

DASYLab[®]

Data Acquisition System Laboratory

Version 8.0

32-bit version for
Windows 2000
Windows XP Pro

Including
DASYLab-Net
&
Analysis Toolkit
Option

**Book 1:
User Guide**

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Year 2000 Compliance Statement

DASYLab 8.0 is Year-2000-compliant. It conforms to the British Standards Institution BSI DISC PD-2000-1 'A Definition of Year 2000 Conformity Requirements' document. Specifically, DASYLab will:

- Work correctly for the following the transition from December 31, 1999 to January 1, 2000
- Recognize that 2000 is a leap year;
- Work correctly for all dates in the range January 1, 1980 through December 31, 2037, but not before, and not after
- Read and store dates correctly using its private (.DDF) data format, and store appropriately for other date formats

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Contents

BOOK 1: USER GUIDE

License Agreement	i
Year 2000 Compliance Statement	ii
Risky Applications	iii

CHAPTER 1: INTRODUCTION

1.Welcome to DASYLab!	1-1
2.About your DASYLab Documentation	2-2
2.1.What's Included	2-2
2.2.Contents	2-3
2.3.Typographic Conventions	2-4
3.What is DASYLab?	1-5
4.Installation	1-9
4.1.System Requirements	1-9
4.2.Setting up DASYLab	1-10
4.3.Hints for PC Hardware Configuration	1-11
5.DASYLab Versions	1-12
6.New in DASYLab Version 8.0	1-15
6.1.Getting Started Tutorial	1-15
6.2.General	1-15
6.3.New Modules	1-16
6.4.Module Changes	1-17

CHAPTER 2: GETTING STARTED

1.Basic Techniques	2-1
2.Starting DASYLab	2-4
2.1.Starting DASYLab with a New Worksheet	2-4
2.2.Starting DASYLab with an existing Worksheet	2-4
3.Experiment Setup and Time Bases	2-5
4.Documenting your Worksheet	2-5
5.Context Menus	2-6
6.Using the DASYLab Help System	2-7
7.Creating your First DASYLab Worksheet	2-7

CHAPTER 3: CREATING AN EXPERIMENT SETUP

1.The Elements of a Worksheet	3-1
1.1.Modules	3-1
1.2.Data Channels, Junction Points	3-3
2.The DASYLab Screen	3-8
2.1.The Worksheet Window	3-8
2.2.The Display Tree View	3-11
2.3.The Control Sequencer Window	3-12
2.4.The Layout Window	3-16
2.5.VITool Toolbox	3-20
2.6.Title Bar	3-20

2.7.Menu Bar	3-20
2.8.Module Bar	3-22
2.9.Function Bar	3-23
2.10.Status Bar	3-27
2.11.Display Windows	3-27
3.Module Groups Overview	3-29

CHAPTER 4: MAIN MENU

1.Worksheet Window Menu	4-1
1.1.File Menu	4-1
1.2.Edit Menu	4-9
1.3.Module Menu	4-17
1.4.Experiment Menu	4-21
1.5.View Menu Commands	4-35
1.6.Options Menu	4-41
1.7.Window Menu	4-71
2.Control Sequencer Menus	4-72
2.1.File Menu	4-72
2.2.Edit Menu	4-75
2.3.Experiment Menu	4-75
2.4.View Menu	4-75
2.5.Options Menu	4-75
3.Tree View Menus	4-75
3.1.File Menu	4-75
3.2.Edit Menu	4-75
3.3.Experiment Menu	4-75
3.4.View Menu	4-75
3.5.Options Menu	4-75
3.6.Window Menu	4-76
4.Layout Window Menus	4-76
4.1.File Menu	4-76
4.2.Edit Menu	4-76
4.3.Object Menu	4-78
4.4.Experiment Menu	4-84
4.5.View Menu	4-84
4.6.Options Menu	4-85
4.7.Window Menu	4-87
5.Help Menu	4-88
5.1.Index	4-88
5.2.Hardware	4-89
5.3.Glossary	4-90
5.4.Using Help	4-90
5.5.Getting Started Tutorial	4-90
5.6.Report...	4-91
5.7.About DASyLab...	4-91
6.Customizing the Main Menu: External Programs	4-92

CHAPTER 5: FILES AND FILE FORMATS / DDE / NETWORK

1.Files and File Formats	5-1
1.1.Worksheet Files (.DSB)	5-1
1.2.Control Sequencer Files (* .DSQ)	5-2
1.3.Module Bar Files (.DML)	5-2
1.4.Layout File (.LAY)	5-2
1.5.Serial Port Settings (.SIN/ .SOU)	5-3
1.6.ICOM Port Settings (.IIN/ .IOU)	5-3
1.7.Initialization File (DASYLAB .INI)	5-3
1.8.Files with Reference Points (.DPF)	5-3
1.9.Data Files	5-4
1.10.DASYLab Data Format (.DDF/ .DDB)	5-5
1.11.Vector File (* .VEC)	5-9
1.12.FGEN File (* .TXT)	5-10
2.DASYLab-Net: Communication with Other DASYLab Programs	5-11
2.1.TCP/IP Network Protocol	5-12
2.2.Bibliography	5-13
3.DDE: Communication with Other Applications	5-13
3.1.DASYLab as DDE Input	5-13

CHAPTER 6: TIPS & TRICKS

1.Demo Worksheets	6-1
2.DASYLab by Keyboard	6-1
3.DASYLab Hotkeys	6-2
4.How to Start and Stop an Experiment	6-3
4.1.Start/Stop/Pause/Resume an Experiment	6-3
4.2.Controlling an Experiment Manually	6-3
4.3.Automatic Program/Experiment Start	6-4
5.Exchanging Worksheets	6-7
6.Display Company Logo	6-8

APPENDICES

A: What's included in Your DASYLab Package	A-1
B: Internal Data Flow and Precision Information	B-1
C: ASCII Table	C-1
D: Error Messages and Troubleshooting	D-1
E: Product Support	E-1

INDEX

Chapter 1

Introduction

Chapter 1: Introduction

1. Welcome to DASYLab!

You have acquired an easy to use software product that provides an enormous range of functions and options for your data acquisition tasks. Install this electronic laboratory on your computer and start experimenting; you will quickly discover many of DASYLab's powerful features.

Use DASYLab's Online Help system to display information about the operation that you are about to carry out on the screen. It may be unnecessary for you to thoroughly study this printed manual.

If you are new to DASYLab, we recommend that you read through the **Step-by-Step Instructions** in the online Help system, or read this introductory chapter plus Chapters 2 and 3. You will then know enough to start off with DASYLab on your own.

If you have upgraded from a previous version of DASYLab, please review Chapter 1 – Section 6 for information about new and changed features.

Later, this User Guide can help you find your way through DASYLab even when you are not at your computer. It can serve as a reference book and it will provide background information that might seem out of place in the immediacy of the online Help system.

The DASYLab team will continue to develop DASYLab as software that matches its users' requirements and preferences.

