

英語版グラフ読み取り数値化システム (SyGRD) の開発と インストール及びユーザズ・マニュアル

Development, installation and user's manual of SyGRD

(System of Graph Reading and numerical data Displaying with image analysis software)

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abstract

The development of SyGRD (System of Graph Reading and numerical data Displaying with image analysis software, English version) is reported. In addition, the installation and user's manual for SyGRD are publicized.

1 はじめに

本稿は、1998 年度に開発された「画像解析ソフトウェアを利用したグラフ読み取り数値化システム [1]」の英語公開版として今年度新たに開発し直した SyGRD (System of Graph Reading and numerical data Displaying with image analysis software、シグルド) の開発についての概要と、システムのパソコンへのインストール及び利用方法に関するマニュアルについてまとめたものである。

本稿は次のような構成になっている。まず、SyGRD の開発経緯とその概略について解説する。次にインストール及び利用方法について記述したマニュアル (英語版) を掲載する。

2 SyGRD について

日本荷電粒子核反応データグループ (JCPRG) では、日本にある実験施設を使用して行われた荷電粒子核反応実験に関するデータを荷電粒子核反応データファイル (NRDF) として採録し、データベースを作成するという作業を行ってきた。実験結果の数値データは、学術雑誌に印刷、あるいはオンラインジャーナルなどで画像として公表されているグラフ等から直接数値データを読み取り、それを NRDF に入力するという方法を主に利用して現在まで採録を続けている。

グラフから数値データを読み取るシステムとして、古くからデジタイザを用いたいくつかのシステムが用いられてきたが [2]、読み取り誤差を極力小さくし、より正確な数値データを得ることを目的に 1998 年度にシステムを一新し、「画像解析ソフトウェアを利用したグラフ読み取り数値化システム [1]」が開発された。このシステムは本来 NRDF での利用のみを考慮して開発されたので、利用者の便宜を考えてシステム上で表示される言語も主に日本語である。しかし NRDF 以外でもグラフの数値をより正確に読み取りたいという需要があり、このシステムは画像解析ソフトウェアのマクロプログラムを利用して開発されているので汎用性が高く、そのような需要にある程度対応できる柔軟性を持っていた。そこで今年度、そのような需要に応え、NRDF の採録以外の用途により多くの方に利用してもらうためにシステムの再開発を行った。SyGRD([sigúrd]) とは、この再開発したシステムの呼称である。SyGRD は旧システムをベースにして

いるが、システム上で表示される言語表記の完全英語化を中心に一部改良を加えてある。さらに NRDF の採録経験のない方にもシステムの導入方法や利用方法を理解していただくために、インストール及び利用方法に関する英語版マニュアルも整備した。利用方法を記載したユーザーズ・マニュアルは、荷電粒子核反応データファイル年次報告書 98 [1999 年 3 月] に掲載された拙稿「画像解析ソフトウェアを利用したグラフ読み取り数値化システムの開発とその利用の手引き」を基本的に英訳したものであるが、システムの英語化や改良及びその後のパソコンの OS や画像解析ソフトウェアのバージョンアップに伴い、大幅な加筆・修正を加えてある。インストール・マニュアルは今回新規に作成したものである。

3 SyGRD の公開状況と利用方法について

SyGRD は Web ページ上で現在既に公開されていて、誰でも自由にシステムに必要なファイルをダウンロードして利用できる。SyGRD のダウンロード用 Web ページの URL は、

<http://nucl.sci.hokudai.ac.jp/~nrdf/sygrd/sygrd.html>

である（本稿執筆現在、Windows 版のみダウンロード可能）。画像解析ソフトウェア「*Scion Image for Windows*」を Scion 社の Web サイトからダウンロード・インストール後、上記 Web ページから「sygrd.exe」というファイル名の自己解凍ファイルをダウンロードし、インストール・マニュアルに従って各々の Windows OS が動作するパソコンにインストールすれば SyGRD を利用することができる。

なお、本稿に登場する製品名などの商標や著作権などについてはユーザーズ・マニュアルに記載してある。

謝辞

SyGRD の開発にあたっては、画像解析ソフトウェアのマクロプログラムのファイルサイズの最大値の制限により、旧「画像解析ソフトウェアを利用したグラフ読み取り数値化システム」を単純に英語化することが不可能であり、システムの開発にはプログラムの一部組み直しなど、英語版マニュアル群の作成とともに多くの困難を伴った。本システムの開発を後押ししていただき、激励して下さった加藤幾芳教授（北海道大学大学院理学研究科）には深く感謝します。また、吉田ひとみ、芦澤貴子両氏（北海道大学理学部）には、旧「画像解析ソフトウェアを利用したグラフ読み取り数値化システム」を利用していただいていた立場から新システムの開発やマニュアルの作成に関して貴重なご意見を賜りましたことを感謝いたします。その他、SyGRD の開発にあたり様々な方からご助言・ご支援を賜りました。この場を借りて御礼を申し上げさせていただきます。

参考文献

- [1] 近江 弘和 「画像解析ソフトウェアを利用したグラフ読み取り数値化システムの開発とその利用の手引き」（荷電粒子核反応データファイル年次報告書 98 [1999 年 3 月]） p. 2.
- [2] 岡部 成玄 「デジタル化によるグラフ読み取り変換システムの更新」（荷電粒子核反応データファイル年次報告書 90 [1991 年 3 月]） p. 2.

Installation Manual for SyGRD (System of Graph Reading and numerical data Displaying with image analysis software)

Version 2.00

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March 18, 2002

1 Introduction

This is the installation manual of SyGRD ([sigúrd]), which is an abbreviation of “**S**ystem of **G**raph **R**eading and numerical data **D**isplaying with image analysis software”. SyGRD is built by the macro program file and some image and text files. The contents of SyGRD are explained in the following section.

In this manual, it is explained that how to set up the various parameters of image analysis software before using SyGRD. and install SyGRD itself.

2 Procedure for installation

2.1 Step 1 : Install of image analysis software

Before install SyGRD itself, you must install the image analysis software. If you want to use SyGRD on Windows OS, you must download the “*Scion Image* for Windows” from Scion Corp. Web site (<http://www.scioncorp.com/>) and install it. If you want to use on Mac OS, download “*NIH Image*”¹ from Web site (<http://rsb.info.nih.gov/nih-image/>) and install it. For the way to install each software, please refer to its Web site or manual.

2.2 Step 2 : Set up parameters of image analysis software

After installation of the image analysis software, you must change the parameters of image analysis software. In this manual, *Scion Image* for Windows is used for explanation. However, the procedure is almost the same on *NIH Image*.

How to change the parameters is as follows:

1. Start the image analysis software.²
2. Click “**Analyze**” on a menu bar and click “**Options...**”. Then, the Options dialog box is displayed.
3. Input value ‘8000’ in “Max Measurements(1-8000):” box and click a “OK” button.

*an abbreviation of Japan Charged Particle Nuclear Reaction Data Group

¹SyGRD for *NIH Image* is now under preparing.

²If you start the software for the first time, some windows may be opened. Check the box and click a “OK” button, if you use the software for SyGRD only.

4. Click **“Options”** on a menu bar and click **“Preferences...”**. Then, the Preferences dialog box is displayed.
5. Input value more than ‘3000’ (‘9999’ is desirable if RAM size of your computer is large enough) in “Undo & Clipboard Buffer” box and click a “OK” button.
6. Click **“File”** on a menu bar and click **“Record Preferences”**.
7. Quit software and restart.
8. Check that the value of “Max Measurements(1-8000):” is ‘8000’ and “Undo & Clipboard Buffer” is more than ‘3000’. If not, retry from 2.

