b>    | This is the X value of the aspect ratio with which the graphs will be plotted.   |

<b>Aspect Y</b>	This is the Y value of the aspect ratio with which the graphs will be plotted.  NOTE: To use the Aspect X and Aspect Y, both controls should have valid values: whole numbers between 0 and 255. Note that this excludes the values 0 and 255.
<b>Graph Key</b>	This variable is the name of the user-defined section created in a GCD file used to create event-specific reports. Refer to Create Event-Specific Reports, page 28, for instructions for using this variable.
<b>Pages</b>	This is a list box that shows you the titles (also called section names – refer to Sections, page 66, for more information) of all defined pages in the report. These names are unique - no two pages can have the same section names. You can add and delete pages. These can be done with the following buttons that appear at the bottom of this control.
	This button can be used to add a new page. This opens the Page Section dialog box (Figure 54), where you will need to give a section name for this page.
	This button allows you to Delete a page. This action is unrecoverable. You will be prompted before the page is deleted.

### **Page Section dialog box**

The Page Section dialog box (Figure 54) opens when you select to add a new page to a report. This box allows you choose a name for the section for the new page that will be created. The section name should be unique.



*Figure 54: New Page Section Dialog Box.*

This dialog box should be unique. If you do not want to create the page, hit the Cancel button.

The dialog has the following fields:

**Section Name**            Enter the title for the new page (section).

## Specific Report Pages

Individual tabs for each report-defined page are included in the Edit Report|Graphs dialog box. Depending on the number of pages defined in a report and their related titles, the number of page specific tabs and the titles displayed in the tabs will vary. The title of the report page will correspond to the tab title. Each report page (Figure 55) may be edited through the appropriate tab.

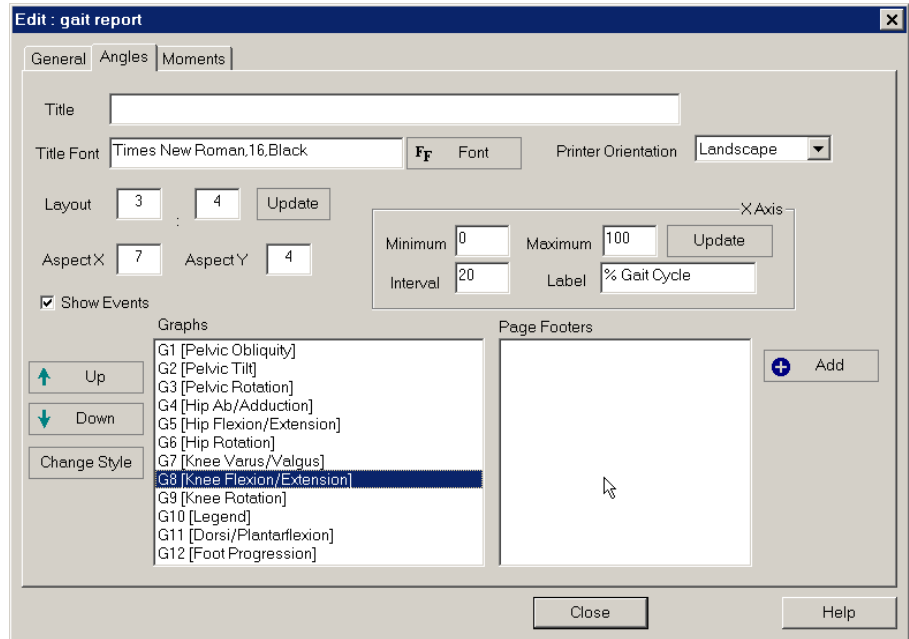



Figure 55: Specific Page of Report Graphs.

- Title** This is the title of the page and is centered above the graphs present on the page.
- Title Font** This font is used to write the Title of each page in the report. This is a read only box. To change the selected font click on the  button. This will open the standard Windows Font dialog box where you can make your selection.
- Layout** There are two controls here, horizontal and vertical. Enter the number of graphs you would like displayed horizontally in the first box. Enter the number of graphs you would like displayed vertically in the second box. The product of the two gives you the total number of graphs that will be printed on the page.
- When changing the values, note that Report Generator does not make changes to the report when you only enter new values. You must click on the Update button for your report to reflect these new values.
- When Report Generator applies your changes, it will check to see if the new number of graphs is less than that already present. If the new number is less, Report Generator will prompt you to continue and delete the last



few graphs or cancel the operation. Otherwise, if the new number of graphs is more than those present, new graphs will be added and identified as [Not Used] in the Graphs list.

**Aspect X**

This is the X-value of the aspect ratio with which the graphs will be plotted. The aspect ratio is the ratio of the length of the X-axis to that of the Y-axis. If a value is entered here, it overrides the value that is used in the General Page.

**Aspect Y**

This is the Y-value of the aspect ratio with which the graphs will be plotted. If a value is entered here, it overrides the value that is used in the General Page.

NOTE: To use the Aspect X and Aspect Y, both controls should have valid values: whole numbers between 0 and 255. Note that this excludes the values 0 and 255.

All the graphs on a page use the same X-axis definition. The labels and values of this axis are annotated on only those graphs at the bottom of a column. The following controls in the X Axis box are used to define this “common” axis.

**Minimum**

This is the minimum value on the X-axis.

**Maximum**

This is the maximum value on the X-axis.

**Interval**

This is the interval, e.g. every 25% of distance defined by the maximum and minimum values, at which tick marks are placed on the X-axis.

**Label**

This is the X-axis label, which shows the unit of measurement on the X-axis.

**Update**

When the Update button is selected, the values in the four controls above are updated. Note that the minimum value should be less than the maximum value; the application will notify the user if the values entered do not meet this criteria.

**Show Events**

When this box is selected, tick marks will be placed along the top of each graph indicating gait cycle events, e.g. opposite foot contact.

**Graphs**

This list box shows you all the graphs and key tables on the page. The graphs have the graph number and the graph title, while the key tables have the graphs number and the entire key table string. Graphs that are not used have Not Used written after the graph number.

Each graph can also have four plots, numbered as G1A, G1B, G1C, and G1D, that are overlaid on the main plot. Note that the A plot will be positioned at the top of the original graph.

You can perform the following actions from within this box:

- Edit a graph by double clicking on it. This will open the Graph dialog box (refer to Figure 56 in Graph dialog box, page. The dialog opened will depend on whether you

click on the main plot or on an overlay plot.

- Edit a key table by double clicking on the entry. This will open the Key Table dialog box (refer to Figure 59 in Key Table dialog box, page 54).
- Rearrange the order of the plots using the up and down arrows.
- Change the style of the plot from a graph to a key table.



Select this button to move the selected entry one level up.



Select this button to move the selected entry one level down.

### Change Style

As mentioned above, you can have graphs and key tables on a page. You can change the style of each graph by clicking on this button.

### Page Footers

Each page can have one or more page footers. Each footer consists of a label and a variable separated by \. There can also be a number after the variable that shows the precision to which the variable should be calculated. In the tree control, there are two levels described below:


#### Level 1


This level shows you the footer number.

#### Level 2

This level has three entries:

**ID=** This shows you the label that will be displayed.

 This shows you the variable that will be computed for each GCD file that is being displayed.

 This shows you the precision to which the variable will be calculated. If you do not want this used, enter any value less than 0.

There are four buttons to the right of this box. They work as follows;



This button is available at all times and is used to add a new page footer.



This button is available only when you are at Level 1 and it is used to delete a page footer.



This button is available only when you are at Level 1 and it is used to move the selected footer up.



This button is available only when you are at Level 1 and it is used to move the selected footer down.

### Graph dialog box

*This dialog box is used only for those graphs that chart data.*

This is the dialog box that opens when you double click on a graph name displayed in the Graphs box of report's specific page. This box (Figure 56) allows you to change the presentation of the graph that is plotted.

The screenshot shows a dialog box titled "Graph" with a standard Windows-style title bar containing a question mark and a close button. The dialog is organized into several sections. At the top, there are five input fields: "Graph Title" (containing "Knee Flexion/Extension"), "GCD Variable" (a dropdown menu showing "KneeFlexExt"), "Ordinate Unit" (containing "Degrees"), "Ordinate Upper Label" (containing "Flx"), and "Ordinate Lower Label" (containing "Ext"). To the right of these fields are three buttons: "OK" with a green checkmark, "Cancel" with a red X, and "Help" with a question mark icon. Below these fields is a "Scaling" section with a "Type" dropdown menu set to "Normal Scaling". Underneath are three input fields for "Minimum" (-15), "Maximum" (75), and "Increment" (15). The next section is "Overlays", featuring a dropdown menu and an "Edit" button. Below that is a "Key Value" input field. The "Bar Variable" section has two input fields, the second of which is a dropdown menu. At the bottom of the dialog is a checkbox labeled "Make Blank Graph".