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2. About your DASyLab Documentation

2.1. What's Included

The DASyLab documentation consists of the following:

- The context-sensitive online Help system provides quick on-screen reference to procedures and commands you may need while working with DASyLab. In addition, hardware help is provided to describe the installation, setup, and use of your specific data acquisition device.
- This User Guide contains a comprehensive description of all of DASyLab's functions and their uses. It serves as a reference book, providing background information. Most of the same information is included in the online Help.
- Volume 2 of the User Guide, the Module Reference Guide, with complete descriptions of each Module Group and Module. Most of the same information is included in the online Help.
- Volume 3 of the User Guide, the **Hands-On Guide to DASyLab**. This self-paced tutorial covers many of the frequently used processes in an illustrated step-by-step guide.
- The Getting Started Guide, an interactive set of examples. In addition to a comprehensive set of examples, this guide includes most of the information in Volume 3, the Hands On Guide.
- The Hardware Information Manual provides a description of the interface between the data acquisition hardware and DASyLab. This manual may not be provided with all packages. If not, review the README file and any hardware specific online help that is installed.
- README.rtf, an information file that is copied to your hard disk when you set up DASyLab, provides information that was updated after this User Guide was printed. You can easily read (or print) this file using Windows Wordpad.
- Additional documentation and examples may be available on www.dasylab.net. Check this site regularly for updates and information.



*We strongly recommend that you read the **README** file before you start working with the software.*

2.2. Contents

The DASYLab User Guide is divided into the following parts:

- Chapter 1: A general introduction to the software. It explains the basic concepts and provides setup information. It includes an overview of the new features and changes in this version.
- Chapter 2: Operating fundamentals. This chapter explains the skills you need to work with DASYLab, how you start the program, and how you can use the online Help system. You can then follow a tutorial.
- Chapter 3: A systematic survey of the elements you will use when working with DASYLab.
- Chapter 4: A description of all of DASYLab menu commands and functions (except those from the Module menu). The chapter's structure corresponds to the DASYLab menu system.
- Chapter 5: Background information about file formats and data exchange between Windows applications.
- Chapter 6: Additional hints and background information structured along particular tasks or problems that may arise during your work with DASYLab.
- Appendices: Lists of program specifications and error messages, a glossary, the License Agreement and a comprehensive Index of Topics covering Chapters 1 to 7.



Please do not forget to register online at www.dasylab.net or www.dasylab.de, or, send us your Registration Card.

The DASYLab Module Reference Guide includes detailed descriptions for each module. The interactive Getting Started Guide and the Hands On Guide provide examples and tutorial information.

The optional Hardware Information Manual contains a description of your device with information concerning setup and operation with DASYLab.

2.3. Typographic Conventions

We have used visual cues and standard text formats in this User Guide to help you locate and interpret information easily.

Text Formats

File names and directory names are printed in ALL CAPITALS.

All references to menus, menu commands and to the options available in dialog boxes are printed in this sans serif typeface.

All references to keyboard keys and command entries are printed in this text format. These are usually commands that you must type at the DOS Prompt or in DASyLab or Windows text boxes exactly as you find them printed in this manual. It does not matter whether you type upper or lowercase letters.

Keyboard Formats

Key combinations and key sequences:

KEY1+KEY2 means to press and hold down the first key while you press the second.

KEY1, KEY2 means to press and release the keys one at a time.

Symbols

We have used the following symbols throughout this User's Guide to identify important information to guide you to information on a related topic:



Serious Warning! Neglecting the hints indicated by this symbol may result in severe program errors or even damage to your hardware.



Warning. Neglecting the hints indicated by this symbol may result in DASyLab not operating properly; data may be misinterpreted or not calculated correctly. This symbol will remind you to check that parameters are set correctly, or to check settings that must match.



When you have read a passage about a subject, this symbol may indicate that explanations on a related subject can be obtained elsewhere in this User Guide, or that similar commands, options, etc. might be of interest in the current context.

3. What is DASYLab?

Data Acquisition and Analysis under Windows

DASYLab is a data acquisition, process control, and analysis system which takes full advantage of the features and the graphical interface provided by Microsoft® Windows™.

The most important design requirements for DASYLab were the integration of the important measuring and control devices on the market, a truly intuitive operating environment which offers extensive help functions, a maximum signal processing speed, and the most effective graphical display of results.

Intuitive Operation

Using DASYLab, a measuring, process control, or simulation task can be set up directly on your screen by selecting and connecting modular elements that can then be freely arranged. Even highly specialized tasks can be solved immediately on the screen, interactively and without difficulty. It is no longer necessary to find your way through lengthy and rigid menu structures.

Large Variety of Measuring, Control, and Analysis Functions

Among the module functions provided are A/D and D/A converters, Pre/Post and Start/Stop Triggers, digital I/O, mathematical functions from fundamental arithmetic to integral and differential calculus, statistics, digital filters of several types, frequency analysis including various evaluation windows, signal generators for simulation purposes, scopes for the graphic display of results, logical connectors like AND, OR, NOR, etc., counters, a chart recorder, file I/O, timer, digital display, bar graph, analog meter and more.

Measuring Technology under Windows

With DASYLab it is now possible to achieve high signal input/output rates using the full power of the PC. Special buffers with large, selectable, memory address ranges enable continuous data transfer from the data acquisition device through to the software. DASYLab uses extremely sophisticated drivers to obtain real-time logging at a rate of up to 800 kHz and real-time on-screen signal display at a rate of up to 70 kHz (depending on the type of data acquisition device and graphics board installed).

Flexible Worksheet Setup

In spite of its complexity and high performance, DASYLab can be used easily. The worksheet displayed on screen can be edited at any time. New modules can be inserted; others can be moved to a different position or deleted altogether. Dialog boxes prompt for all the necessary parameters to be set for an experiment.

Use the **Black Box** module to take combinations of worksheet elements repeatedly required in your experiments, and integrate them into a **Black Box** module,

which you can then insert into worksheets as ready-to-use units. This will save you time and simplify your worksheets.

Integrated Autorouter Utility

While you are connecting the module inputs and outputs using the mouse, these connections are displayed as direct lines, but as soon as the mouse button is released the integrated Autorouter optimizes all these connections. This prevents data channel lines being drawn through or behind existing module symbols or too close to other lines.

In the same way, the integrated Autorouter rearranges the display whenever a module symbol has been moved. It thus creates a readable worksheet diagram ready for documentation purposes.

Ample Resources

The maximum worksheet size is 2000 by 2000 pixels, and a worksheet can contain up to 256 modules. For most modules up to 16 inputs and/or outputs can be configured.

The virtual working area at the user's disposal is much larger than what can actually be presented in the active window on screen. When dealing with more extensive applications, where the complete arrangement of module symbols will not fit on the screen, you can scroll through the screen window vertically and horizontally. In addition, an overview command, several tagging functions, and the ability to hide the worksheet diagram help you to keep track of the setup and experiment.

Function Bar and Module Bar

Icon bars that provide commands and functions that might be repeatedly required when experiments are set up and carried out enhance DASYLab's user-friendliness considerably.

You can define the Module Bar on the left of the screen to reflect your preferences. You can assign module functions that you need most often in your individual tasks to the buttons on the Module Bar. Once configured, these settings can be saved and reused for other worksheets or experiments. Various configurations adapted to the individual requirements of different tasks are easily reused.

Display of Results

Readings can be displayed graphically or numerically using specially assigned modules. This can be done effectively by making use of scope modules. Each one provides a resizable window in which data from several channels can be displayed; a system of suitable coordinates (linear, logarithmic, polar, waterfall), and different color codes (for multiple signals) can be selected.

Scaleable analog instruments, bar graphs and LED indicators are especially helpful when it comes to process control and testing. As these elements can be freely

placed and combined, all the instruments necessary for any process can be integrated completely.