2.3 Step 3 : Create work folder

Next, you must create a folder for extracting the files of SyGRD and saving the graph image files and reading numerical data files. This folder is called **‘work folder’** in this manual. You may create the work folder anywhere and decide the name of the work folder. However, it is desirable to create the work folder immediately under the folder where the image analysis software has been installed.

2.4 Step 4 : Download SyGRD package file and extract

After finishing the installation and set up parameters of image analysis software, download SyGRD package file (file name is “sygrd.exe”) from SyGRD download Web page and save to your computer. The “sygrd.exe” is a self-extracting file. When double clicking the icon of this file, it is displayed that the dialog box which inputs the extracting folder path. Input the work folder path (for example, C:/Program Files/Scion Corporation/Scion Image/work) and click a “OK” button. All files are extracted automatically. **If there is a file having the same name as shown in the list below in the same folder, that file is overwritten.** Be careful for overwriting when extracting the files.

The extracted files and their explanations are as follows:

file names	explanation of the files
00edigit.txt	the macro program running on the image analysis software (it is main program of SyGRD.)
00edigitXP.txt	the macro program running on the image analysis software for Windows XP under “Windows XP Style” design only
smp1.bmp	the sample image (graph) file used in the user’s manual
ifg/SyGmanu.pdf	the user’s manual for SyGRD (PDF file)
ifg/SyGinst.pdf	this manual (PDF file)
ifg/error.bmp ifg/etype.bmp ifg/menubar.bmp ifg/howmme.txt	the image and text files that are used in the macro program

When files are extracted, the folder named **“ifg”** is automatically created. **Never delete this folder and files in this folder.** If you delete, SyGRD never works normally.

Now you are ready to use SyGRD. About the usage of SyGRD, please read user’s manual for SyGRD (SyGmanu.pdf).

3 Copyrights and trademarks

SyGRD, which is composed of the macro program files and the file group that accompanies the macro programs, is copyrighted by JCPRG and OHMI, Hirokazu (O.H.).

Windows and Windows XP are the registered trademarks of Microsoft Corporation. Mac OS is a registered trademark of Apple Computer, Inc. *Scion Image* for Windows is the registered trademark of Scion Corporation. In addition, generally the product name that appears in this manual is the trademark or registered trademark of each company.

All ©, ® and ™ marks are omitted in this paper.

4 Disclaimer

- The author (O.H.), authority (JCPRG) of SyGRD and this manual take no responsibility to any loss or damage caused by installation of image analysis softwares and SyGRD.
- Copyright holders make no warranties to users, express or implied, as to the performance of installation of SyGRD. However, the author and authority would welcome any mistakes and bug reports or suggestions about SyGRD and this manual.
- If new versions of the image analysis software, “NIH *Image*” or “*Scion Image* for Windows”, will be released, copyright holders make no warranties as to the installation of SyGRD on new version software.

User's Manual for SyGRD (System of Graph Reading and
numerical data Displaying with image analysis software)
Version 2.00

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¹an abbreviation of Japan Charged Particle Nuclear Reaction Data Group

²for additional explanation of the operation on Windows XP

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7 Copyrights and Licensing

- 7.1 Copyrights and trademarks
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Chapter 1

Introduction

This is user's manual of SyGRD ([sigúrd]), which is an abbreviation of “**S**ystem of **G**raph **R**eading and numerical data **D**isplaying with image analysis software”. SyGRD is built by the macro program file and some image and text files running on “*Scion Image* for Windows” and “*NIH Image*”. *Scion Image* is an image processing and analysis program for Windows OS. It is based on the popular image analysis software, *NIH Image* on the Macintosh platform. Although the macro program running on *Scion Image* for Windows also runs on *NIH Image*, a slight replacement of commands in the macro program is needed. In this manual, the macro program running on *Scion Image* for Windows is mainly explained.

1.1 Overview

SyGRD is the system that reads and outputs the numerical value of points on a graph. It is the most important one in case the reading numerical data of the points on a graph, which is printed by the scholarly journal etc. or is released by the PDF file etc. on on-line (electric) journal that “The error at the time of reading is reduced as much as possible.”. This graph reading and numerical data displaying system, SyGRD, was developed in order to reduce such a reading error as much as possible. There are following features of this system:

- From the read of the numerical value of the points on a graph to the output of results, it is altogether possible on one computer.
- Reading operation can be performed in assembly line using a mouse except a input of numeric value from a keyboard.
- A graph wanted to read is scanned from printed matter or copied from electric journal distributed as a PDF file etc., and displayed on image analysis software as an image data. Therefore, zooming of a graph image can be done easily and thus a precise reading will be carried.
- GUI (Graphical User Interface)-like operation method is adopted, so that user can work easily.
- Since the point wanting to read numerical value on a graph is specified surely by the mouse pointer, the numerical error caused by blurring of a mouse (hand) is completely eliminated.
- Since the data points already read are marked by colored points, a graph reader will avoid a miss-reading, for example, double-reading of one point, skipping over the point to read or reading position being out of the position wanting to read.

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- A vertical axis and a horizontal axis can be specified either in a linear scale or a common-logarithms scale.
- The numerical value to read can be limited to be integer value.
- The graph with various type of error bar can be read, and the reader can select the type of error bar every time during graph reading.
- Since SyGRD is made by using the macro programming function of image analysis software, this system can be customized freely.

Required hardwares are only a main part of a personal computer and a scanner. Reader can perform reading work only by memorizing basic operation of Windows or Mac OS, and the operation on a macro program. The flow of rough work of graph reading is as follows:

- 1) Scan of the graph is carried out with a scanner (or getting image data of graph from such as PDF files), and it takes in to a computer.
- 2) The macro program of the image analysis software is started and data is read.
- 3) The read numerical data is stored in a computer as a file.

Chapter 2

System Requirements

2.1 Software

For using SyGRD, an image analysis software, “NIH *Image*” or “*Scion Image* for Windows”, must be installed in the computer. NIH *Image* is widely used in the field of medicine or biology as the image analysis software for Macintosh computer. *Scion Image* for Windows is the Windows transplant version of NIH *Image*.

Since NIH *Image* is a public domain software, the software can be freely downloaded from NIH *Image* Web site (<http://rsb.info.nih.gov/nih-image/>). *Scion Image* for Windows is transplanted by Scion Corporation. However, Beta version of it is a free software and can be downloaded from Scion Corp. Web site (<http://www.scioncorp.com/>).

2.2 Hardware

- Computer (Environment of image analysis software for operation)

– For using *Scion Image* for Windows

OS	Microsoft Windows 9x/Me, Windows NT4.0/2000/XP or subsequent ones (Windows 3.1 is improper since <i>Scion Image</i> for Windows operates by 32-bit.)
CPU	Intel MMX Pentium 133MHz (Pentium II 233MHz or more CPU is recommended.)
Memory	RAM of the size from which at least 4MB of free memory domain is secured (generally at least 128 MB is recommended for recent Windows OS.)
Video Card	DirectX correspondence video card (Since big load is applied to a computer for image processing during graph reading, the video card with as high 2D-display capability as possible is more desirable.)
Other	Microsoft DirectX extensions to be installed

– For using NIH *Image* (Macintosh computer)

OS	Mac OS System 7.0 or subsequent ones
CPU	CPU to which Mac OS System 7.0 or subsequent ones operates (PowerPC is recommended.)
Memory	RAM of the size from which at least 4MB of free memory domain is secured (64MB or more is recommended.)