Figure 56: Dialog Box for graph specific Information.

This dialog box has the following fields:

- |                       |   |
|-----------------------|---|
| <b>Graph Title</b>    | This is the title of the Graph. It appears at the top of the graph.   |
| <b>Graph Variable</b> | This is the variable that is selected for plotting. Variables may be selected using the drop list box, or may be typed in directly if known. Note that if a specific file's variable is not available from the list, you can add the variable to the list using Edit GCD Variables (page 40).<br><br>Note that if you enter <b>MLSLegend</b> as the variable name, then the application will print out the file name, data in the COMMENTS section of the GCD file or the trial.comments variable and the line style used for the GCD file. As many entries as will fit into the box will be printed. You can enter a title if you want into the Graph Title box. All other fields are not used in this case. |
| <b>Ordinate Unit</b>  | This is the unit of the X-axis and is written to the left of the graph.   |
| <b>Ordinate Upper</b> | This is the label which is present at the top of the X-axis.  |

<b>Label</b>	
<b>Ordinate Lower Label</b>	This is the label that is present at the bottom of the X-axis.
<b>Scaling</b>	This is the frame that encloses all the controls for data scaling.
<b>Type</b>	<p>This drop list shows you the type of scaling that is in effect. The possible types are Normal Scaling, Auto Scaling with Annotation, and Auto Scaling without Annotation:</p> <p>When <b>Normal Scaling</b> is selected, the maximum and minimum values and the interval values are taken from the Maximum, Minimum, and Interval Controls.</p> <p>When <b>Auto Scaling with Annotation</b> is selected, the Maximum and Minimum values are determined at run times depending on the data within the GCD file being plotted. The maximum and minimum values are annotated on the X-axis.</p> <p>When <b>Auto Scaling without Annotation</b> is selected, the Maximum and Minimum values are determined at run times depending on the data within the GCD file being plotted. The ordinate axis does not have the values written next to it.</p>
<b>Minimum</b>	This is the smallest value that will be plotted on the graph. This control is available only if the scaling method is Normal Scaling.
<b>Maximum</b>	This is the largest value that will be plotted on the graph. This control is available only if the scaling method is Normal Scaling.
<b>Increment</b>	Tick marks are placed on the ordinate axis at this interval. Annotations are made at these tick marks.
<b>Overlays</b>	This control allows you to select up to four plots to place on top of an existing graph. To enter information for an overlay, select an overlay plot option using the drop list box (e.g., OverlayA [Not Used] and click edit. The Graph Overlay dialog box (Figure 57) opens. Refer to Graph Overlay dialog box, page 54, for further information.
<b>Key Value</b>	This variable is only active if a Graph key was entered into the General Page for the active report. This variable contains the event-specific identifier, e.g. crutches, that you entered into the GCD file to define specific GCD files for plotting. Refer to General Page, page 46, for more information about the Graph Key variable and Create Event-Specific Reports, page 28, for specific instructions for using this variable.
<b>Bar Variable</b>	This variable contains information about the ON/OFF state that is to be called from the BarIni file. This variable (e.g., Tibialis Anterior) should match the variable (e.g., Tibialis Anterior) that has been selected for plotting. Note that the variable names may not match, but the source of the data

should.

The data for this variable will be drawn at the bottom of the graph.

- Bar Color** This is a drop list box where you can set the color with which the bar is drawn.
- Bar Thickness** This is a spin button that allows you to control the thickness with which the bar is drawn.
- Make Blank Graph** If this check box is marked, all the data in this graph structure will be removed, as a result of which the graph will not be plotted on the page.

### Graph Overlay dialog box

The Graph Overlay dialog box (Figure 57) allows you to select the overlay graphs for an existing plot; specifically this feature is used to primarily overlay EMG graphs with kinematic data. This dialog box is opened using the following steps:

- 1.0 From the Graph dialog box, select an Overlay plot (e.g., OverlayA [Not Used]) from the Overlay drop list box.
- 2.0 Click the Edit button.

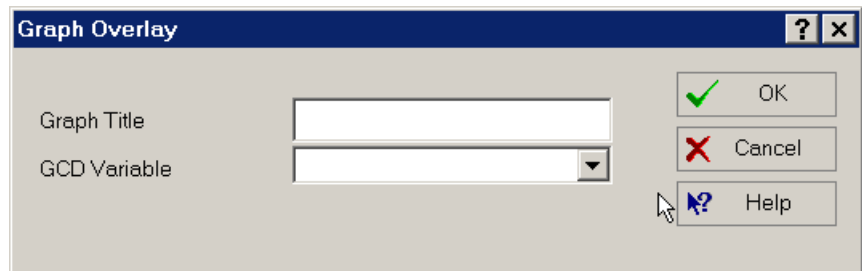


Figure 57: Graph Overlay Dialog Box.

This dialog box has the following fields:

- Graph Title** This is the title of the Graph. It appears at the baseline of the plot on the right side of the bounding rectangle. The title that is shown is derived from what you enter here by taking all the uppercase characters and numbers in the title. If that results in a blank name, the first three characters are taken.
- Graph Variable** This is the variable that is plotted.

### Key Table dialog box

A graph may be redefined as a key table (Figure 58) by changing its style within the Graphs list section of Edit Graph window. The Key Table dialog box (Figure 59) is used to edit a key table. Refer to Define Key Tables, page 14, for specific instructions for creating a key table.

Patient Number	Sample walk #1
Cadence	0.980
Step Length	655.324
Patient Number	Sample walk #2
Cadence	0.909
Step Length	654.504

Figure 58: Example key table.

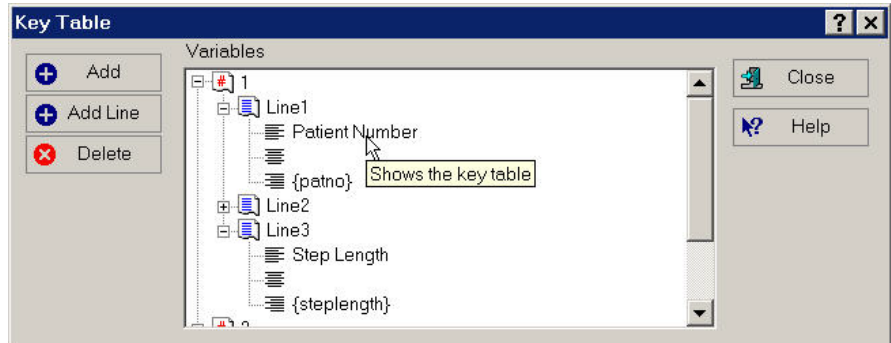


Figure 59: Key Table dialog box – example.

This dialog box has the following controls:

**Variables**

This is a tree control that contains the variables that will be written to the key table. The tree has three levels.

*Level 1:*

This is the GCD file number for which the variables will be reported. This can range from 1 to 120, since 120 GCD files can be plotted. The Up and Down buttons have no meaning at this level. Clicking on the Add button with this level selected will add another entry of the same level. Clicking on the Add Line button will create a new line for this level.

*Level 2:*

This is the line number. This is the order in which the variables are written in the table. At this level, you can click on the Add Line button to add a new line.

*Level 3:*

Each line can have text justified left, center and right and this is represented at this level. You cannot add or delete entries at this level.

**Add**

This button is enabled only at Level 1 and it adds another entry to the key label.

**Add Line**

At Levels 1 and 2, it adds a line to the selected level.

**Delete**

You can delete any item at Level 1 or 2 using this button.

**Move Up**

You can move up any entry that is at Level 1 or 2.

**Move Down**

You can move down any entry that is at Level 1 or 2.

---

## View menu

The View menu provides commands to customize the appearance of the application interface, to apply changes made to the active report format, and to maneuver through the active report.







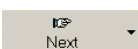


### Toolbars

Report Generator provides two toolbars, Standard and Edit, to provide quick access to commands regularly used. These toolbars are moveable, but not customizable.

#### **Standard Toolbar**

Use this command to display and hide the Standard Toolbar, which includes buttons for some of the most common commands in Report Generator, such as File Open. A check mark appears next to the menu item when the Toolbar is selected for display.


The Standard Toolbar, when turned on, is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in Report Generator,

Click	To
	Open a new report.
	Open the last used report.
	Open GCD files into the selected report.
	Save the changes made to the active report
	Close the active report.
	Move to the previous page or display the list of available pages in the report.
	Move to the next page or display the list of available pages in the report.
	Print the active report.
	Context sensitive help

#### **Edit Toolbar**

Use this command to display and hide the Edit Toolbar, which includes buttons that can be used to editing the reports in Report Generator. A check mark appears next to the menu item when the Toolbar is displayed.