Storing the Setup

The complete experiment setup, including all the currently selected parameters, window positions, and additional information can be saved to a file and opened again later. Multiple ready-to-use standard setups for different tasks can be developed. The corresponding data acquisition process itself can even be started automatically at a specified time, when your computer restarts or when Windows starts.

Storing Data and Data Exchange

The acquired data and process results can also be saved to files so that they can be retrieved for further processing at a later time. They can be analyzed in detail, or used for simulation and training.

Use DDE (Dynamic Data Exchange) to transfer data directly to other Windows applications supporting the DDE protocol. For example: Excel and applications with DDE capabilities may be used to start DASYLab and control it while running an experiment.

Process Control Applications

External systems can be controlled by employing appropriate modules for digital I/O or D/A conversion. DASYLab provides a wide range of powerful modules for binary operations (AND / OR / NOT etc.), counters, and PID control functions.

Precise time-related process control operations depending on complex signals can be realized with DASYLab. Output frequencies, slopes, duration, dependencies on certain input source conditions, etc., can be determined for several channels by the user.

Simulation – for Testing and Training Purposes

Pure simulations, even without a data acquisition device, offer excellent opportunities to test measuring or process control experiments that have been developed on the PC. In these cases, a signal generator module, or several of them, is substituted for the measuring device. By combining signal generator modules with mathematical modules, complex stimuli can be generated. For example, a sine or rectangle signal might be overlaid by a noise signal or by further sine, rectangle, or saw tooth signals. Even signals that have previously been saved to files may be retrieved and used again as stimuli using the file I/O module.

You can use DASYLab in training courses, as trainees can directly observe the effects and results of data acquisition and process control systems.

Publication

All the resources provided by Windows are at your disposal for publication purposes. Not only the measured results, but also the entire experiment setup can be published comprehensively and professionally. DASYLab can supply the worksheet diagram itself, or the graphic display of the measuring results, directly to Windows WordPad, Microsoft Word, or PageMaker. DASYLab provides integrated publishing tools to print the worksheet, graphic or numerical data displays, captions and explanatory text passages.

Custom Functions

As a service to customers who have to cope with highly specialized tasks, MeasX will develop custom function modules and other software modifications on request to meet individual demands. For instance, specified mathematical operations or options concerning the graphic presentation can be implemented or modified as required, and further data exchange interfaces can also be supplied.

An Extensions Tool Kit is available for experienced C programmers who wish to design their own modules. Contact your dealer for more information.

Integrated Help System

In most situations, it is not necessary to refer to the complete manual, since almost any problem can be solved using the online help system.

The context-sensitive help system provides the user with detailed instruction on hardware settings and software options, and it also supplies background information on measuring technology topics like FFT/spectral analysis.

Conclusions

In combination with one of the established PC measuring and process control devices, the DASYLab system is a powerful tool for data acquisition, process control and simulation.

4. Installation

4.1. System Requirements

DASYLab works with most personal computers available today. The minimum software and hardware requirements your PC needs to run DASYLab successfully are listed below. To get the best performance from the software, especially when more than one Windows applications is to be run, we recommend additional hardware resources.

Minimum Requirements

- A personal computer with a Pentium class processor, a standard keyboard, a mouse or similar pointing device
- 128 MB for NT/2000/XP
- 40 MB of free hard disk space
- CD-ROM Drive for installation
- A monitor and a VGA display adapter, 1024 x 768 resolution
- Windows 2000 or Windows XP Pro
 - Windows 3.x, Windows 95, Windows ME, and Windows XP Home are *not* supported by this version of the software
 - Windows 98 and Windows NT V4 have not been tested for this release

Recommended Configuration

- Pentium 4 class or better PC
- Additional memory (RAM) (the amount of memory determines the display capability of the Chart Recorder and Y/t Chart modules)
- Hard drive space to install optional components, such as DataSockets
- High resolution color monitor
- Super VGA display adapter supported by Windows
- Software, keyboard, mouse, hard disk, CD-ROM drive, and interfaces as described above
- Serial interface (RS232)

All printers and plotters supported by Windows can be used with DASYLab. No data acquisition hardware is *required* to run DASYLab. To acquire input or output analog signals one of the A/D or D/A devices that are supported by DASYLab must be installed. Please refer to the Hardware Installation Manual or the online help for details about the installation of your hardware.

Note that DASYLab does not support multiple monitors. Your application may work, but we cannot provide support for a multiple monitor environment. See the Readme.rtf file for updates to this limitation.

4.2. Setting up DASyLab

Preparations

1. Make sure that your DASyLab package is complete. It should contain a CD-ROM disk and your DASyLab serial number. It may contain one or more printed books. The books are also included on the CD and are available for download from www.dasylab.net.
2. Review the Software license. Note that DASyLab is licensed for use on a single computer, unless you have specifically purchased a multiple user license.
3. Make sure that there is at least 40 MB of free space on the hard disk where you are installing DASyLab. In addition, you may need space on the hard drive where your TEMP folder is located to decompress files while installing.
4. You must be running Windows. DASyLab will not install from the DOS prompt.

Starting the CD-ROM Installation

1. Insert the CD-ROM disk into your drive.
 - 1a. If your system supports Autostart, the CD menu will appear.
 - 1b. If your system does not support Autostart, run START.EXE
2. Choose your language, English (Continue) or German.
3. The CD menu will offer you several choices. In addition to installation, you can review the product specifications, view a short tutorial, or run the demo version of the program.
4. Select Installation
5. Choose the version of the software to install (full)
6. Select Install to run Setup.

Setup Summary

The installation program will ...

- ... Give you the choice of standard or custom install. If reinstalling, you will be able to modify, repair, or remove the software. For most customers, the standard installation is appropriate. Custom install gives you the ability to add or remove standard components, such as optional drivers.
- ... Ask for the serial number which was provided for a new or upgraded installation (use your current number to re-install)
- ... Give you the opportunity to specify the directory and other installation options
- ... **Allow you to specify the data acquisition driver(s) to install.**
- ... Check if the specified directory exists, and create it if necessary.
- ... Check if there is enough free space on your hard disk. If not, you will be asked to enter another drive or to cancel setup.

- ... Copy all the DASYLab program files to the drive and directory.
- ... Create a DASYLab program group in the Windows Program Manager. If the group already exists, it will be opened.
- ... Create various program items within that group.
- ... Load kernel mode drivers (*.KMD) for Windows 2000/XP.
- ... Add appropriate items to the Windows Registry
- ... Optionally, install DataSocket Client and Server software
- ... Allow you to register online. Registration is important, and allows you to contact Technical Support for assistance.

Completing Setup

If your data acquisition device does **not** require a kernel mode driver, you can exit the installation procedure and use DASYLab immediately.

If you have installed a DASYLab version that includes a kernel mode driver, Windows may need to be restarted so that the changes made to your system can take effect.

If you choose **Exit Installation** to use your original Windows configuration, DASYLab is ready to be used, but can only access any newly installed device drivers (if required) after you exit Windows and restart it. If you choose **Restart Windows**, the program will exit Windows completely and restart it.



With some data acquisition devices it may be necessary to modify the configuration of Windows. Please refer to the documentation that comes with your hardware, or to the Software Installation section pertaining to your hardware in the Hardware Installation Manual.

4.3. Hints for PC Hardware Configuration

PC's used for data acquisition systems must fulfill other requirements than computers used as **office systems** or **for games**.