– **Common to *Scion Image* for Windows/*NIH Image***

Hard disk availability	Availability of about 7MB (for installation of an image analysis software) + that for saving the graph image files to read, and numerical results as text files
Display	Display in which 1024×768 pixel and 256 colors or more is possible
Operating devices	A mouse and keyboard – indispensable
Scanner	Scanner which has 400 or more dpi of resolution (600 or more dpi of resolution is recommended.)

2.3 Setup of SyGRD

If a set of a personal computer, a scanner, the image analysis software, macro program file and the file group that accompanies it are prepared, anyone can use SyGRD anywhere. The brief procedure of a setup of this system is as follows:

- (1) Connection of a personal computer with a scanner and setup of the scanner.
- (2) Installation of an image analysis software and change of a setup of the software.
- (3) Installation of SyGRD, containing a macro program file and the file group that accompanies it.

The details of installation and setup procedure are explained in “Installation Manual for SyGRD”, and are omitted in this manual.

Chapter 3

Reading procedure of graph data

In this chapter, the reading procedure of graph data is explained in a tutorial form. Although *Scion Image* for Windows is used for explanation, the procedure is almost the same also on *NIH Image*. Hereafter, an image analysis software will be installed in the `c:/ScnImage` folder in hard disk of a computer, and a macro program (filename “00edigit.txt”) will be in the `c:/ScnImage/work` folder that is made as a folder for the work of the graph reading and the explanation is started.

3.0 Procedure 0 : Before beginning of reading data on graph : graph scanning or getting graph image files

Before beginning read of graph data, scan of the graph with a scanner to read is carried out. When carrying out scan a printed graph, following points should be cared:

- A setup of scanning must be “2-colors (perfect black and white only)”. If monochrome or a color scanning is carried out, a display of an inner graph image becomes amusing.
- Although resolution is related with the size of a graph, the desirable resolution will be about 400–600 dpi. However, scanned image must be smaller than the display width. If not, the image window cannot be resized so that graph reading may be impossible.
- A scanned image must be saved as Windows bitmap format or TIFF format (if using Macintosh computer, saved as TIFF format) in the folder for work (`c:/ScnImage/work`) which is made after installation of the image analysis software. However, since the 1-bit (2-colors) Windows bitmap files cannot be used on *Scion Image* for Windows (this is a specification of *Scion Image* for Windows), the 1-bit (2-colors) Windows bitmap files must be translated to at least the 8-bit (65536-colors) Windows bitmap files by using the other software (such as “Paint” software in Windows, “Paint Shop” and so on).

As a substitute for graph scanning, you can also get graph images directly from a PDF file etc. on on-line (electric) journal. In this case, the image file must be translated to the “2-colors (perfect black and white only)” form and furthermore translated to the 16-bit (65536-colors) or more-bit Windows bitmap file (or TIFF format file) before saving in the folder. Read also section 5.3.

Graph image files and a macro program file (00edigit.txt) must be put absolutely into the same folder. Never move or delete the folder `c:/ScnImage/work/ifg` and files in the folder.

3.1 Procedure 1 : Starting an image analysis software

After preparing graph image files which you want to read, start the installed image analysis software (*Scion Image* for Windows or *NIH Image*). Next, click a “Window Maximization” button displayed on the right side of the title bar of *Scion Image* for Windows (Fig. 3.1), when using *Scion Image* software. **If the window of *Scion Image* is not maximized, the values reading from a graph image may be incorrect** (this is also a bug in *Scion Image* for Windows).

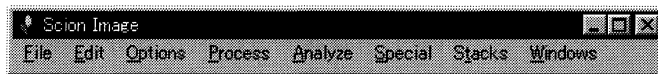


Figure 3.1: Title bar of *Scion Image* for Windows

3.2 Procedure 2 : Arrangement of window positions in image analysis software

When you start the image analysis software, some windows are displayed in the root window of the image analysis software. These windows can be dragged around the screen by their title bar. In addition, the **Info** window can be resized by dragging a corner or a side of the window. Among these windows, the important windows for graph reading is the **Info** window and **Tools** window.

The **Info** window (Fig. 3.2) displays the current state or procedures during graph reading. The **Tools** window (Fig. 3.3) uses for scrolling or zooming (and unzooming) image in the window.

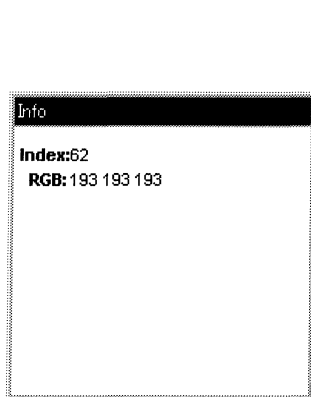


Figure 3.2: **Info** window



Figure 3.3: **Tools** window

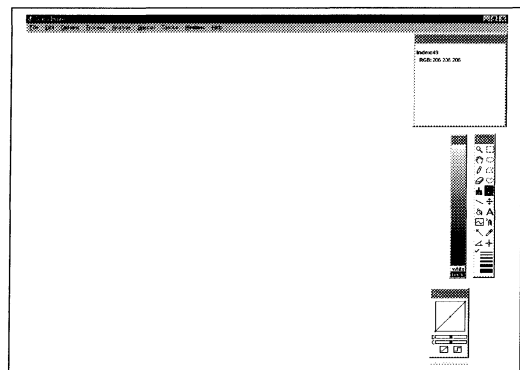


Figure 3.4: Overview of desktop image

Since above two windows must be shown at all times during reading, these windows are moved by a screen right end so that it may not overlap. Other windows may be arranged anywhere if these do not overlap with the two above-mentioned windows (Fig. 3.4).

3.3 Procedure 3 : Loading of macro program

Click “**S**pecial” on a menu bar and then click “**L**oad Macros...”. After displayed a file selection dialog box, select and load the macro program file (file-name is “00edigit.txt” for *Scion Image* for Windows¹, “00edigit.text” for *NIH Image*) in the folder for work (c:/ScnImage/work).

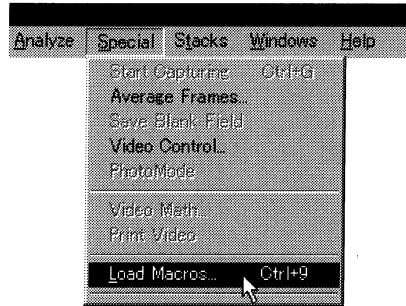


Figure 3.5: Loading the macro program

3.4 Procedure 4 : Loading image (graph) file to read

Click “**F**ile” on a menu bar and then click “**O**pen...”. After a file selection dialog box is displayed, select and load the image (graph) file previously (**Procedure 0**) saved in the folder for work (c:/ScnImage/work). The image window is created and selected image (graph) is displayed.

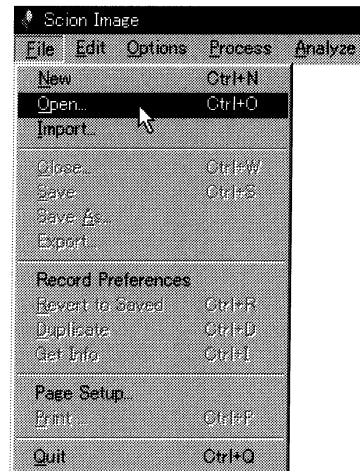


Figure 3.6: Loading the image (graph) file

¹ “.txt” may not be shown owing to the your computer’s setting.