The Edit Toolbar, when turned on, is displayed across the top of the application window, below the menu bar. The toolbar provides quick mouse access to many tools used in Report Generator.

Click	To
	Edit the Report Header.



Edit the Report Footer.



Edit the graphs in the Report.



Edit the attributes of the lines in the report

## Status Bar

Use this toggle command to display and hide the Status Bar. A check mark appears next to the menu item when the Status Bar is selected for display.

The Status Bar, which is a horizontal area in Report Generator at the bottom of the application interface, provides information about the action to be executed by the selected menu item or depressed toolbar button. Specifically,

- The left area of the status bar describes actions of menu items as you use the arrow keys to navigate through menus. This area similarly shows messages that describe the actions of toolbar buttons as you depress them, before releasing them. If after viewing the description of the toolbar button command you wish not to execute the command, then release the mouse button while the pointer is off the toolbar button.
- The right area of the status bar displays the page number that is being viewed in the application.


## Refresh command

*Shortcut – F5*

The Refresh command is available via a keyboard shortcut.

This command can be used to read the report from the file and re-draw it on the screen. This might be necessary when you want to discard changes you have made to the report, if you have edited the report file in an external editor, or if you apply a new report format to open data.


## Next Page

 *Shortcut – Page Down*

The Next Page command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command opens the next page in the active report. There is a drop down arrow next to the Next button on the toolbar. Clicking on the arrow will open a list of pages in the active report; you can open any of the pages by selecting the required page.

## Previous Page

 *Shortcut – Page Up*

The Previous Page command is available on the Report Generator toolbar at the top of the application window or via a keyboard shortcut.

This command opens the previous page in the active report, unless the first page is already currently displayed. There is a drop down arrow next to the Previous button on the toolbar. Clicking on the arrow will open a list of pages in the active report; you can open any of the pages by selecting the required page.



## Specific Page Names

The Title of each page for an active report is displayed under the View Menu. You can click on the appropriate Title to open that page.

---

## Tools Menu

This menu provides commands to apply a different report format to any open GCD files, to select a database with which to connect for advanced data input, and to set options for advanced functions.

### Format

This command allows you to change the format of the active report. This command opens the standard MS Windows File Open command for you to choose the new report format.

### Data Source

This command allows you to select a data source, such as the Vicon Clinical Manager (VCM) database, from which you can call data to display in the active report. Note that this connection must be made if you want the information present in the database to be used in your reports.

This command opens the Database dialog box (Figure 60) where you can make the selection of your data source.

See Data Sources, page 81, for more information on creating and selecting data sources.

### Database dialog box

The Database dialog box (Figure 60) shows you the name of the data source that is in use and allows you to choose a new data source.

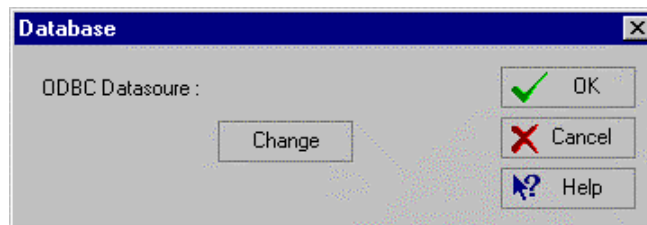


Figure 60: Database dialog box.

This box has the following controls:

- |                        |  |
|------------------------|--|
| <b>ODBC Datasource</b> | This control shows you the name of the selected data source.   |
| <b>Change</b>          | This button allows you to select the new data source. Selecting this button opens the MS Select Data Source window. Refer to Data Sources on page 81 for more information. |
| <b>Help</b>            | This button brings you to the Help screen specific to the database dialog box.   |

<b>OK</b>	This button closes the open data source and tries to open the data source that has been just selected by you.
<b>Cancel</b>	This button closes the dialog box without making any changes.

## Options

The Options command allows you to set preferences for interpolation, standard deviation display style, printed quality, and GCD variable processing. This command opens the Options dialog box (Figure 61).

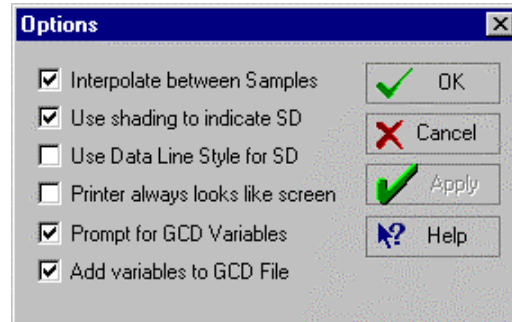


Figure 61: Options dialog box.

This dialog box has the following fields:

<b>Interpolate between samples</b>	This command will supply additional data points to those data sets that contain fewer samples than the plot area. The additional data points will be created using cubic spline interpolation. Refer to Interpolate between Samples, page 60, for more information.  Note that this option can also be selected directly from the Tools menu bar.
<b>Use shading to indicate SD</b>	For all data sets that contain standard deviation (SD) information, a shaded region surrounding the plotted data will indicate the SD. Refer to Use Shading to Indicate SD, page 60, for more information.  Note that this option can also be selected directly from the Tools menu bar.
<b>Use Data Line Style for SD</b>	For all data sets that contain standard deviation (SD) information, the standard deviation lines will be drawn with the same line style as the data lines. Refer to Use Data Line style for SD, page 60, for more information.
<b>Printer always looks like Screen</b>	When selected, this option ensures that the line attributes that have been selected for the screen will also be used for printing and previewing.
<b>Prompt for GCD Variables</b>	This command forces the application to prompt you for variables that are present in the report file, but could not be found in the GCD file.  When the report is being generated, if a variable in the report is not found, the Missing Variables dialog box (Figure 42), page 33, will open in which you

can enter the data for the variable.

### **Add variables to GCD file**

This command saves new variables, which were added during a session, to the GCD file. If new GCD variables are added when first prompted, Report Generator will not request these variables when they are needed at a later date. Note that the new variables will not be added to the GCD file until the application is closed

### **Apply**

This command will apply all changes made to all open reports.

## **Interpolate between Samples**

If the number of sample points is less than the number of horizontal pixels used to display a graph, rather than automatically joining the samples directly, you can choose to interpolate between the samples. This command will create data points, so that the number of sample points equals the number of horizontal pixels, through a cubic spline interpolation. Note that if the number of sample points available, however, is more than the number of horizontal pixels, then this operation is not carried out, although the option may be selected.

This command affects only the active report. Use the Tools: Options command to change this option for all reports.

## **Use Shading to Indicate SD**

This command will shade the standard deviation (SD) area for those plots that contain SD information and were marked with a “Yes” in the Standard Deviation column of the GCD Files dialog box (refer to example figure, page 32). The color used for shading is a lighter version of the pen color that is used to draw the line; for a monochrome printer, the shading is done with various levels of gray.

When standard deviation data is plotted, it is interpolated using a cubic spline to achieve a smooth shaded region.

This command affects only the active report. Use the Tools: Options command to change this option for all reports.

## **Use Data Line style for SD**

If this command is selected, the line style used to draw the standard deviation lines will be the same as that of the data lines.

This command affects only the active report. Use the Tools: Options command to change this option for all reports.

---

## **Window menu**

This menu contains commands that are useful in arranging the open windows in the application workspace.

### **Cascade**

This command arranges multiple opened windows in an overlapped fashion.

## **Tile**

This command arranges multiple opened windows in a non-overlapped fashion.

## **Arrange Icons**

This command arranges the icons for minimized windows at the bottom of the main window. If there is an open document window at the bottom of the main window, then some or all of the icons may not be visible because they will be underneath this document window.

## **1,2, ... command**

Report Generator displays a list of currently open windows at the bottom of the Window menu. A check mark appears in front of the file name of the active window. Choose a file from this list to make its window active.

---

# **Help menu**

This menu contains commands useful in finding Help and to register the application.

## **Help Topics**

This command opens an index of the help topics that are available for the application. It is possible to search for a topic of interest. Help is available by highlighting a menu item and then clicking the F1 key. Help can also be sought by clicking the Shift-F1 keys. This transforms the cursor into a help cursor and the user can click on the item of interest to see the help topic associated with it.

## **Register**

This command enables you to register this application if you have previously downloaded an evaluation copy and subsequently purchased a registration key for the program. This command opens the Register dialog box (Figure 62) Motion Lab Systems registration keys consist of a User Name, Organization Name, and a sixteen-digit serial number. You must enter this information correctly before the application will export data from files with more than 100 frames.

### ***Register dialog box***

The Register dialog box (Figure 62) is used to register the application. You enter your name and organization and the 16-digit code as given to you by Motion Lab Systems.