This means there are different considerations when installing a measurement system. The following hints will help if your PC hardware has hardware problems. Often these problems are related to the following components or functions:

- **Power Management**

The Power Management System of some PCs often obstructs the measurement. Please completely disable the Power Management option in the PC BIOS. You may also have to disable the "Support of Advanced Power Management" in System/Device Manager/Hardware Components. Even the Windows Screen Saver should be disabled, as it may interrupt data acquisition processes.

PCMCIA / PC-Card and USB based devices may have additional power management settings. Disable all applicable power management to prevent Windows from stopping your devices while running.

- **Windows Time Zone Settings**

Please disable the Time Zone property "Automatically adjust clock for daylight savings changes" in the Window's Date/Time Properties. If DASyLab is running when the operating system changes the clock time, it pauses until the user clicks on the Dialog Box to acknowledge the change. In addition DASyLab will not have the correct start time for the Experiment. DASyLab only checks the PC clock time at experiment start.
- **Graphic Card Drivers**

New drivers from some Graphics Card manufacturers are often optimized for maximum speed (e.g. to reach high performance in PC games). The driver overrides and obstructs the measurement running in the background. When in doubt, do not use the driver of the card manufacturer but use the original Standard VGA or SuperVGA driver shipped with Windows by Microsoft. Sometimes, there is a newer driver available from your graphics card manufacturer that fixes problems. Please check with your manufacturer for the latest drivers.
- **Printers**

Several printer drivers may disturb the data acquisition. If you experience any problems, use a printer that is supported by the original Standard Printer Driver of Microsoft. Often these standard drivers support a complete family of drivers. For example, you can control the HP LaserJet family with the 'HP LaserJet Series II' driver from Microsoft.
- **Resource Conflicts**

Please pay attention to resource conflicts between the hardware components of your PC. Often the data acquisition hardware uses the same IRQ or DMA addresses as Sound Cards, Network adapters and other devices. In case of doubt, remove the Sound Card from your system or, if it is fixed in a notebook, disable it in the BIOS. Simply removing the driver (!) in Windows 98 will not solve the problem.

5. DASyLab Versions

DASyLab V8.0 is available in several versions. The table below lists the features available with each version. Please contact your dealer or distributor for more information about DASyLab.



This User Guide includes information about optional features. To determine which version you have, select About DASyLab from the Help Menu and click on the Options button



Optional features may vary by country. Check with your dealer or distributor for details.

The DASyLab **Limited, LE or Lite** version provides only the most basic functions of DASyLab and is limited to up to 32 Analog Input channels (1 main

board, 1 extension or expansion board) and a maximum of 64 data channels. One VITool Layout Window is allowed. Add-On modules and optional features, such as the Sequence Generator and the Microstar DAP Power DLL are not available with this version.

The DASYLab **Basic** version has all of the properties of the Full version, and includes a full set of modules for data acquisition and processing, although some modules or groups of modules are not available. One VITool Layout Window is allowed. The Analysis Toolkit and optional features, such as the Sequence Generator are not available with this version. The Driver and Extension toolkits are supported.

The DASYLab **Full** version gives you all functionality of this easy to use software and adds the Control Sequencer, Signal Analysis Modules and Action/Event based modules that enhance program control. The full VITool is included, with 200 Layout Windows. It can be supplemented with all available options, the Analysis Toolkit and hardware. Check with your dealer or distributor if you have any questions.

The DASYLab-Net option adds the Net Input and Output modules to the DASYLab+ **Full** version. The Analysis Toolkit option adds specialty features for advanced FFT signal analysis (Transfer Function, Octave Analysis, nth Harmonic), statistical modules for fatigue analysis and classification, and the Set-point/Sequence Generator.

DASYLab 16- and 32-bit Version Differences

This version of the software is only available as a 32-bit product. DASYLab 32-bit version takes advantage of the features available with Windows 32-bit operating systems: Windows 98, Windows NT/2000 and Windows XP Pro. It provides some functions that aren't supported by the 16-bit version. The 32-bit version will not run under Windows 3.1 or 3.11, even if Win32s is loaded. Due to problems with some drivers, Windows 95, Windows ME and Windows XP Home are not supported. Windows 98 and Windows NT V4 were NOT tested with this release.

To convert 16-bit program worksheets to V8.0, you must use DASYLab V5.0 16-bit to save the worksheet as worksheet ASCII format, *.DSA. You can read this format with DASYLab V8.0. You will need to copy both the *.DSA and the *.DMX files if you need to move them from their original folder. You can contact your distributor to obtain a V5.0 serial number to allow you to install the older version.

The chart below shows which modules are provided with each version.

Group	Module	LE	Basic	Full	Pro
Input/Output	Analog Input	✓	✓	✓	✓
	Analog Input Multispeed	✓	✓	✓	✓
	Analog Output	✓	✓	✓	✓
	Analog Output Multispeed	✓	✓	✓	✓
	Digital Input	✓	✓	✓	✓
	Digital Input Multispeed	✓	✓	✓	✓
	Digital Output	✓	✓	✓	✓
	Digital Output Multispeed	✓	✓	✓	✓
	Counter Input	✓	✓	✓	✓
	Frequency Output	✓	✓	✓	✓
	RS232 Input	✓	✓	✓	✓
	RS232 Output	×	✓	✓	✓
	ICOMS Input	✓	✓	✓	✓
	ICOMS Output	×	✓	✓	✓
	IEEE488 Input	×	✓	✓	✓
	IEEE488 Output	×	✓	✓	✓
	DDE Input	✓	✓	✓	✓
	DDE Output	✓	✓	✓	✓
	IVI Devices	×	✓	✓	✓
	MODBUS Devices	✓	✓	✓	✓
Trigger	Combi Trigger	×	✓	✓	✓
	Pre/Post Triggering	✓	✓	✓	✓
	Start/Stop Triggering	×	✓	✓	✓
	Trigger on Demand	×	✓	✓	✓
	Sample Trigger	×	✓	✓	✓
	Relay	×	✓	✓	✓
Mathematics	Formula Interpreter	×	✓	✓	✓
	Arithmetic	✓	✓	✓	✓
	Comparator	×	✓	✓	✓
	Trigonometry	×	✓	✓	✓
	Scaling	✓	✓	✓	✓
	Different/Integration	×	✓	✓	✓
	Logical Operations	×	✓	✓	✓
	Slope Limitation	×	✓	✓	✓
	Bit Logic	×	✓	✓	✓
	Gray Code	×	✓	✓	✓
	Flip-Flop	×	✓	✓	✓
Reference Curve	×	✓	✓	✓	
Statistics	Statistical Values	×	✓	✓	✓
	Position In Signal	×	✓	✓	✓
	Histogram	×	✓	✓	✓
	Regression	×	✓	✓	✓
	Rainflow	×	×	☆	✓
	Two Channel Counting	×	×	☆	✓
	Counter	×	✓	✓	✓
	Minimum/Maximum	×	✓	✓	✓
	Pulse Width Analysis	×	✓	✓	✓
Check Refer. Curve	×	✓	✓	✓	
Signal Analysis	Filter	×	×	✓	✓
	Correlation	×	×	✓	✓
	Data Window	×	×	✓	✓
	FFT	×	×	✓	✓
	Polar/Cartesian	×	×	✓	✓
	Electric Characteristics	×	×	✓	✓
	Harmonic Distortion	×	×	✓	✓
	Period Check	×	×	✓	✓
	FFT Filter	×	×	☆	✓
	FFT Max	×	×	☆	✓
	Octave Analysis	×	×	☆	✓
	Nth Harmonic	×	×	☆	✓