3.5 Procedure 5 : Starting of macro program

The macro program is assigned to the 'D' key. When you push the 'D' key, the macro program starts and it becomes a screen as the right figure. In the center of a screen, the message dialog box written "Please resize the width of Image (graph) Window so as to show below OK button." is displayed. **Never click "OK" button yet.**

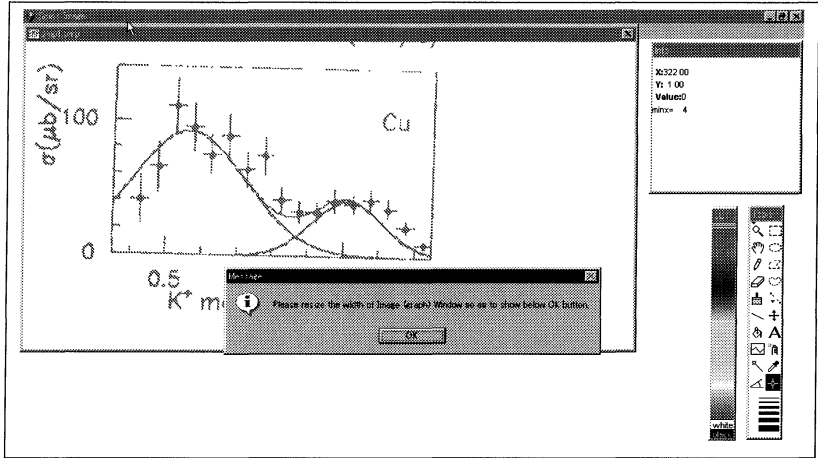


Figure 3.7: Desktop image immediately after starting macro program

3.6 Procedure 6 : Regulation of size of image (graph) window

If the "OK" button in the message dialog box is hidden by the image (graph) window, you must resize the image window. Drag the right end of the image window and resize the window so as to show the "OK" button in the center of the message dialog box. Don't move the position or left end of the image window by any means.

After finishing of resizing the image window, click the "OK" button in dialog box finally.

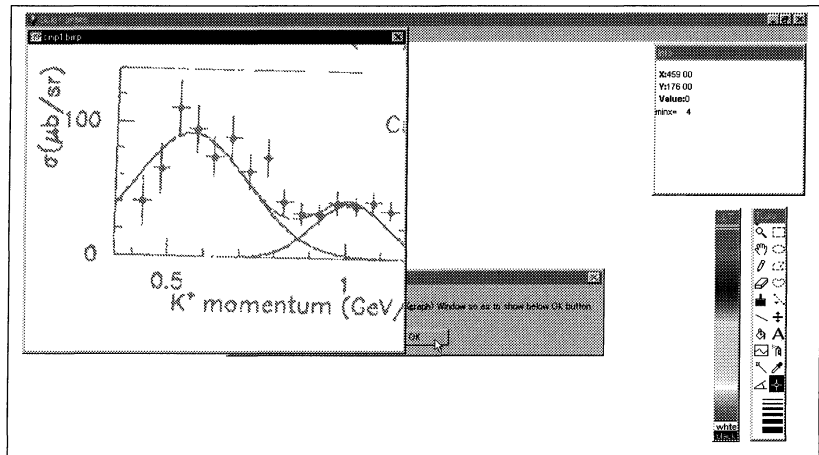


Figure 3.8: Resize image window so as to show "OK" button

3.7 Procedure 7 : Input of type of the axis of graph

After clicking the “OK” button, the image window for inputting the type of the axis of the graph is displayed on the screen upper left. In the window, the words such as “LINEAR” are displayed beside the X- and Y-axis. The type of the axis of the graph can be decided by clicking these words. Each word is changed alternately as

LINEAR ⇔ LOG10
 REAL ⇔ INTEGER

by clicking the words. Each axis of the graph to read specifies alignment, linear or common logarithms, or a real numerical value or integer value by clicking each word. Moreover, if you want to change factors (magnification of value on axes), click the words “xfactor” and “yfactor”. After clicking the word “xfactor” or “yfactor”, the dialog box inputting a factor is displayed. Input the value of a factor from a keyboard and click a “OK” button in the dialog box. It is also possible to input an index type numerical value like $1.2e-5$ ($= 1.2 \times 10^{-5}$).

After the input of the type of the axis being finished, click the word “OK” in the upper left of the window.

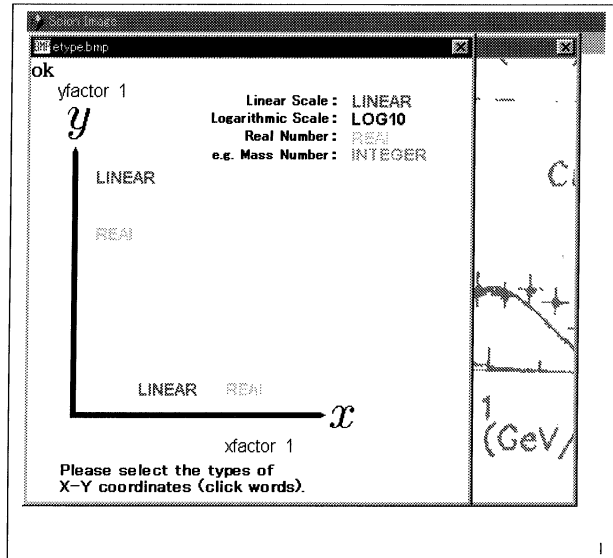


Figure 3.9: Input window of type of axis of graph

3.8 Procedure 8 : Input of datum points of graph for reading values

After decided the type of the axis of the graph, the values of two points on a vertical axis and a horizontal axis are inputted in order to decide the numerical value of a point on graph. The values of two points of a vertical axis are inputted first, and next, the values of two points of a horizontal axis are inputted. Input is performed by first clicking a pointer at the arbitrary points on an axis, and next inputting the value of the position. **If the axis has overflowed the screen, or you want to expand a image and set a pointer by the point on an axis precisely, carry out the operations explained in Chapter 4.**

CHAPTER 3. READING PROCEDURE OF GRAPH DATA

If the point on an axis is clicked, the 'x' mark will be drawn at the pointer position and the window that demands a numerical input as shown in the right figure is opened. You input the value of the position of the 'x' mark in the box of the window. The input of an index type numerical value like '1.2e+5', as in the case of axis scale input, is possible. After a numerical value is inputted, click the "OK" button.

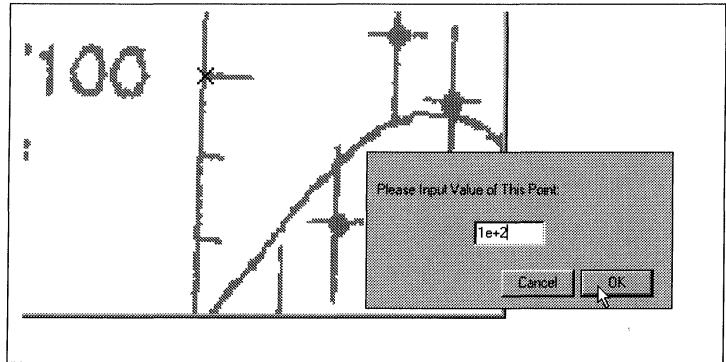


Figure 3.10: Input value on an axis of graph

Then, the inputted value is drawn by the side of the 'x' mark and the window that checks whether it is good for the numerical value inputted is opened. If inputted value is not wrong, click the "OK" button.

When wrong, you change the letter 'y' in the box of the window to 'n' and click the "OK" button. Since the inputted numerical value is canceled, it clicks the point on an axis again and inputs value.