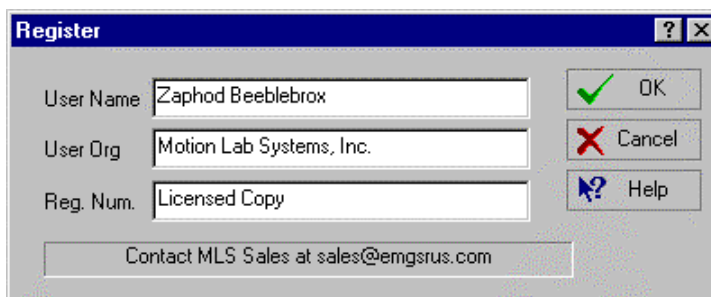


Figure 62: Register dialog box.

This dialog box has the following fields:

<b>User Name</b>	Enter the name of the User.
<b>User Org</b>	Enter the Organization of the user.
<b>Reg. Num.</b>	Enter the 16-digit code provided to you by Motion Lab Systems. If Report Generator is already registered, “Licensed Copy” will appear in this field.
<b>OK</b>	Click on this button to validate the changes you have made and close the dialog box. The modifications you made will be written to the registry and the code will be checked.
<b>Cancel</b>	Click on this button to ignore all you changes and close the dialog box.

Note that if you enter invalid registration information, RGEN will install successfully, but it will run as an *EVALUATION COPY*.

## MLS Home Page

If you have an Internet connection and use the World Wide Web then you can launch your Internet Web browser directly from this item and visit the Motion Lab Systems Home Page, <http://www.emgsrus.com>. You can check here for new updates to this application as well as download evaluation copies of other Motion Lab Systems software products. You can also contact Technical Support directly from this Web Page.

### ***About Report Generator***

The About Report Generator dialog box provides information about the application and some information about the resources on your system.

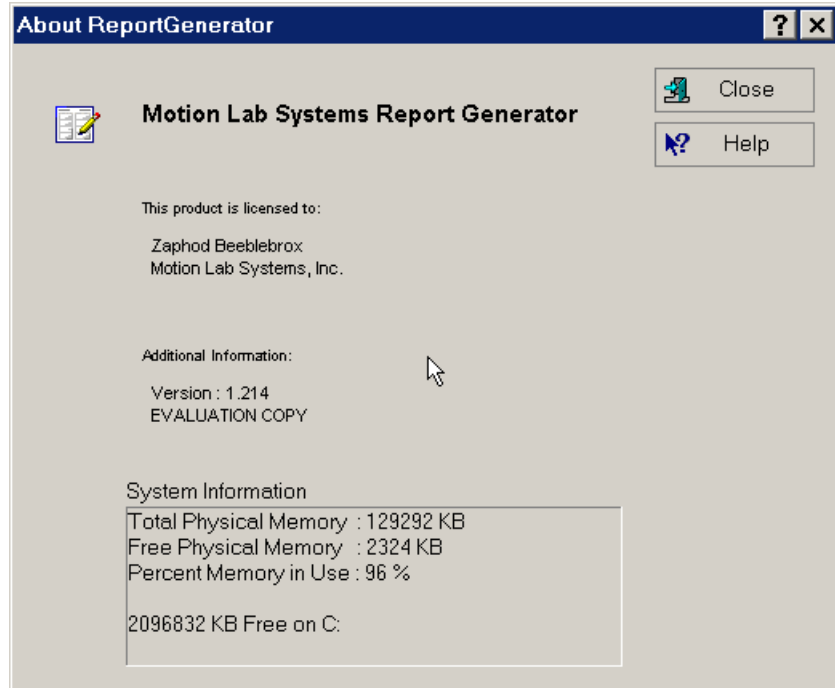


Figure 63: The Help:About window.

Specific information displayed includes the following information:

- The Name of the Application with the Application Icon.
- The Name and Organization of the registered user.
- The Version Number of the Application.
- Whether you are using an Evaluation Copy or a Registered Copy of the Application.

# File Formats

This section describes the different file formats that are used by Report Generator.

---

## DST (or GCD) Files

GCD files are text files written under the specifications for DST formatted files. GCD files are the files from which Report Generator plots data.

A DST file consists of a string of 7-bit ASCII codes, divided into a series of lines. Each line is delimited by any number of Carriage Return, Line Feed, or Form Feed characters [ASCII codes 13, 10, and 12, respectively]. Lines can be of any length.

Each line is either a Header, a Data Line, or may be part of a Comment. The file consists of a number of sections. Each section begins with a one-line header, followed by an arbitrary number of data lines. A section continues until the start of the next section, or the end of the file.

### File Type Line

The first line of a DST file, known as the File Type Line, is a unique header, without subsequent data lines. It must always have the form:

```
#!DST[-version_number] [creator information]
```

where:

[ ]	Indicates optional items
-version_number	Identifies a DST version, currently -1.0
creator information	Is a DST type qualifier

For example, a DST file might begin with the DST File Type line:

```
#!DST-0.1 EXP Ancona
```

This identifies the file as conforming to the DST-1.0 protocol (this document), and to be of type EXP Ancona. The DST type qualifier generally, but not necessarily, defines the DST lexicon for the contents of the file.

As the DST file type identification is always contained in the first line of the file, programs can very quickly locate a DST file and determine its contents, whatever its name or extension.

## Sections

There are two types of sections in a DST file: Text and Numeric. The numeric and text variables stored in GCD files are all identified by unique names. The RPT file calls on these variable names stored within the GCD file when constructing a report.

### **Text Sections**

Text sections have a header of the form:

`$SectionName [population_size]`

where:

[ ]	Indicates an optional item
SectionName	Is a unique text section identifier. A text and a numeric section can share the same name.
population_size	is an integer, indicating that the text lines in the section result from the concatenation of that number of similarly named text sections.

The data lines in a text section contain only the text, except lines beginning with ! or \$, where the first character must be repeated.

For example, a text section might be:

```
$PartnerName
Professor Tommaso Leo
```

Text sections in DST files have a completely free format and may therefore be of any length, from one line (text header only) to many hundreds of lines (e.g. a section of program code, or a patient's medical notes).

If a number of "string" (text) variables are contained within a single DST text section, any delimiters used to separate these variables must be defined in the relevant lexicon.

### **Numeric Sections**

A DST numeric section contains a block of numerical data. Data within a numeric section is structured into a number of vectors, each component of which must contain homogeneous data. Each vector has an individual vector dimension.

Numeric sections have a header of the form:

`!SectionName[[-dimension]...] [population_size]`

where:

[ ]	Indicates optional item(s)
...	Indicates an optional item repeated an indefinite number of times.
SectionName	Is a unique numeric section identifier. A numeric and text section can share the same name.
-dimension	(Hyphen followed by integer), indicates the dimension of a vector component. The dimension of the "only" or "highest" vector is implicit, and no dimension is included for it in the header.
population_size	Is an integer, indicating that the values in the section result from the averaging of that number of similarly named



	numeric sections.
--	-------------------

Values in the data lines of DST numeric section are delimited by white space characters [space (ASCII 32) or tab (ASCII 9)] and by the permitted DST line separators [carriage return, line feed, or form feed].

Values in the data lines of a DST numeric section can be integer or floating point, both with optional sign.

Integers are, by default, decimal. Decimal integers must not use an initial zero.

Octal and hexadecimal integers are permitted with the prefixes 0 (zero) and 0x (zero-x or zero-X), respectively.

Floating-point numbers are always decimal with a "decimal point" (ASCII 46) used as the integer-fraction delimiter. Exponent forms of floating point numbers are not permitted.

The values in a numeric section form a tensor (multi-vectorial) array in which the components of the "lowest" vector change most rapidly, and the components of the "highest", implicitly dimensioned, vector change least rapidly.

If a variable has more than one vector, line breaks must occur immediately following each occurrence of the highest component of the "highest" vector. They may also occur immediately following each occurrence of the highest component of any vector. If present, line breaks must occur uniformly through the array.

### ***Averaged GCD Files***

Averaged GCD files also contain two numeric values wherever the corresponding unaveraged GCD file contains one. The first value is a mean and the second is a standard deviation.

In an RPT file, the following variable references can be made.

For a non-averaged GCD file:

{SampleMean.variable} Is the mean value of the samples in a variable

{SampleSize.variable} Is the number of samples in a variable

For an averaged GCD file:

{StandardDeviation.variable} Is the standard deviation(s) of a variable

{PopuLation.variable} Is the population size of a variable

### ***\$Reference section***

All GCD files generated by VICON Clinical Manager include a text section with the name \$Reference, containing one or more lines of text. In averaged files, this provides a cross-reference to a list of those trials that are included in the average. Only trials included in the \$Reference section can be removed from an averaged file. This section also states the link from the GCD file to the VCM database.