Group	Module	LE	Basic	Full	Pro
Control	Generator	✓	✓	✓	✓
	Stop	×	✓	✓	✓
	Switch	×	✓	✓	✓
	Coded Switch	×	✓	✓	✓
	Slider	×	✓	✓	✓
	PID Control	×	✓	✓	✓
	Two-Point Control	×	✓	✓	✓
	Time Delay	×	✓	✓	✓
	TTL Pulse Generator	×	✓	✓	✓
	Latch	×	✓	✓	✓
	Block Time Info	×	✓	✓	✓
	Global Variable Read	✓	✓	✓	✓
	Global Variable Write	✓	✓	✓	✓
	Sequence Generator	×	×	☆	✓
Display	Y/t Chart	✓	✓	✓	✓
	X/Y Chart	×	✓	✓	✓
	Polar Plot	×	✓	✓	✓
	Chart Recorder	✓	✓	✓	✓
	Analog Meter	✓	✓	✓	✓
	Digital Meter	✓	✓	✓	✓
	Bar Graph	✓	✓	✓	✓
	Status Lamp	✓	✓	✓	✓
	List Display	✓	✓	✓	✓
Files	Read Data	✓	✓	✓	✓
	Write Data	✓	✓	✓	✓
	Backup Data	×	×	✓	✓
	ODBC In	×	×	✓	✓
ODBC Out	×	×	✓	✓	
Data Reduction	Average	✓	✓	✓	✓
	Block Average	✓	✓	✓	✓
	Separate	×	✓	✓	✓
	Merge/Expand	×	✓	✓	✓
	Shift Register	×	✓	✓	✓
	Cut Out	×	✓	✓	✓
	Time Slice	×	✓	✓	✓
	Circular Buffer	×	×	✓	✓
	Network	Net In	×	×	☆
Net Out		×	×	☆	✓
Message In		×	×	✓	✓
Message Out		×	×	☆	✓
DataSocket In		×	✓	✓	✓
DataSocket Out	×	✓	✓	✓	
Special	Black Box	×	✓	✓	✓
	Ex/Import Black Box	×	✓	✓	✓
	Event Driven Actions	×	×	✓	✓
	Message	×	×	✓	✓
	Send E-Mail	×	×	✓	✓
	Time Base	×	✓	✓	✓
Add-On 1 (Option)	Signal Adaptation	×	✓	✓	✓
	Transfer Function	×	×	☆	✓
	Convolution	×	×	☆	✓
	Block Weighting	×	×	☆	✓
	Universal Filter	×	×	☆	✓
	Save Universal File	×	×	☆	✓
Program	Control Sequencer	×	×	✓	✓
	VITool Layout Windows	1	1	200	200

☆ - Signal Analysis Toolkit Option
 ☆ - Network Version only

6. New in DASYLab Version 8.0

Below, you will find an overview of the most important additions and changes for the current DASYLab Version. Please also read the README file for additional changes made after this book was printed.

6.1. Getting Started Tutorial

The Getting Started Tutorial supports new DASYLab users with useful tips and examples for creating typical worksheets. You can open demonstration worksheets in a second DASYLab session and test them in parallel to the user's own worksheet.

Extended Getting Started

The Getting Started section of the Help contains a new QuickStart chapter that shows beginners step-by-step procedures for basic functions of DASYLab and provides an easy-to-use tutorial for the creation of your first worksheets. Concrete tasks of worksheets are explained in each single step. Each worksheet developed in the different chapters is available as a Getting Started worksheet and allows you to easily verify whether the worksheet you created with this tutorial is correct.

6.2. General

User defined Function Buttons

All four DASYLab Main Views provide 8 User Defined Function Buttons that can be defined to execute any of the functions and commands available in DASYLab.

Overview of Global Variables and Strings

A new command in the Options menu opens an overview of all global Variables and Strings. Each item lists information about global Variables and Strings, including where they are used, how they are used, and the current value and settings. Possible conflicts in usage are marked.

Module Defaults

The settings of modules on the workarea can be stored as the module default for that type of module. Right-click over the module to open the context menu and choose the Default Module Options command. Each time a module of that type is inserted on the worksheet, it will be configured based on the saved settings.

User defined Hot-Keys

New option menu command allows you to define and assign key combinations to any available DASYLab menu function.

Simply use the key (combination) to call up the assigned menu function.

Activation of Channels






The method for activating and deactivating channels has changed. You can now quickly enable and disable multiple channels for all types of modules.

Extended Tooltip Functions

Move the mouse over the modules symbol to get information about modules name and short description shown as Tool-Tip flag.

6.3. New Modules

See the Module Reference Guide for details of each new module.

	Module	Module Group
	Polar Plot Module	Display
	CAN Logger	CAN Hardware (see the CAN Hardware Help)
	Multi-Speed Analog Output	Input/Output (only available for selected drivers) See the Help for the Multispeed Driver that you install
	Multi-Speed Digital Input	
	Multi-Speed Digital Output	

6.4. Module Changes

Action Module

New Event: Input = Value.

New Action: Copy Layout as Bitmap into Clipboard allows you to create Bitmap Snapshots of VITool layout pages while DASYLab is running. The Bitmap is stored to the clipboard. The moment of capture is controlled by an event driven action.

Message Module

Messages created by the Message Module now are displayed in the Layout using the fast drawing mode.

Regression Module

The coefficients of the polynomial can be stored in global variables.

The module now supports exponential curve fitting. If the Exponential Fit option is active the exponential polynomial is calculated ($\exp(a + b x + c x^2 + \dots)$) not the standard polynomial ($a + b x + c x^2 + d x^3 + \dots$).

ICom/IEEE Modules

Motorola Float and Double Format are available.

Chapter 2

Getting Started

Chapter 2: Getting Started

1. Basic Techniques

Chapters 2 and 3 are designed to give you a quick first look at the program and to let you start experimenting with it.

This chapter discusses the following subjects:

- How to start DASYLab.
- How to obtain online help while working with DASYLab.
- How to create your first worksheet and become familiar with DASYLab's basic functions.

You should be familiar with the basic techniques needed to operate your PC, DOS commands (such as those concerning drives, directory changes and file management), mouse operations and Windows fundamentals (like using menus or window features, etc.).



If you require additional information, please refer to your Windows User's Guide and the documentation that comes with the corresponding software and devices. The online tutorial supplied with Windows helps you to learn basic mouse techniques.