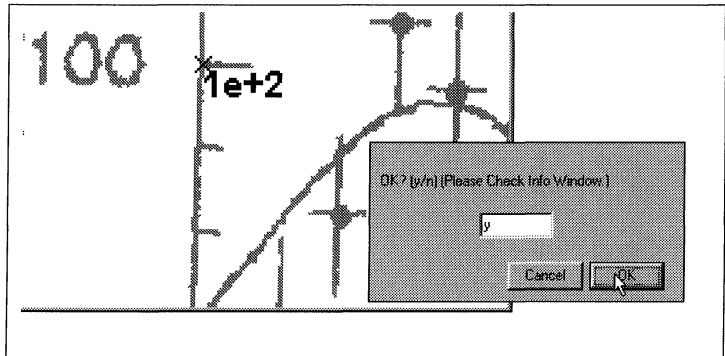


Figure 3.11: Confirmation of inputted value

The above thing is repeated four times, two on a vertical axis, and two on a horizontal axis. Although the order of input of numerical value on an axis is no matter, horizontal axes are surely inputted after two vertical axes and it is desirable that the interval of two input points on same axis is as large as possible.

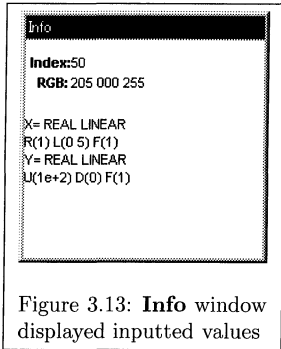


Figure 3.13: Info window displayed inputted values

After finishing four points of inputs, the window for performing a final check opens (Fig. 3.12). Since the information of previous inputted types of axis and value on axis is displayed in the **Info** window (Fig. 3.13), check the previous work and click the “OK” button if there is no matter.

If you find some mistake, you change the letter ‘y’ in the box of the check window to ‘n’ and click the “OK” button. Since the inputted numerical value is *all* canceled, the work of the inputs of value on axis from the beginning of **Procedure 8**.

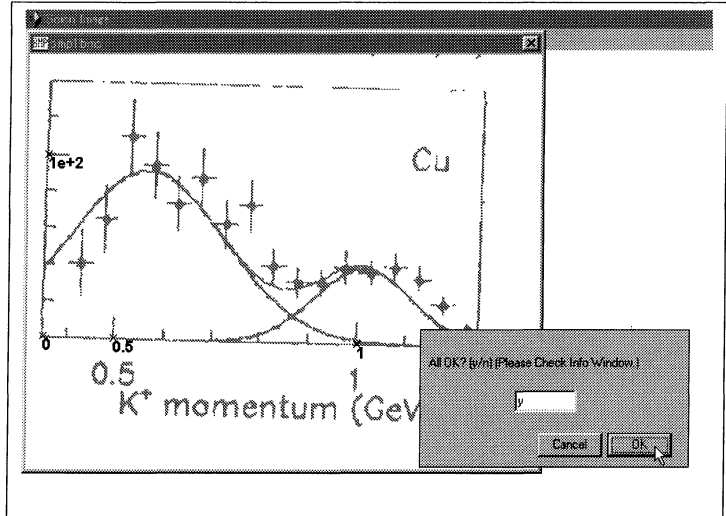


Figure 3.12: Final confirmation of inputted values

3.9 Procedure 9 : Selection of type of error bar (type of data)

Next, as shown in the right figure, an icon-like list of the type of data is displayed on the screen upper left. Choose and click the type of the data of the graph to read among a list. Then, a dialog box that checks whether it is good for the type of data is opened. If selected type is correct, click the “OK” button.

If the selection is not correct you change the letter ‘y’ in the box of the window to ‘n’ and click the “OK” button. Since it will return to selection of the type of data, choose the type of data again.

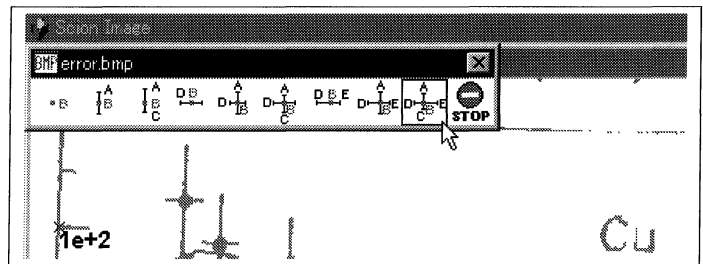












Figure 3.14: Selection of type of error bar

Explanation of each icon (type of data)

	Data without error bars		The case for error bar being symmetrical with the upper and lower sides from the central point
	The case for error bar being asymmetrical with the upper and lower sides from the central point		The case for error bar being symmetrical with the left and right sides from the central point
	The case for error bar being symmetrical with the upper and lower, the left and right from the central point		The case for error bar being asymmetrical with the upper and lower sides, while symmetrical with the left and right from the central point
	The case for error bar being asymmetrical with the left and right sides from the central point		The case for error bar being asymmetrical with the left and right sides, while symmetrical with the upper and lower from the central point
	The case for error bar being asymmetrical with the upper and lower, the left and right from the central point		A macro program is terminated. Since it becomes invalid all the information inputted until now, when you use it, be careful.

3.10 Procedure 10 : Starting read

When selection of the type of data (error bar) finishes, the message dialog box written in “Now starting to read the values on the graph.” is displayed (Fig. 3.15).

The reading numerical data of the graph starts when you click the “OK” button in the message dialog box.

If you move mouse pointer on the image (graph) window and click data points or edges of error bar, the numerical value of the point will be read.

When the position that you want to read the value is clicked, the point

with colors corresponding to the data point or each error bar (ABCDE) is displayed on its position. By these colored points, you can check that whether the position that you want to read is exactly read. By checking the positions of the colored points, it is prevented that the reading mistake by misreading that occurred the mouse moving before clicking, a mistake of double reading, and so on.

If the button of a mouse is clicked, the warning sound registered into your computer will sound. It can be confirmed whether the button of a mouse was clicked certainly by listening this sound.

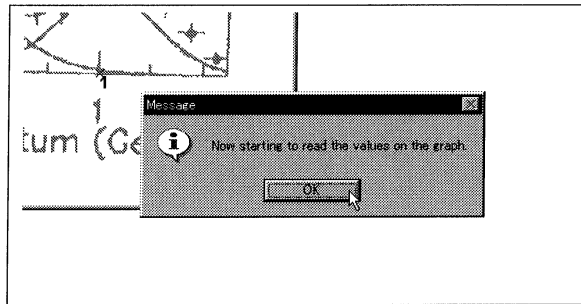


Figure 3.15: Start message of reading

The current situation is expressed in the **Info** window as real time.

1	The color index specified by color palette on a mouse pointer
2	The current state (now reading state)
3	The current pointer coordinate on an image window, where the origin is at the upper left-hand corner of an image
4	The current pointer coordinate on a graph, where the coordinates is specified by Procedure 8
5	The color index on a mouse pointer (0 if white)
6	The type of data (error bar). A letter in parentheses shows next point to read in a set of data.
7	The number of read data (number of center of data with error bar)

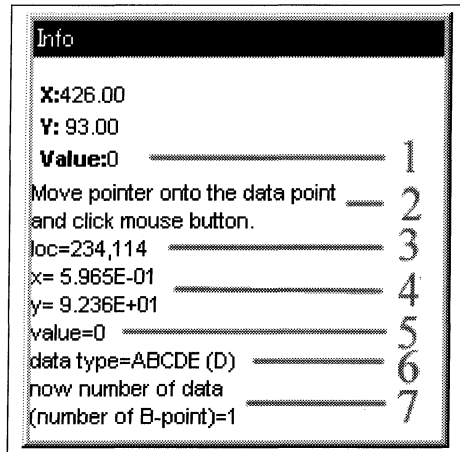


Figure 3.16: A sample of **Info** window during reading

3.11 Procedure 11 : Reading procedure with various matters that require attention

3.11.1 Zoom/unzoom and scroll method of image during reading

If a point to read has overflowed the screen and want to scroll, or to zoom a image for setting a pointer on a reading point correctly, the operations explained in Chapter 4 should be performed. This performance is same as that mentioned in Section 3.8.