---

## Report Files

*The MLS RPT file is similar to the RPT format used by VICON Clinical Manager (VCM), but it is not identical. RGEN can read RPT files generated by VCM, but VCM cannot read those files that are generated by RGEN.*

The Motion Lab Systems Report (RPT) file is a text file that contains information describing the content, layout, and fonts of graphical Report Generator reports. Report Generator reads and opens a selected RPT file before further report processing continues. The RPT file format is written in ASCII text as described in this document. Each file is divided into groups of parameter assignments; each group is prefixed by a header enclosed in square brackets. The order of groups within a file, and of assignments within a group, is not critical.

The Report Generator program searches for each parameter within a group by name. The parameters of the search include:

- A variable name appears at the start of a new line.
- The assigned value is separated from the parameter by an equals character “=”.
- Spaces and tabs are ignored and are stripped from the beginning and end of all strings.
- Text case is not significant and is used for readability only.
- A Carriage Return ends each entry.
- Comments all start with a semi-colon “;” - any portion of a line following a semi-colon is ignored.

An RPT file can contain the following groups with fixed names:

- [Header]
- [Footer]
- [Screen]
- [Printer]
- [Graphs]

Additionally, the RPT file can contain an unlimited number of groups with user-selectable names:

[<page>]

where <page> means a graphical report page name corresponding to a page in the report.

## The Header Group

The [Header] group in an RPT file is optional and defines the content and fonts of the header to appear at the top of every page of the report. The header group can contain four types of assignment:

- Title
- Font
- Line
- Line font

Note that unregistered (or evaluation) copies of the software will always display the header “Motion Lab Systems Report Generator” which cannot be modified. When the software is registered, the default header will be replaced by the header defined in the RPT file.

### **Title**

The title is optional and, if present, appears centered at the top of every page. It is intended to be used to display the name of the lab or hospital that generates and distributes the reports. The title has the form:

Title = <text string>

e.g. Title = The Children’s Hospital Motion Lab EMG Report

Note that any character, except a semi-colon, may appear in the Title string. The string will have all leading and trailing white spaces removed before centering and display.

### **Title Font**

The title font assignment sets the font used for the title. If the title font assignment is missing then 20pt Times New Roman Bold will be used. The font assignment has the form:

Font = <valid font>, <point size>, <font color>

e.g. Font = Times New Roman Bold, 20,0

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Line**

Up to ten lines of text may be included in a page header. This text may include data items from the GCD file. Data is specified by enclosing the entry in {} brackets. The line assignment form is:

Line<line number> = entry \ entry \ entry

e.g. Line1 = \\Name: {name} Hospital # {PatientNo}

<line number> is optional (1-10) and determines the order of the line below the header title with the lines being displayed in order 1-10 with Line1 closest to the header and Line10 closest to the center of the page. If no line numbers are used then the lines will be displayed in the order in which they appear in the RPT file. Lines are justified, using backslash delimiters (\), as left, center, and right.

e.g. Line = Left Edge of Page \ Center of Page \ Right Edge of Page

Each line assignment "entry" can be any concatenated combination of

- ASCII Text characters
- {GCD variables}

### **Line Font**

A line font is defined where lines are included in the header. If the line font is not defined then 12 point Times New Roman font will be used. The line font uses an assignment of the form:

Linefont = <valid font>, <point size>, <font color>

e.g. Linefont = Times New Roman, 12, 5

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Miscellaneous**

The header of the report can be enclosed in a box using the assignment:

Box = <Status>

Where status can be ON or OFF

Unregistered (or evaluation) copies of the software will always display the following header that cannot be modified. When the software is registered, the default header (Figure 64) will be replaced by the header defined in the RPT file.

Title = Motion Lab Systems Software
Font = Times New Roman Bold,20,0
Line0 = \ This is an evaluation copy of the Report Generator Software \
Line1 = \ Please contact Motion Lab System, Inc to obtain a registered copy
Linefont = Time New Roman,14,0

Figure 64: The default Header group in the reports for unregistered RGEN copies.

### **[Footer] Group**

The [Footer] group in an RPT file is optional and defines the content and fonts of the footer to appear at the bottom of every page of the report. The general structure of the footer group is very similar to the header group with some minor differences in the defaults. The group can contain four types of assignment:

- Title
- Font
- Line
- Linefont

Note that unregistered (or evaluation) copies of the software will always display the following footer that cannot be modified. When the software is registered, the default footer will be replaced by the footer defined in the RPT file.

```
Title = Motion Lab Systems, Inc.  
Font = Arial Bold,12,0  
Line1 = \15045 Old Hammond Hwy, Baton Rouge, LA 70816 USA\  
Line2 =  
Line3 = Phone: (225) 272-7364\Email: sales@emgsrus.com\Fax: (225)  
272-7336  
Linefont = Arial Italic,10,0
```

Figure 65: The default Footer group in the reports for unregistered RGEN copies.

### **Title**

The title appears centered at the top of the footer area of every page and is intended to display the address or contact information for the hospital or lab generating the reports. The title assignment has the form:

```
Title = <text string>
```

e.g. Title = 15045 Old Hammond Highway, Baton Rouge, LA 70809

### **Title Font**

The title font assignment has the form:

```
Font = <valid font>, <point size>, <font color>
```

e.g. Font = Times New Roman, 20, 6

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Line**

Up to 10 lines may be included in footer. The general line assignment form is:

```
Line<line number>=entry\entry\entry
```

e.g. Line1=\Name: {name} Hospital # {PatientNo}

<line number> is optional (1-10) and determines the order of the lines below the footer title with Line1 appearing above Line2. If no line numbers are used then lines are displayed in the order in which they appear in the file. Lines are justified, using backslash delimiters (\), as left, center, and right.

e.g. Line = Left Edge of Page \ Center of Page \ Right Edge of Page

Each line assignment "entry" can be any concatenated combination of:

- ASCII Text characters
- {GCD variables}

In addition to the variables present in the GCD file or the VCM database, the application allows you to print the present page number and the number of pages in

the report. This can be done by using the variables "page\_number" and "total\_number\_of\_pages" respectively.

e.g. Line1 = \\Page {page\_number} of {total\_number\_of\_pages}

### **Line Font**

A line font is defined where lines are included in the footer, using an assignment with the form:

Linefont = <valid font>, <point size>, <font color>

e.g. Linefont = Times New Roman, 12

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Miscellaneous**

The footer of the report can be enclosed in a box using the assignment:

Box = <Status>

Where status can be ON or OFF.

## **[Screen] and [Printer] Groups**

The characteristics of graphic lines in a report can be controlled by use of the [Screen] and [Printer] groups in the RPT file.

Thickness, color, and style and extended style can be set for each of the files selected for the report, and for graph borders. There are separate settings/groups for [Screen] and [Printer] so that the output can be optimized for each device. The assignments for each of these groups are the same.

Each assignment sets the relevant attribute for the Graph Border, Plot1, Plot2, ... and Plot120.

The assignments are:

Thickness=t1, t2, t3, t120 tn is 0-10 points (1/72") or device pixel width.

Color=c1, c2, c3, c120 where cn is the 0-7 red-green-blue (RGB) color as described below.

0 Black	4 Blue
1 Red	5 Magenta
2 Green	6 Cyan
3 Yellow	7 White

Style=s1, s2, s3, ... s120 where sn is 0-4 line style as described below.

- 0 solid
- 1 dashed
- 2 dotted
- 3 dot-dashed
- 4 dot-dot-dashed

StyleEx=s1,s2,s3, ... s120 where sn is 0-9 extended line style as described below.

0 normal	5 filled triangle
1 star	6 circle
2 square	7 filled circle
3 filled square	8 diamond
4 triangle	9 filled diamond

For example:

```
[Printer]
Thickness = 1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1,1
Color = 0,1,1,2,2,3,3,4,4,5,5,0,1,1,2,2,3,3,4,4,5,5
Style = 0,1,2,1,2,1,2,1,2,1,2,0,1,2,1,2,1,2,1,2,1,2
StyleEx=0,1,3,0,0,0,0,0,1,2,0,1,3,0,0,0,0,1,2

[Screen]
Thickness = 2,1,1,1,1,1,1,1,1,1,2,1,1,1,1,1,1,1,1
Color = 0,1,2,3,4,5,1,2,3,4,5,0,1,2,3,4,5,1,2,3,4,5
Style = 0,1,1,1,1,1,2,2,2,2,0,1,1,1,1,2,2,2,2,2
StyleEx=0,1,3,0,4,0,5,0,1,2,0,1,3,0,0,9,0,0,1,2
```

Figure 66: Example of the [Screen] and [Printer] groups in an RPT file.

## Graphs Group

The [Graphs] group must be present in all RPT files and must contain, at a minimum, a list of the names of pages in the report. In addition, the [Graphs] group may contain:

- The font size and name for all graph titles and axes;
- The default aspect ratio of all graphs;
- The name of the GCD data file to be plotted against subject plots.