DASYLab uses features common to most Windows applications:

- A menu structure with pull-down lists
- Scroll within windows using vertical and horizontal scroll bars on the right and the lower window borders
- Drag elements across the working area by selecting the element and moving the mouse with the **left** mouse **button** pressed
- Drag groups of modules by selecting the group using the **left** mouse button to click and drag a selection box. Then **left** click on the selected area and drag it to the desired location.
- Dialog boxes provide option buttons, list boxes and text boxes to select options and to enter parameters

Right Mouse Button Functions in the Worksheet Window



*The **right** mouse **button** has multiple functions within DASYLab, which are explained here and in Chapter 3.*

When the mouse cursor is on a module in the worksheet, you can display a context-sensitive pop up menu by pressing the **right** mouse button. The following menu items are displayed:

- Delete Module
- Delete Input Channels (if module has any input channels connected)
- Delete Output Channels (if module has any output channels connected)

- Cut (if module is selected)
- Copy (if module is selected)
- Replace Module
- Search for Module
- Default Module Options
- Module Documentation (extended description of selected module)
- Properties (Module dialog box for selected module)
- If the mouse cursor is over a free area of the worksheet (the worksheet background), the pop up menu has the following entries:
 - Colors
 - Paste (insert previously copied or cut worksheet components at the position of pointer)
 - Properties (general worksheet settings)

To select the window mode:

- Control Sequencer
- Display
- Worksheet
- Layout

Worksheet Documentation Tool:

- \surd Edit Documentation (enables the documentation tool)
- Create Documentation
- Delete Documentation
- Documentation Properties

Delete a Data Channel - Two separate clicks (not a double-click!) with the **right** mouse button on the connection line between a module output and another module's input deletes that data channel

Right Mouse Button Functions in the Control Sequencer

Click with the right mouse button on the background to open the popup context menu to switch to the other window modes (Worksheet, Layout, Display).

Right click on a flowchart junction to open a menu with the commands:

- New (Flowchart or Action)
- Comment Flowchart
- Set Start Flowchart (The start flowchart is marked by an added "start")
- Load Flowchart
- Delete Flowchart (with an additional security request)

For Action junctions the commands below are available:

- New Action)

- Edit Action
- Delete Action

Right Mouse Button Functions in the VITool Layout Window

If the mouse cursor is on an object in a VITool Layout Window, you can display a context-sensitive pop up menu with the following items:

- Cut
- Copy
- Delete
- Up
- To Front
- Down
- To Background Properties (Graphic Object)

If the mouse cursor is on a free area of the Layout Window, the pop up menu has the following entries:

- Paste
- Object (to insert a new object)
- Zoom
- Full Screen
- Delete Layout page
- Switch to...
 - Worksheet
 - Displays
 - Control Sequencer
- Global Layout Properties
- Page Layout Properties

Right Mouse Button Functions in the Display Window

Display Windows: If the mouse cursor is on a display window, the pop up provides the window menu options (useful if the Menu Bar is hidden)..

Right Mouse Functions if the pointer is on Module, Function or Status Bar

- Module, Function or Status Bar (32-bit Version only): You can use the **right** mouse button to activate or deactivate the Module, Function or Status Bar. Activated bars are marked with a checkmark. The Module Bar display can be defined by user (number of rows/columns).
- Configure the Module Bar - Click on a Module Bar icon with the **right** mouse button to assign any of the modules available in DASYLab to that button

- You can change the relative size of the Module Bar by choosing from the selection of settings for the configuration of the Module Bar (1x40, 2x20, 4x10, etc.).

Configuring Hardware Module Input/Output Channels

Double-click the icon of an active channel on the Channel Selection Bar with the **right** mouse button to deactivate that channel.

2. Starting DASyLab

2.1. Starting DASyLab with a New Worksheet

From the Windows Start Menu

Click on the Windows Start button. Select Programs, then the DASyLab program group. Select the DASyLab icon from that group to start the program.

From the Windows Program Manager

Double-click the DASyLab Icon displayed in the DASyLab program group of the Windows Program Manager. When you installed DASyLab on your hard disk, a new program group (“DASyLab”) was automatically created.

2.2. Starting DASyLab with an existing Worksheet

From the Windows Program Manager

- If you prefer to keep a program startup option without a worksheet, first copy the DASyLab icon. Select the icon, and press the **F8** function key, or choose Copy from the File menu.
- Select either of the two icons (one mouse click), and press the **ALT+ENTER** keys or choose Properties from the File menu.
- Type the complete worksheet file name (including drive, directory, and extension) after the DASyLab command in the Command Line box. For example:

```
"C:\Program Files\DASYLAB 5.6\DASYLAB.EXE" D:\TESTS\TEST1.DSB
```
- In the Description box, type a description that identifies the worksheet that will be loaded onto the work area.
- Press **ENTER**
- Use this method to set up several icons to automatically open various worksheets.



You will find additional information on Automatic Program Start options in Chapter 6 of this User Guide.

3. Experiment Setup and Time Bases

General parameters for data acquisition and measurement control are set in the Experiment Setup dialog. You can set the

- Global Sampling rate per channel
- Global block size
- Global settings for Analog Output and Digital Output
- Global clocking for the driver
- Disk Streaming options
- Driver specific settings, including driver buffer, acquisition mode, etc.

See Chapter 4: 1.4.9, Experiment Setup... on page 4-24 for more details.

In addition to the Global Sampling Rate, DASYLab supports special drivers that may also be able to generate their own clock. The NI-DAQ driver for National Instruments devices is one such special driver.

The Time Base Setup, in the Experiment Menu, allows you to review each of the available time bases, and to configure them in one place. Various modules which can generate data, such as the Switch or Slider Modules, have a user settable option to choose the time base, allowing you to synchronize the output with hardware generated data.

4. Documenting your Worksheet

In addition to the module name and short description you can add an extended description to each module inserted on a flowchart. You can also create documentation frames that are permanently shown on the worksheet background, behind or around one or more modules or just in an empty area.

Modules Documentation

The popup context menu, opened by right clicking the mouse over a module shows the **Module Documentation** choice. Select this command to create a description with up to 256 characters.

Flowchart Documentation

In addition to the module documentation, you can insert information to the flowchart in text boxes, which are shown permanently on the background of the worksheet. A right mouse click on an empty area of the worksheet background opens the popup context menu that offers several commands to **Edit**, **Create** and **Delete** documentation frames where you can enter up to 256 text characters to be displayed. The **Edit Documentation** command activates (✓) the documentation function. The **Properties** command enables you to modify the look of the frame (background, font and frame colors) and provides an edit area to insert any text up to 256 characters. You can choose any available font to apply to all

of the characters. Use the left mouse click to move (“catch” the upper left corner) or resize (“catch” the lower right corner) the boxes.

A maximum number of 256 frames may be placed on each worksheet.



This new feature allows you to structure your flowchart with colored frames. Put modules of the same functional group into boxes with the same color (see the online help for a colored example).

5. Context Menus

Right Mouse Click on Module

If the pointer is over a module on the worksheet, you can display a popup menu by clicking the right mouse button. The following menu items are displayed:

- Delete Module
- Delete Input Channels (depending on position of pointer)
- Delete Output Channels (depending on position of pointer)
- Replace
- Cut
- Copy
- Delete
- Search for Module
- Default Module Options
- Module Documentation (Description of the module)
- Properties (Dialog box for the module beneath the mouse pointer)

Context Menu: Right Mouse Click on Worksheet Background

If the pointer is on a free area of the worksheet, the popup menu has the following entries:

- Modules→ (display a list of the modules in the Module Menu)
- Colors→ (change colors for background, wires or grid)
- Paste (Insert components of worksheet at the position of the mouse pointer)
- Search for Module
(to select the window mode)
- Control Sequencer
- Displays
- Flowchart
- Layout
(Worksheet Documentation Tool)
- √ Edit Documentation (enables the documentation tool)
- Create Documentation
- Delete Documentation
- Documentation Properties

- Properties (general worksheet settings)

6. Using the DASYLab Help System



Click on this Button to call up the DASYLab Online Help or choose Help from the Main Menu and select Index or one of the other available options.