3.11.2 Order of reading data

The data point (center of data, not error bar) must be read from the point that has a smaller value of X-coordinates to that has a larger value. If this order is not kept, below the message is displayed. If "OK"

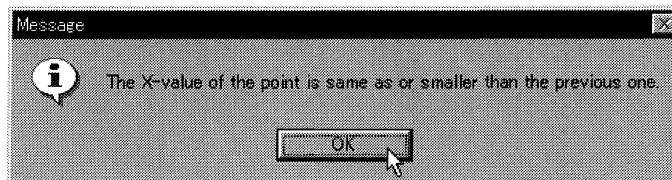


Figure 3.17: Message dialog box for caution of reading order









button is clicked, it will return to a usual reading state. After ending reading, a dialog box that confirms

whether sorting is performed, so that the value of X-coordinates in the numerical order is displayed. The details of this dialog box are explained in Section 3.12.

3.11.3 Order in reading data with error bar

There is a rule of order in reading of the data point with error bar.

Order of clicking points of the data with error bar

	A → B		A → B → C
	D → B		A → B → D
	A → B → C → D		D → B → E
	A → B → D → E		A → B → C → D → E

Since reading order is fixed, click data point with error bar in due above order. While reading the data point, next reading point (expressed in a letter of ABCDE) is shown in the **Info** window. Input mistake will decrease, if you click data points as checking the **Info** window.

3.11.4 Shift key operation

For doing various operations under reading mode, for example, deletion of mistakenly read data, and input infinite or unknown number as the value of error bar, and so on, push a “Shift” key. When pushing a “Shift” key, a icon-like menu-bar is displayed at the upper left-hand corner of an image. Various operations are performed by clicking each icon of a menu-bar.

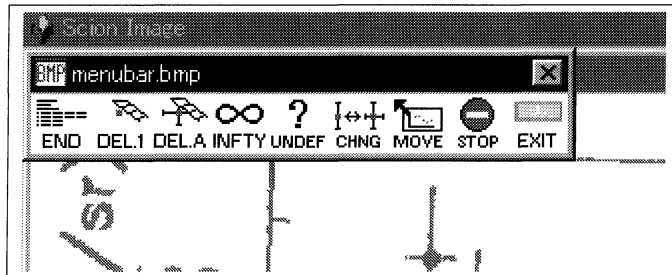











Figure 3.18: Displayed an icon-like menu-bar


Explanation of each icon of a menu-bar

	<p>Finishing reading numerical values on a graph. Read numerical data are displayed in a text window.</p>
	<p>Deleting one last read numerical data and reading is redone. Deleting can be done only one last point.</p>
	<p>Deleting the data point including the error bar under present reading and reading is redone. For example, when reading ABC type data and next reading C point, the read value of A and B points will be deleted, and it will redo reading from A point. When next reading is A point, all read value of previous data points (A, B and C) is deleted, and it will redo reading from previous A point.</p>
	<p>Choosing this icon if an error has infinite value. Never click on a graph (image) window in this case.</p>
	<p>Choosing this icon if an error has negligible value (or an error is so small that the value cannot be specified). Never click on a graph (image) window in this case.</p>
	<p>Changing the type of data (error bar) in the middle of reading. After change of the type of data, you can read data continuously again.</p>
	<p>A graph image window is moved to the position of the upper left corner on which should originally exist. When the graph picture window has been moved by mistake, choose this icon immediately. Then the window is move to the original position again.</p>
	<p>A macro program is forced to terminate. Since a read result is not outputted, be careful at the time of selection of this icon.</p>
	<p>Nothing is carried out but it returns to the graph reading mode. It is used for returning to the graph reading mode when pushing a "Shift" key mistakenly.</p>


When an icon is chosen, the dialog box for a check opens. If the selection is correct, only click a "OK" button and then processing corresponding to each icon will be performed. If wrong, change a letter "y" to "n" in the dialog box and click a "OK" button. In this case, it will return to the selection of an icon mode.

3.11.5 Attention for moving image (graph) window

When you are working on Windows OS, **never move the image (graph) window where the image is displayed during data reading.** If it should have moved, **immediately** push a “Shift” key and

click  icon for returning a window position. If not, numerical values of reading data may be wrong (this is caused by the bug in *Scion Image* for Windows).

3.12 Procedure 12 : Finishing read, and preservation of reading results

If reading of all the data is completed, push a “Shift” key and click  from a menu-bar. Since the dialog box for a check is displayed, click a “OK” button.

Then, the dialog box that tells finished reading of data, as shown in Figure 3.19, is displayed. Click a “OK” button and then the reading data mode is finished.

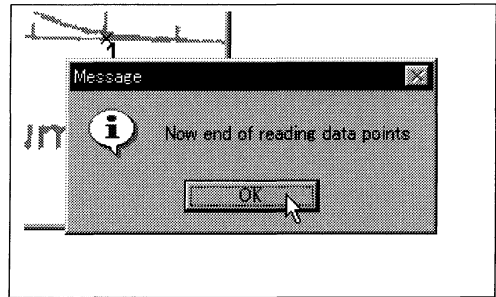


Figure 3.19: End reading dialog box

When you have not read the data in the increasing X-coordinate order for central points (from lower to upper), a dialog box that confirms whether sorting the data is performed or not is displayed (Figure 3.20). If you want to sort, click a OK button and then reading data points are sorted automatically. If you do not want, delete “y” in the dialog box, input “n”, and then click a “OK” button.

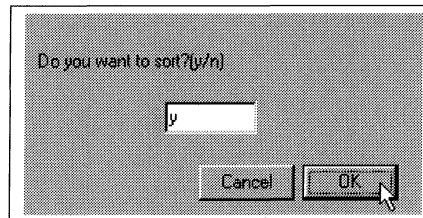


Figure 3.20: Dialog box for confirmation of sorting

The numerical read data are displayed on a “Notepad” window as shown in the following Figure 3.21. The outputted format of numerical data is based upon NRDF (an abbreviation of Nuclear Reaction Data File) that has been compiled by JCPRG. However, you will be easily draw a graph of the outputted numerical data if you use a graph displaying software such as Gnuplot.

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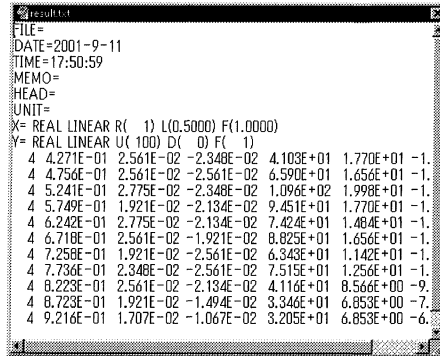


Figure 3.21: Results displayed in “Notepad”

The details of format of files are as follows:

1st line	the line for inputting the file name of this outputted file
2nd line	the date of data being outputted (automatically entered)
3rd line	the time of data being outputted (automatically entered)
4th line	the line for writing memo if need
5th line	the line for writing the names (or NRDF code) of physical value and so on
6th line	the line for writing the names (or NRDF code) of units of data
7th line	type of X-coordinate and the values of datum points on X-axis (automatically entered)
8th line	type of Y-coordinate and the values of datum points on Y-axis (automatically entered)
9th line and after	numerical value of reading data

The number (from 1 to 4), which is entered the head of 9th line and after, is shown the type of data (error bar)². The correspondence of the number, type of error bar and outputted format is as follows:

number	type of error bar	format of outputted data (“,” means a space)
1	B	X-coordinate, Y-coordinate
2	AB, ABC	X-coordinate of B point, Y-coordinate of B point, value of error of data along +Y-axis, value of error of data along -Y-axis
3	BD, DBE	X-coordinate of B point, value of error of data along +X-axis, value of error of data along -X-axis, Y-coordinate of B point
4	ABD, ABCD, ABDE, ABCDE	X-coordinate of B point, value of error of data along +X-axis, value of error of data along -X-axis, Y-coordinate of B point, value of error of data along +Y-axis, value of error of data along -Y-axis

²The details of type of error bar are written in sectin 3.9.