### Page Names

Each page must have a unique name, which is used to reference a [<page>] group and is displayed and/or printed in the report as a title at the top of the relevant page. This is also displayed and used by the Report Generator program to identify the graph pages for display and printing. The Pages assignment has the form:

Pages = <Page1name>, <Page2name>, ...

e.g. Pages = Overview, RMS vs. Raw, Powers, EMG Levels

### Title Font

Each graph may optionally have a title, which appears immediately above it. The Title Font assignment has the form:

Titlefont = <valid font>,<point size><font color>

e.g. Titlefont = Arial,12,2

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Axis Font**

Each graph may optionally have two ordinate labels and an ordinate unit, which appear to its left. The AxisFont assignment has the form:

AxisFont = <valid font>,<point size>, <font color>

e.g. Axisfont = Arial,8, 15

When displaying a report on the video monitor the program will use the size of the report window and the resolution of the display, to determine when to selectively reduce the size of, and finally omit, text to maximize the space available for graph plotting.

### **Plot Aspect**

All graphs in a report can be plotted with a fixed aspect ratio. The Aspect assignment has the form:

Aspect = <horizontal>: <vertical>

e.g. Aspect = 4:3

If an Aspect assignment is not made, then the aspect ratio is automatically adjusted to fill the available space. The report program also scales the size of graphs independently for printer or screen window plotting. In general, it is a good idea to specify an aspect ratio since this enables the user to compare graphs with some confidence that the results have been plotted to similar scales.

### **EMG Activity Bar**

The application allows you to display a single bar at the bottom of the graph. The data used to plot this is taken from the muscle file. Refer to Muscle File, page 79, for information about this file.

The most common use of a bar graph is the indication of normal phasic EMG activity for a muscle. A 'Normal EMG' bar is useful for comparison with an EMG activity envelope plotted in the same graph.

This is done using the BarIni assignment, which has the form

BarIni= <FileName>, <Section>

e.g. BarIni=D:\Apps\Report Generator\sammuscle.ini, Adult - Rancho

### **[<page>] Groups**

Each [<page>] group in an RPT file has the name, for example [Angles], of one of the pages defined in the [Graphs] group.

There are seven possible assignment types in a [<page>] group:

- Title
- Font
- Aspect (optional)



- Layout
- X-axis definition (optional)
- G
- Footer

### **Title**

The page title appears as a subtitle, below the Header, at the top of the page. The Title assignment has the form:

Title = <text string>

e.g. Title = Joint Rotation Angles

### **Title Font**

The page title font and size is individually controlled. The Font assignment has the form:

Font = <valid printer font>,<point size>,<font color>

e.g. Font = Times New Roman,18, 4

There are 16 (0-15) available font colors that correspond to the 16 standard colors. Refer to the list of font colors and their appropriate assignment in Font Colors and Corresponding Values, page 87.

### **Layout**

Graphs and key tables on the page are plotted in cells in a matrix. The Layout assignment has the form:

Layout= <horizontal>,<vertical>,<orientation>

For example:

Layout=3,4,Landscape {generates space for 12 graphs in Landscape mode}

### **X-axis**

All the graphs on a page have a common horizontal (X) axis. The lowest graph in each column of graphs has its horizontal axis annotated and labeled. The X-axis assignment has the form:

Xaxis = <min>,<max>,<increment>,<axis label>

e.g. Xaxis = 0,100,25,% Gait Cycle

### **Graph (G) Assignments**

An individual definition must be made for each graph on the page. The definition number determines the placement (left-to-right, then down) of a graph or key table within the matrix defined by the Layout assignment.

## **Graphs**

The 'G' assignment for graphs has the form:

G<graph number>=<graph title>,<GCD variable name>,<ordinate main label>,<min>,<max>,<increment>,<ordinate upper label>,<ordinate lower label>

For example:

G6=PELVIC TILT, PelvicTilt, Degrees, -10, 30, 10, Dwn, Up

Note that substituting the character \* for <max>, <min>, and <inc> causes autoscaling without axis annotation. Substituting the character # for <max>, <min>, and <inc> indicates autoscaling with axis annotation. A minus sign in front of the GCD variable name inverts the graph.

## Overlays

Each graph can also have four overlay graphs on it. These are of the form:

G<graph number>A|B|C|D=<graph title>, <GCD variable name>

For example:

G6A=PELVIC TILT, PelvicTilt,

The variable in definition A is plotted at the top of the bounding rectangle.

## Key Tables (also known as G-Tables)

In addition to graphical data the program can also display numeric and text data in the form of a key table which each have an individual definition just like the Graphs on the page. The definition number determines the placement (left-to-right, then down) of both Graph and Key tables within the matrix defined by the Layout assignment. The 'G' assignment for Key tables has the form:

G<graph number>={1(entry\entry\entry,...,entry\entry\entry),  
2(entry\entry\entry,...,entry\entry\entry), 3(entry\entry\entry,...,entry\entry\entry)}

For example:

G13={1({name}\{PatientNo}, {Side}\{Date})}

Each "entry" in a Key table can be any concatenated combination of:

- {'key' variables}
- text characters
- {GCD variables}
- {parameter variables}

Note that variables in key table entries are distinguished from text by enclosure in {} brackets.

Any number of rows, within the space available, can be used for each table. Each row can have up to 3 entries, separated by \ characters; justified left, center, and right. Any entry can be omitted, but the \ separators must then remain to indicate a blank entry field. Key tables use the same font as graph axes.

Three 'key' variables are used in key tables to identify graphs. They are:

- {side}
- {motionfile}
- {gcdfile}

Variable	Description	Details
----------	-------------	---------

{side}	The side (left/right) of the patient to which the plot applies	The value is determined by the Left/Right selection made for each plot in the Plot Selection box.
{motionfile}	The file (C3D) which was processed to produce the report	This is the filename-only portion of {filespec}, the path plus filename stored in the trial parameters and written to the GCD and C3D files.
{gcdfile}	The file (GCD) within which the results are stored	This is the filename of the GCD file for each plot.

Table 2: Key table variable descriptions.

When any variables other than these three are specified in a key table, the program obtains them from the selected GCD file.

Note When the program accesses a GCD file for variables to be printed in a key table, according to what is specified in the Plots Selection box, it searches for both text and numeric variable names with the prefix Left or Right, such as !LeftHipFlexExtMoment. However, certain GCD text variables, such as the two optionally written into the GCD file during averaging, \$Name and \$Comments, have no Left or Right prefix.

Any RPT reference to a GCD variable, whether text or numeric, which will never have the prefix Left or Right should start with the character ! This applies wherever variable references are made in an RPT file.

For example:

!Name

!Comments

## Footer

An optional set of page footer assignments creates a page footer table, divided into 4 columns of fixed width. Each page footer assignment, creating a single line of the footer, has the form:

Footer<footer line number> = <text string>\entry

e.g. Footer2 = Double Support (%)\{DoubleSupport}

In each page footer row, the left hand column contains the text string. The three remaining columns contain entries for each of the GCD files selected for the report. Entries are taken from the same set as for a key table (see Table 2):

- 'key' variables
- GCD variables
- Parameter variables

Note that Page Footers, which appear only on the page for which they are defined, should not be confused with Report Footers, which appear on every page. Page Footers use the same font as graph axes.

## Mathematics with GCD Variables within the RPT

Any numerical variable from a GCD file, whether single- or multi-valued, which is plotted or printed in a report, can be multiplied or divided by a constant or by another variable from the same GCD file. Addition and subtraction is also allowed.

The operator syntax in graphs (multi-value), Key tables (single-value), or page footers (single-value) definitions in the RPT file takes the form:

{variable \* Q [#n]}

{variable / Q [#n]}

{variable - Q [#n]}

{variable + Q [#n]}

where Q can be either a numeric constant or another variable in {} brackets. #n is an optional indicator, inserted immediately before the closing } bracket, of the number of decimal places of the result.

For example {Cadence\*120#0} calculates cadence in steps per minute from the stored units of strides per second

In addition, operations may be nested -

{variable1\*{variable2\*{variable3/{variable4}}}}

## Parameter References

The full form for reference to a parameter field is:

<group>.<parameter>

For example:

- physician.city
- patient.name
- session.AnkleWidthR

The program searches backwards up the group-parameter hierarchy (starting with report, then trial, session, patient, and finally physician) until it locates a parameter with the required name. Parameter names that are shared by two or more groups, such as street, phone, and comments, are always picked up from the 'lowest' group, so the reference phone locates to a patient's phone number, not a physicians.

---

## Muscle File

The muscle file is a text file that contains ON/OFF timing information for included muscles. The file's format is like that of configuration files (INI files) used by MS Windows. There can be multiple sections within each file that could be used, for example, to document information for different age groups. Each section contains entries for all the muscles for which you have ON/OFF data. A specific entry should be written in the following format:

```
MuscleName=Value1Start, Value1End, Value2Start, Value2End  
...
```

where ValueStart and ValueEnd are normally stated in percentage of gait cycle.