You can usually obtain information on the function you are currently using by pressing the F1 function key or by clicking the **Help** button found in many dialog boxes. Then, either specific information on the current function, command or dialog box, or the **Help Index** will be displayed.



You can obtain information on how to use the Windows Help system itself by pressing the F1 function key while using a Help window or by choosing Using Help from the Help menu.

7. Creating your First DASYLab Worksheet

Follow this tutorial to create a simple worksheet and to learn about the basic elements and functions of DASYLab. Also see the Online Help and the new Getting Started Tutorial for interactive examples.

To start the program, double-click the DASYLab icon in the DASYLab Program Group of the Windows Program Manager.

The DASYLab screen will appear, displaying the Title Bar and the Main Menu Bar, the Function Bar below them, and the Module Bar on the left of the window. (These elements of the DASYLab screen are described in Chapter 3.)

Press the F1 function key (or the **Help** button while working in a dialog box) to obtain online help. If you prefer to follow these instructions on screen, press F1 now, and choose **Creating your First Worksheet** from the **Help Index** page.

On the left hand side of the DASYLab screen you can see the Module Bar. It displays a selection of icons that represent modules frequently required in worksheets.



Place the mouse pointer on this Module Bar icon. It represents a Generator module. Click the icon with the left mouse button. The name of the module the mouse pointer is pointing at is displayed in a small window above the module icons.



In the same way, choose the Y/t Chart module by clicking its icon on the Module Bar with the left mouse button. You have now integrated these two modules into your worksheet; their symbols appear in the work area.

Any module can be installed either by clicking the corresponding icon on the Module Bar, or by choosing it from the **Modules** menu. While the Module Bar can only offer a limited selection of icons, the **Modules** menu provides the complete list of available modules.

When you install a module from the Display group of the Modules menu (for example, a Y/t Chart module), an additional icon will appear at the bottom of the screen.

The two modules in the worksheet must now be connected by data channels so that data can be transferred between them.

To connect them, simply move the mouse pointer to the Y/t Chart module symbol, press the **left** mouse button, and drag the module symbol to the Generator module symbol (keeping the mouse button pressed down) until the output (O) and input (I) symbols touch. When you release the mouse button, DASyLab will automatically connect the two modules and route the wires.

You can also connect two modules without moving the module symbols – you'll do that in a few minutes.

The data channel is now complete; the output of the first module is connected to the input of the second. The experiment can begin.

At the top of the DASyLab screen, below the Main Menu Bar, you can see the Function Bar. It contains icons that provide easy access to frequently used functions. When the mouse pointer is pointing at a Function Bar icon, a QuickInfo tag with the name of that function will appear. Just click the icon representing that function.



Use the **left** mouse button to click this icon on the Function Bar – the first one on the left or press **F5**. This will **start** the experiment, and soon the Generator module will generate a signal.

The signals and results of measuring processes can be displayed graphically using modules from the Display group. They consist of two elements each: the worksheet symbol, which is integrated into the worksheet and connected to the other modules by data channels, and the Display Window, which initially appears minimized as an icon at the bottom of the computer screen, and which you must separately restore (or “open”) to see the display during an experiment.



Open the Y/t Chart Display Window using the **left** mouse button, either by clicking this Function Bar icon (it represents the Show Display Windows command from the View menu) or by double-clicking on the display window icon at the bottom of the desktop.

The Y/t Chart Display Window appears, and you can observe the signal generated by the Generator module as it is shown on the display.

Before you perform the next steps, please drag the Y/t Chart Display Window to a position above this Help window, so that it does not hide any elements of your worksheet. It may be necessary to adjust its height first. You can drag a window by clicking its Title Bar with the **left** mouse button and moving it to its new location with the mouse button pressed down.



By alternately clicking this Function Bar icon with the **left** mouse button you can **pause** the running experiment or **resume** it at the same stage at which you interrupted it. Pressing **CTRL+F6** on your keyboard has the same effect.

Click the **right** mouse button on the Y/t Chart Display Window screen: the Color dialog box appears. Select a new color for the display background by clicking the colors on the palette and pressing OK.



Now **stop** the experiment. You can either click this icon on the Function Bar or press CTRL+F5 on your keyboard.

If you cannot see the Y/t Chart module symbol (in the work area) because it is hidden behind the display window, drag the window to one side or reduce it to an icon by clicking the Minimize button (the down arrow in the upper right-hand corner of the display window).

Use the **right** mouse button to double-click the Y/t Chart module symbol on the worksheet to open a dialog box. Select Delete Module and press OK to delete the Y/t Chart module from your worksheet.



Now add the Bar Graph module to your worksheet by clicking its icon on the Module Bar with the **left** mouse button. The module symbol appears in the work area, and the icon representing the corresponding display window will appear on the lower edge of the desktop.

Connect the input of the Bar Graph module symbol with the output of the Generator module symbol as described above.



Open the Bar Graph display window either by clicking this Function Bar icon or by double-clicking the display window icon at the bottom of the desktop.



Start the experiment again; the Generator signal will appear in the Bar Graph display window.



Stop the experiment,



And click the Module Bar icon representing the Digital Meter module. The module symbol appears on the worksheet next to the Bar Graph module symbol, and the corresponding display window icon appears at the bottom of the desktop.

Move the Digital Meter module symbol around the worksheet by clicking and holding the **left** mouse button while you drag it to various locations. For example, drag it below the Bar Graph module symbol. DASYLab will arrange the blocks evenly according to the grid settings defined in the Window Setup dialog box from the Options menu.

The quickest way to connect the Digital Meter module to the Generator module is to “tap” the existing data channel between the Generator module and the Bar Graph module. To create a branch, use the **left** mouse button to click anywhere on the data channel between the two module symbols. The mouse pointer takes the shape of a hand holding a plug. Place the tip of the plug precisely onto the input symbol (I) of the Digital Meter module symbol, and click the **left** mouse button again. This establishes the connection, and the Autorouter automatically finds the correct path for the new data channel segment.

You can now start, pause, and resume the experiment. Practice changing the color of the display by double-clicking the **Digital Meter** icon at the bottom of the screen, to change the color of the display as described above.

The default signal generated by the **Generator** module is a square wave. Double-click the **Generator** module symbol with the **left** mouse button. You can select various settings in the dialog box to define the signal to be generated. Refer to the Module Reference Guide or press the **F1** function key to obtain information on the parameters.

Click the **Sine** button in the **Wave Form** box, and then click the **OK** button. The **Display** modules will display the selected signal type.



The **Y/t Chart** module can be used now to visualize the sine wave. Since you previously deleted the **Y/t Chart**, click on the **Module Bar** to bring the **Y/t Chart** back onto the worksheet. (If your experiment is still running, you must first stop it before making changes in the experiment setup.)



Create another data channel branch to connect the **Y/t Chart** module symbol, and then start the experiment again.

You should **Save** your first worksheet now, so that you can use it to try out some more of **DASYLab's** options later on.



First, stop the current experiment,



And then click this **Function Bar** icon with the **left** mouse button. It represents the **Save** command from the **File** menu.

A dialog box appears. In it, the **File Name** box displays a list of demo worksheet files that were copied to the **DASYLab** directory during the setup procedure. These files will give you examples of the wide range of measuring and data acquisition tasks that can be solved by **DASYLab**. You can open, run, modify and re-run them all later. Their **File Info** box contains a description of each worksheet.