CHAPTER 3. READING PROCEDURE OF GRAPH DATA

After inputting the data headings (Physical values), units and so on in a “Notepad” window if you need, click button at the upper right of the window. Since it checks whether it saves or not, click a “YES” button and input save file name and click a “OK” button.

When there are many amounts of reading of data, a result is divided and displayed on two or more windows. The turn of an output is expressed with the number after the letters “res” on each window title. Save each data in windows and after combining all the data by using some text editor software that can treat big size file in this case.

Furthermore, based on the read data, graph is drawn on a graph image window. You can confirm whether reading was performed correctly by checking this on a screen.

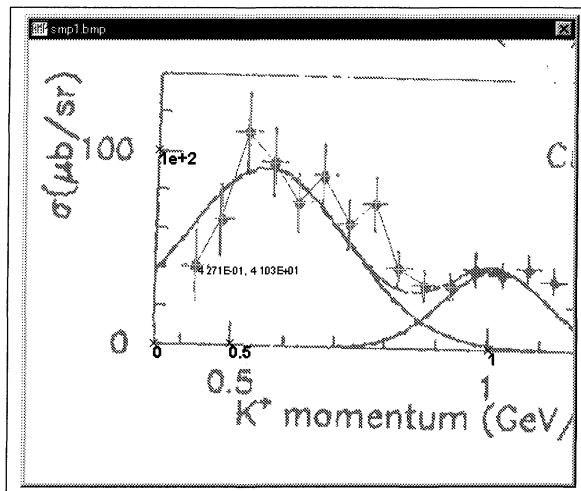


Figure 3.22: Image window drawn a graph

On a screen, a dialog box shown right is also displayed. This inputs the number explained below in the window for choosing the following operation here. It progresses to the following processing by clicking a “OK” button.

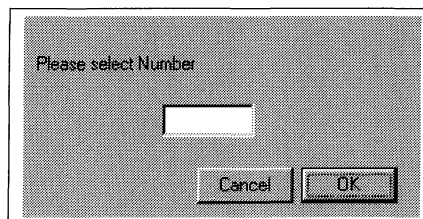


Figure 3.23: Dialog box for next operation

Number and next processes

1	A macro program is terminated. When you want to perform a macro program again, push a “D” key.
2	Loading another graph and re-start reading. After choosing the file of a new graph image, perform Procedure 6 : Regulation of the size of image (graph) window and following procedure for reading a new graph.
3	The same graph is read again. It is convenient if you choose this number when two or more graph is drawn on one screen or when you find mistakes in the results of read data.

If you input number “1” in the dialog box and click a “OK” button, a macro program is terminated. When closing the image (graph) window by clicking button on the title bar, it is asked whether saving the image file or not. Normally, click “NO”. Then you can terminate the image analysis software immediately.

If you input number “2” in the dialog box and click a “OK” button, a dialog box for opening a new image (graph) window. Select a new image file, and progress **Procedure 6 : Regulation of the size of image (graph) window** and following procedures for reading the new data.

If you input number “3” in the dialog box and click a “OK” button, a dialog box is displayed for asking whether the displayed image window that is drawn some numbers, points and lines is refreshed (closed opened window and re-opened it) or not. When you click a “OK” button only, the displayed image window is refreshed.

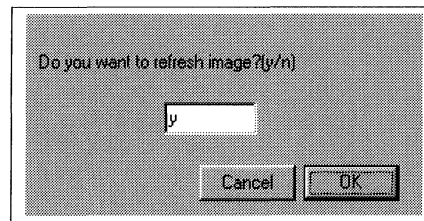


Figure 3.24: Dialog box for refreshing image or not

After performing **Procedure 6 : Regulation of the size of image (graph) window**, a dialog box is displayed for asking whether re-input datum points on Y-axis (vertical axis) or not. If you do not want it, click a “OK” button only. If you want to re-input datum points of Y-axis (for example, when you want to read two or more graph that those scale of Y-axis are different), delete “n” in the dialog box, input “y”, and then click a “OK” button. Procedure for inputting datum points on Y-axis is started and following procedures are progressed.

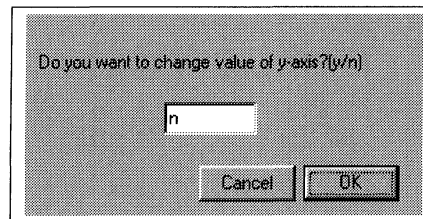


Figure 3.25: Dialog box for re-inputting datum points on Y-axis

Chapter 4

Zoom/unzoom and scroll method of image

When clicking data points or datum points on an axis, you will sometimes want to zoom an image (graph) for precisely deciding the clicking point. In other case, since the size of image (graph) window must be about a half of the desktop, some part of graph sticks out from the window, and thus you will want to scroll image for showing a hidden area. This chapter explains that the methods for zooming/unzooming and scrolling of a graph in an image window.

4.1 Preparing for zoom or scroll

You cannot zoom or scroll a graph in an image window at any time. Before doing zoom or scroll procedure, you must push a “Ctrl” key. When you push a “Ctrl” key, a message dialog box (Fig. 4.1) written “Now you can zoom, unzoom and scroll image (graph).” is displayed at the center of the desktop. **Never click a “OK” button before zooming or scrolling.** “OK” button is clicked after finishing zooming or scrolling procedure.

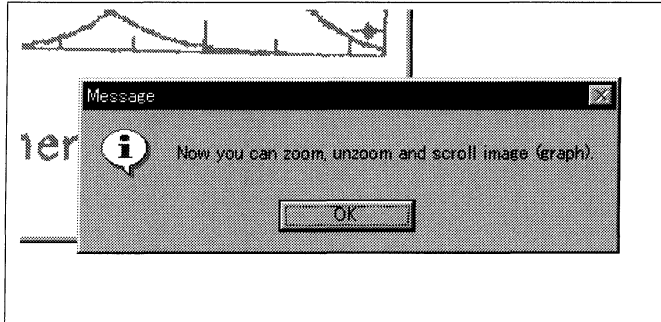




Figure 4.1: Message dialog box for announcement of prepared for zoom or scroll

4.1.1 Procedure for zoom/unzoom graph

When you want to zoom/unzoom a graph image, for the first time, click  (Magnifying Glass icon) in the **Info** window. Next click within the image (graph) window at the position that you want to zoom. Eight magnification levels are available: 1:1, 2:1, 3:1, 4:1, 8:1, 16:1, 32:1 and 64:1. If you want to

unzoom, click within the image (graph) window **with pushing a “Ctrl” key**.

4.1.2 Procedure for scroll graph

When you want to scroll a graph image, for the first time, click  (Scrolling Tool icon) in the **Info** window. Next drag mouse within the image (graph) window in the direction you want to scroll a graph.