For example:

```
Adductor Longus=47, 68.0, 88.6, 96.0  
Adductor Brevis=48.0, 62.0e
```

Note that there should be an even number of values within each entry. This is because every start value should have an end value.

In addition to the muscle name entries, there are two entries that are present in each section. They are:

```
Stance = Value  
Stretch = Value
```

These additional entries are used by the MLS EMG Application and, although they are not used, have been retained in this file for future reference.



# Data Sources

This chapter deals with choosing a Data Source and creating new Data Sources to enable you to directly access the information contained in the VCM database.

Setting up the data source can be a little tricky if you are not familiar with the Microsoft Open Database Connectivity (ODBC) feature. However, a little effort to get this working will pay off as you will then be able to browse through the VCM database and extract the necessary information into the GCD files without having to know what any of the files are called. Instead, you simply process data that is associated with a particular subject trial and then view the results in C3d Editor.

These instructions assume that you are using the current 32-bit ODBC application available directly from Microsoft. If you are not, then you may need to obtain an update from Microsoft. All the operations described in this chapter are accessible through the 32-bit ODBC option in the Windows95 (or Windows 98) Control Panel.

---

## Selecting an Existing Data Source

The Database command should be chosen from the File menu. However, note that a data source will have to be created before it can be selected. You may create as many Data Sources as you have VCM databases and then switch between them instantly by using this command.

The Database dialog box opens. This box shows you the currently selected data source. To change it click on the Change button. This opens the Select Data Source dialog box. This box has two tabs. Choose the Machine Data Source tab. This tab has a multiple column list box that lists the following,

- Names of the Data Source.
- Type of data source, which can be User or System.
- Description of Data Source.

Choose the Data Source in the list box by clicking on it and then click the **OK button**. C3dExport will now use this Data Source and display the contents of the selected database.

---

## Creating a new Data Source

The Database command should be chosen from the File menu. The Database dialog box opens. This box shows you the currently selected data source. To change it or to create a new data source click on the Change button.

The Select Data Source dialog box opens. This box has two tabs. Choose the **Machine Data Source tab**. This tab has a multiple column list box as shown below and which lists the following,

- Names of the Data Source.
- Type of data source, which can be User or System.
- Description of Data Source.

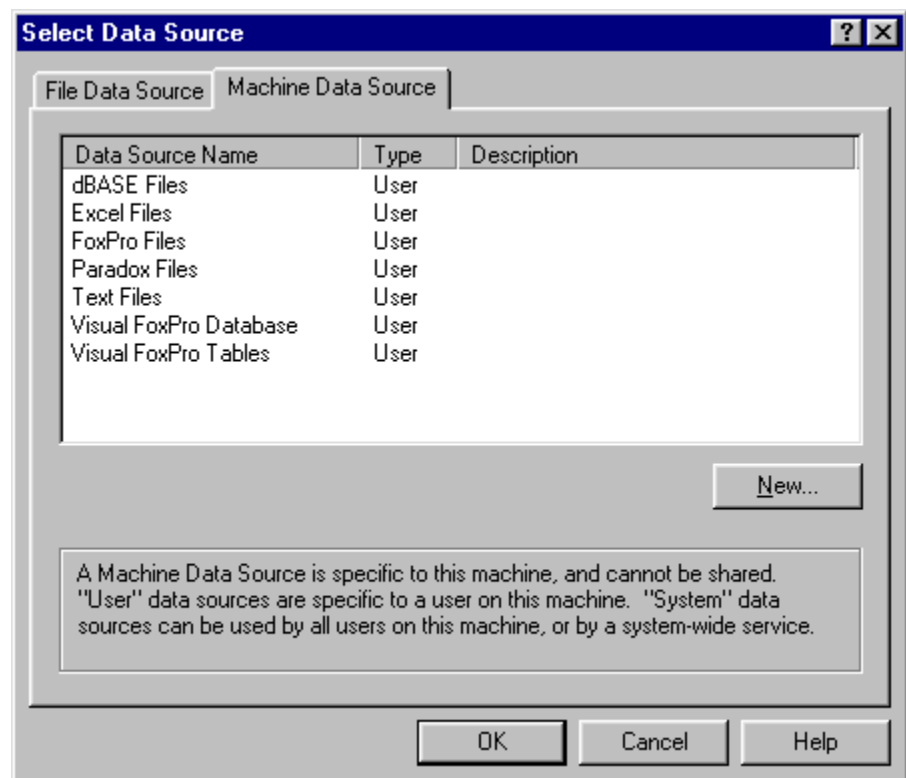


Figure 67 - Selecting the Data Source

Click on the **New** button to create a new Data Source.

This opens a dialog box that contains two radio buttons User Data Source and System Data Source.

- Choosing User Data Source will mean that the Data Source created will be available only to the user who creates it.
- Choosing System Data Source means that the Data Source will be available to all users on the machine.



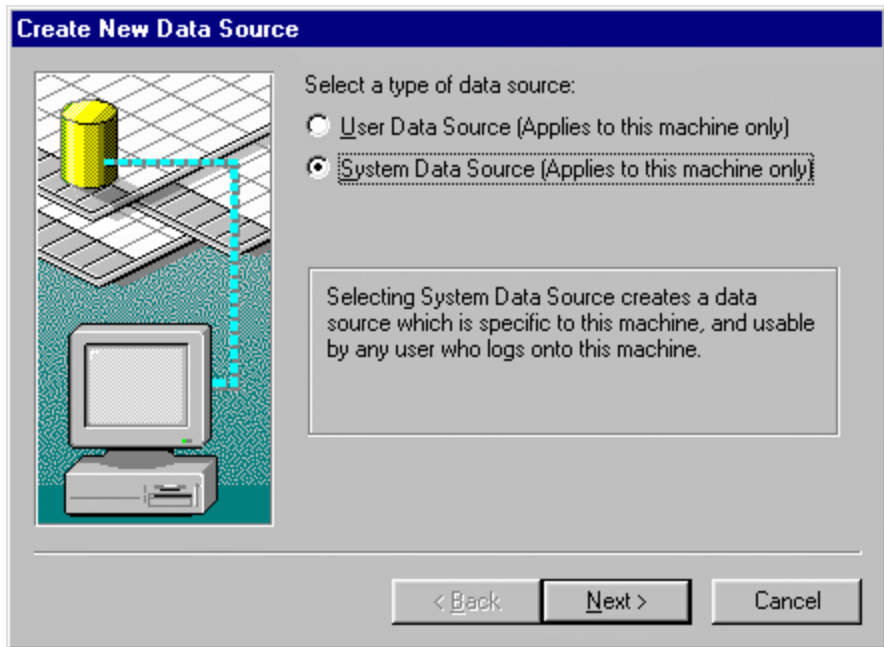


Figure 68 - Selecting a Data Source Type

After choosing one of the above, click on the **Next** button. Choose System Data Source unless you have a good reason for selecting User Data Source. In most cases, it will not make any difference which option you select at this point unless several different people use your computer.

*Select the Microsoft Paradox Driver (\*.db) to connect to the VCM database.*

This opens the Create New Data Source dialog, which will give you a list of drivers present. Select the appropriate source and click on the **Next** button.

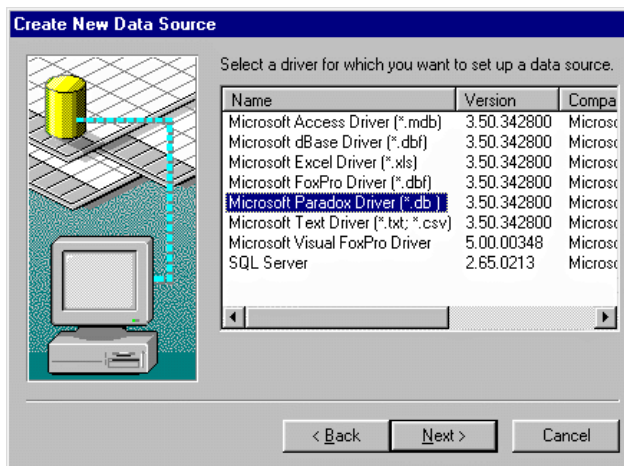


Figure 69 - Selecting the Driver

This opens a page that displays a little information about the choices. Click on the **Finish** button to finish the process.

## VCM Paradox Driver Setup Instructions

If the Paradox Driver was selected as the data source, the ODBC Paradox Setup dialog box opens for you to enter required information:

- Enter the Name you want the Data Source to have in the Data Source Name box. This is usually something short (8 characters) that you will use to reference this ODBC link.