4.2 Procedure after zoom or scroll and its attention

If zoom or scroll is finished, click a “OK” button in the message dialog box (Fig. 4.1). The zoom and scroll procedures are terminated and it returns to the current state (Procedure 8 : Input of datum points of graph for reading values or Procedure 11 : Reading procedure).

During those procedures, **never move the position an image (graph) window**. If accidentally moved it, push a “Shift” key and then move the image window to the normal position.

Chapter 5

Notes on use

5.1 Maximum number of reading data points

The maximum number of the data that can be read is about 8000 points. 8000 points include the edge of error bars. For example, the data with the ABCDE type error bar (see section 3.9) can be read about 1600 data. When reading the number of data beyond 8000, it reads in several steps, and results are combined each other later.

5.2 Restriction of click of mouse button

Don't click the button of a mouse during macro program running except for the time of necessity. There is a possibility that the following problems may arise.

1. **The mistaken numerical value is read.**

If click places other than a graph (image) window accidentally during data reading, surely push a "Shift" key and delete data (select "Delete" icon from a menu-bar).

2. **A key (mouse) response becomes very late.**

This tends to occur, especially when the title bar (portion as which the title of a window is displayed) of a window is clicked. Don't click a title bar.

3. **An unexpected error occurs and a macro program forces to terminate.**

If a macro program forces to terminate, all read data will be also vanished. This phenomenon will tend to occur, when a mouse clicking unnecessary during data reading. Push the button of a mouse certainly only when required (Never click the button of a mouse any number of times when a mouse or key response is very slowly). Moreover, because this phenomenon frequently happens when the processing speed of a computer is not so fast, this problem rarely arises when using computers with the high performance of CPU or a video card.

5.3 Type of image

The format of image (graph) must be (Windows) BMP or TIFF format (restricted by image analysis software). In order to clearing outlines of data, for example the edge of error bar, a graph image must be "black and white (only two colors of perfect white and perfect black)". If not, when starting the macro

program, some area of image which seems to be black or white color become various colors and thus it becomes hard to read the graph. However, since *Scion Image* for Windows can open only 16-bit or 24-bit BMP files, the image files must be converted to 24-bit BMP files after converted “perfect black and white only (1-bit)” files. Above procedure is applicable both scanning and copy from such as PDF images in electric journal.

How to create the graph image files to read by *Scion Image* for Windows is as follows:

1. Create the graph image file by scanning the printed graph or copying the graph image from electric journal distributed by such as PDF file.
2. Convert those image file to the “**perfect black and white only (1-bit)**” BMP file.
3. Re-convert the above image file to a **16- or 24-bit BMP file**.

If you try to open an 1-bit BMP image files on *Scion Image* for Windows, an error message is displayed and the software itself is forced to terminate (as of October 12, 2001).

5.4 Relation of vertical and horizontal axis

Even if the horizontal (X-)axis of graph image leans to the screen, exact values can be read from that graph image. However, if the graph does not have an orthogonal axis, exact values cannot be read. **The axes of graph to read must be at right angle.**

5.5 Attentions for using *Scion Image* for Windows on Windows series

5.5.1 Font size

As explained in A.3.1 in Chapter 6, the top edge of image window must always exist perfectly on the bottom line of the title bar of *Scion Image* for Windows for reading numerical values correctly. If the font size of the desktop is larger than normal size, the width of the title bar of *Scion Image* become wide and thus bottom of the title bar of *Scion Image* is overlapped the top of the image window. Therefore, **font size of the desktop must be normal size** (mostly, this is default setting on Windows series). However, some additional attention is needed when using Windows XP. Read also subsection 5.5.3 if you are Windows XP user.

5.5.2 Operating by limited user on Windows XP

If a limited user (not an administrator) wants to use *Scion Image* for Windows on **Windows XP**, a limited user must be set up *Scion Image* for Windows running on “Windows 98 compatibility mode”. The details of set up of “Windows 98 compatibility mode” are explained in Windows XP Help.

5.5.3 Problem of macro program “00edigit.txt” on Windows XP

On initial setting of UI (User Interface) of **Windows XP**, SyGRD does not operate normally (this relates Q.3 in Chapter 6). To avoid this problem, there are two methods:

1. **Change UI (window design) of Windows XP.**

If you change window design of Windows XP, you can use SyGRD on Windows XP in the same way as in other version of Windows. Open “Display Property” window and click “Design” tab.

CHAPTER 5. NOTES ON USE

Then “window and button” setting changes from “Windows XP Style” to “Windows Classical”. The details refer Windows XP help.

2. Use another macro program.

If you do not want to change UI of Windows XP, use macro program “00editXP.txt” instead of “00edit.txt”. All operation when using “00editXP.txt” is the same as that in using “00edit.txt”. However, normal operation of SyGRD cannot be warranted when using “00editXP.txt” as of March 9, 2002.

Chapter 6

Questions and Answers

Q.1 Sometimes the response of a key input and mouse click and change of message of Info window become slow during graph reading. What should I do and why is this?

A.1 When it changes into such a state, push a “Ctrl” key continuously until a message window written “Now you can zoom, unzoom and scroll image (graph).” is opened, and then click a “OK” button in the message window. Mostly, the response will be recovered by doing this procedure.

This state arises with a very high probability when the title bar of any windows in *Scion Image* for Windows is clicked. **Don’t click title bar during graph reading.**

Q.2 During data reading, I push a “Shift” key and open the menu-bar. But even if click an icon in the menu-bar, sometimes it does not react. What should I do?.

A.2 Operation of a computer becomes slow especially immediately after a menu-bar display. Please wait about 1 second. Mostly, it will normally react. **Don’t click a button of mouse any number of times, even though there is no response when clicking.**

Q.3 Although a certain position on a graph image was clicked during data reading, the colored point which shows already read is displayed on the place other than the clicked position. Why is this?

A.3 There are two reasons why such a problem arises.

1. **The position of a graph image window has been moved.**

When working by *Scion Image* for Windows, the graph image window must always touch perfectly the left end of a screen, and under the title bar of *Scion Image* for Windows. If not, the coordinate in the image window does not correspond to that in the macro program (this is also a bug of *Scion Image* for Windows). Push a “Shift” key and return a graph image window to the suitable position. Read also section 5.5.1 and 5.5.3

2. **The resolution of scanned or got graph image data is too low.**

Within a computer, the graph image data which scanned or got from electric documents such as PDF file is expressed by digitized per dot. Therefore, in case data is read, even if it clicks the middle position of a dot and a dot, the point which displays the read position is displayed on the nearest dot from the clicked position. Above thing is related to reading numerical value exactly. In order to read value exact, in case scan of the graph is carried out, it is required to

CHAPTER 6. QUESTIONS AND ANSWERS

raise the resolution if possible and to increase the number of dots per unit length. However, if resolution becomes high too much, the file size of a image becomes large. Moreover, a high-resolution graph image window size becomes large and then any trouble may occur during graph reading operation (for example, read next Question). The resolution of graph image cannot be raised too much.

- Q.4 When I load the large size graph image file which overflows the screen of a desktop and run a macro program, the right end of a graph image window overflows a screen, and the size of the window cannot be adjusted. What should I do?
- A.4 This problem is generated for the specification (it is also called a bug) of *Scion Image* for Windows. This problem can be avoided by adjusting the width of the graph image window to less than about 95% of the maximum desktop width. When scanning a graph, the control of scanning resolution is needed so that the width of the graph image dose not becomes too large.

Chapter 7

Copyrights and Licensing

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- If new versions of the image analysis software, “*NIH Image*” or “*Scion Image for Windows*”, will be released, copyright holders make no warranties as to the performance of SyGRD on new version software.

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