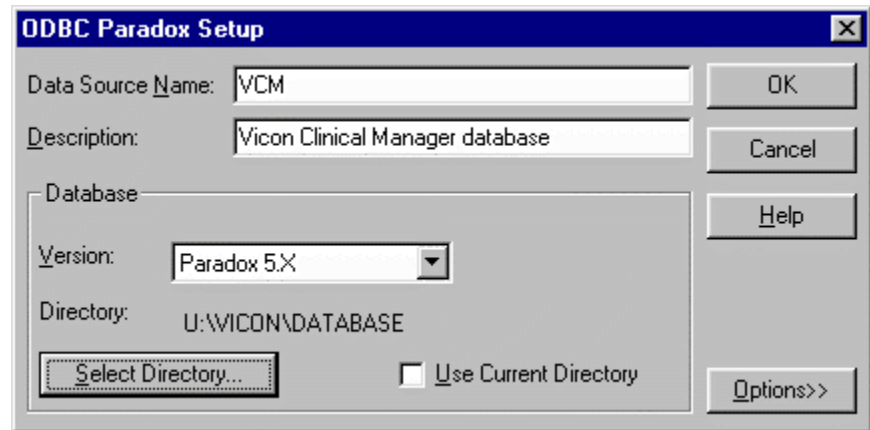


Figure 70 - The ODBC options dialog

- Enter the Description for the Data Source in the Description box. This step is optional but useful if you are using several different VCM databases as you can enter a long description.
- Uncheck the Use Current Directory box otherwise this will usually point to the wrong directory - you need to specify the directory that stores the VCM database.
- Click on the Select Directory button. This opens a Select Directory dialog box, which you can use to browse the directory structure of the machine. Choose the directory in which the VCM database files reside, and click OK.

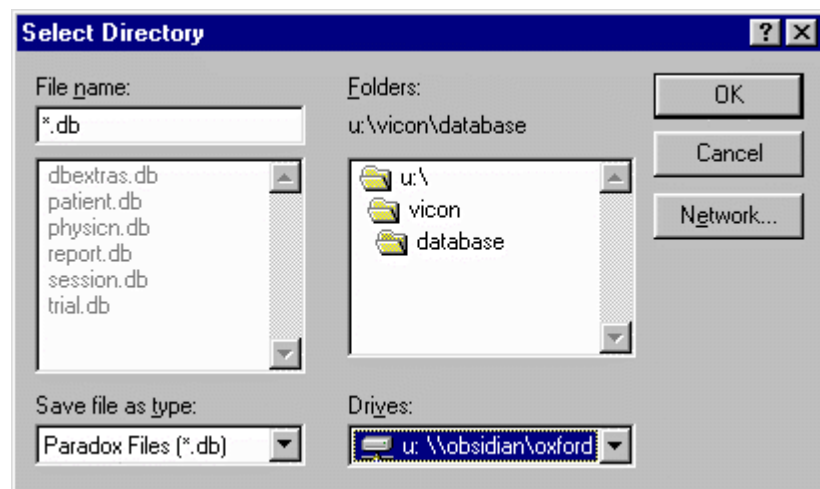


Figure 71 - You must select the correct database directory

Once you are back at the ODBC Paradox Setup you can use the "Options" button (lower left corner) to configure the rest of the ODBC link.

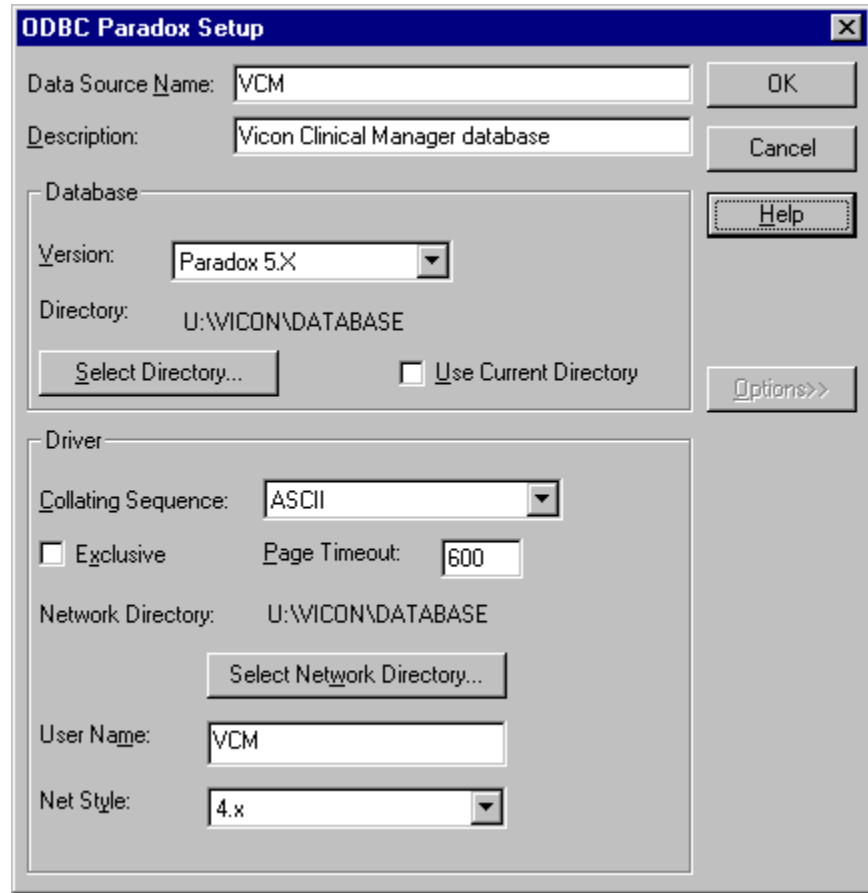


Figure 72: ODBC Paradox Setup dialog box.

*If you do not see the correct database entries, you may have entered some information incorrectly and will need to either delete the entry or modify it using the 32-bit ODBC option in the Windows Control Panel.*

Click OK in the ODBC Paradox Setup dialog box. This takes you back to the Select Data Source dialog box where you will see that the newly created Data Source is listed. Choose the Data Source that you have just created and click OK. EMG4VCM will now open the VCM database and display the database contents.



# Reference Material

---

## Application General Usage Instructions

This section lists some general information about the Application.

### Title Bar

The title bar is located along the top of a window. It contains the name of the application and document.

To move the window, drag the title bar. Note: You can also move dialog boxes by dragging their title bars.

The RGEN title bar also contains the following elements:

- Maximize button
- Minimize button
- Name of the application
- Name of the document
- Restore button

### Scroll Bars

Scroll bars are displayed at the right and bottom edges of the document window. If the size of the window is smaller than what it should be to display the contents of the window. The scroll boxes inside the scroll bars indicate your vertical and horizontal location in the document. You can use the mouse to scroll to other parts of the document.

---

## Font Colors and Corresponding Values

The font colors that can be used are:

0 Black	8 Maroon (Dark Red)
1 Red	9 Dark Green
2 Green (Lime)	10 Dark Yellow (Olive)
3 Yellow	11 Dark Blue (Navy)

4 Blue  
5 Magenta (Fuchsia)  
6 Cyan (Aqua)  
7 White

12 Dark Magenta (Purple)  
13 Dark Cyan (Teal)  
14 Light Gray (Silver)  
15 Dark Gray (Gray)

# Acronyms

B&W	black-and-white
CAMARC	computer aided movement analysis in a rehabilitation context
DST	data storage and transfer
GCD	gait cycle description file format
MAC	Motion Analysis Corporation
MLS	Motion Lab Systems
MS	Microsoft
ODBC	open database connectivity
RPT	report file format
SD	standard deviation
VCM	VICON Clinical Manager

# Glossary of Terms

## **aspect ratio**

The ratio of the length of a graph's x-axis to that of the y-axis, e.g. 4:3. The results of adjusting this ratio is that it adjusts the perspective of the graph from square, e.g. 2:2, to rectangular.

## **Aspect X**

This is the X value of the aspect ratio with which the graphs will be plotted. The aspect ratio is the ratio of the length of the X axis to that of the Y axis. If a value is entered here, it overrides the value that is used in the General Page.

## **Aspect Y**

This is the Y value of the aspect ratio with which the graphs will be plotted.

## **graph key**

Report Generator provides the ability to define items in a GCD files as keys. These keys may be later used to determine the eligibility of the data for plotting.

## **key table**

A text box that is generated in the space allotted for a graph. Text entered into the box may include comments and data from the GCD file.

## **overlay plot**

Report Generator provides the ability to place four graphs on top of an defined plot. This functionality is focused on placing analog graphs on a kinematic or kinetic plot. However, analog, kinematic, and kinetic plots may be combined. Note that the values of the overlay plots will lose their meaning.

## **session**

A period defined by the opening and closing of the RGEN application normally.





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