Type a file name of your choice (using no more than eight characters) in the **File Name** box; for example, type **TUTOR1**. Choose the **OK** button, and your worksheet will be saved as **TUTOR1.DSB** in the **DASYLab** directory. (**DASYLab** automatically adds its standard extension **.DSB**.) The **DASYLab** window **Title Bar** now shows the file name.



To open this (or any other) worksheet file later, click the **File Open** icon on the **Function Bar** with the **left** mouse button. This icon is a shortcut to the **Open** command on the **File** menu.

Congratulations! You have successfully finished the **DASYLab** basic lesson and are now ready to begin working with **DASYLab**!

The next time you have a question or need help, you can

- Read these instructions again
- Find the answers in other chapters of the DASYLab documentation
- Use Online Help. You can obtain Online Help by pressing the F1 function key whenever you need help; or use the **Search** function in the **Help** window

Unless you prefer to continue experimenting with DASYLab, exit the program now by double-clicking the **Control Menu** box in the upper left corner of the DASYLab window, or by pressing **ALT+F4** on your keyboard.

Chapter 3

Creating an Experiment Setup

Chapter 3: Creating an Experiment Setup

This chapter describes DASYLab's basic elements and functions used to set up a data acquisition experiment.

Read these pages at your computer so that you can try out all the functions provided by DASYLab. This chapter can also be used as a reference.

This chapter addresses the following topics:

- The elements of an experiment setup
- The elements of the DASYLab screen and how to use them effectively
- A brief overview of the module groups
- A systematic approach to a data acquisition task to be solved on screen.
- An overview of the VITool Layout windows

1. The Elements of a Worksheet

The worksheet graphically displays the complete experiment setup or measurement procedure, including all the modules and data channels. The maximum size of a worksheet in pixels is 2000 (vertically) by 2000 (horizontally). It is independent of the screen resolution.

1.1. Modules

A module represents a functional element in the DASYLab experiment setup (worksheet). A worksheet can contain up to 256 modules.

The functions symbolized by the modules comprise all the operations required for an experiment:

- Data acquisition (by a data acquisition board) or signal generation (simulated by a software generator)
- Data analysis, evaluation and processing (mathematics, statistics, control, trigger and other functions)
- Presentation on screen (display instruments) or export for documentation purposes (printer, metafile, etc.).

Most modules can be configured with up to 16 inputs and outputs.

A module can be installed on the worksheet by choosing it from the **Module** menu or by clicking the icon on the Module Bar.

You can find detailed information about the **Module** menu functions in Module Reference Guide. The Module Bar is described in detail on page 3-22 in this chapter.

Icons in the Module Bar appear slightly different from the worksheet symbols. Additionally, modules from the **Display** module group have a display window symbol.

Module Bar Icons

On the Module Bar, the modules are represented as simplified icons at a slightly reduced scale. The name of the module selected by the mouse is displayed above the Module Bar.

- Click the Module Bar icon with the **left** mouse button to add that module as a symbol to the worksheet, where it takes the first available free space. The exact position depends on the **Spacing** value entered in the **Window Setup** box of the **Options** menu.
- Click any Module Bar icon with the **right** mouse button to assign any of the available DASyLab modules to that position in the Module Bar (see page 3-22 in this chapter for a complete description of the Module Bar and techniques to customize it.)
- The Module Bar can only display a limited selection of the modules available in DASyLab. The exact size of the Module Bar depends on the screen resolution of your PC. All the available modules can be accessed from the **Module** menu. Please refer to Module Reference Guide of this manual for complete module documentation.

Worksheet Symbols

In the worksheet, modules are represented as complete symbols. These symbols display each module's name and the input and output channels you have selected for it.

- Use the **left** mouse button to double-click on the symbol to open the dialog box to configure the module.
- Use the **right** mouse button to double-click on the symbol to open the dialog box to delete the module from the worksheet or to delete its input or output data channels.
- Click and hold the **left** mouse button to drag and drop the symbol to any position on the worksheet (depending on the **Spacing** value entered in the **Window Setup** box of the **Options** menu).



When positioning modules manually in the worksheet, leave enough space between the module symbols for data channels to be created later. If you try to connect two modules and there is not enough space to arrange the data channels, an error message will appear: "Connection is not possible."

- The modules from the **Display** module group provide an additional display window, which initially appears minimized at the bottom of the screen.

Module Manipulation by Keyboard

The modules on the worksheet can be manipulated in various ways. The module symbols on the worksheet can be dragged about, connected by data channels, configured, or deleted. The last two of these manipulations can also be done using the keyboard.

First, select the module. Only one module in the worksheet can be selected and manipulated at a time. When a module is selected, the Module Name Title Bar is highlighted in an inverse color.

- To select a module, click it once with the **left** mouse button, or press the **TAB** key on your keyboard until that module is selected.
- When you press the **ALT+ENTER** keys, the module configuration dialog box appears. Press the **TAB** or **SHIFT+TAB** keys to move from one field or button to another; select items by pressing the arrow keys, the **SPACE** and **ENTER** key.
- Note: Channel selection can only be done using the mouse.
- To copy setting for the selected channel to the other activated channels, use the **F7/F8** function keys. This procedure can only be done using the keyboard.
- To delete the selected module from the worksheet, or to delete all the input and/or output channels of that module, press the **DEL** key. In the dialog box that then appears, select the desired option, or choose **Cancel**, and press **ENTER**.

1.2. Data Channels, Junction Points

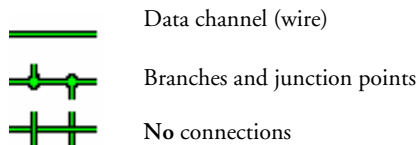
A data channel is the connection between the output of a module and the input of another module. Data is transferred between the respective modules via these connections.

A branch is a data channel segment that branches off from another data channel at a junction point.

Branches allow you to connect the output of one module to the inputs of several other modules.

By creating branches each module output can be connected to up to 16 inputs of other modules.

In the worksheet, lines like these represent data channels, branches and junction points:



You can choose the colors of the wires using the **Colors** command from the **Options** menu. Different colors can be specified for the wire cores and the wire sleeves.

When you connect the modules, the **Options Autorouter** menu function allows the following.

- When the **Autorouter** is active, DASYLab automatically finds the correct paths for the data channels. DASYLab ensures that the data chan-

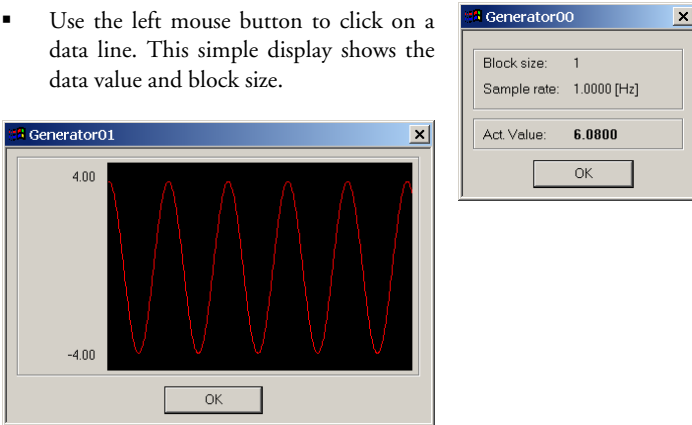
nels do not run across modules or hide other data channels. A control window in the Status Bar displays the progress of the autorouting operation.

- When the Autorouter is not active, you determine the paths of the data channels manually.

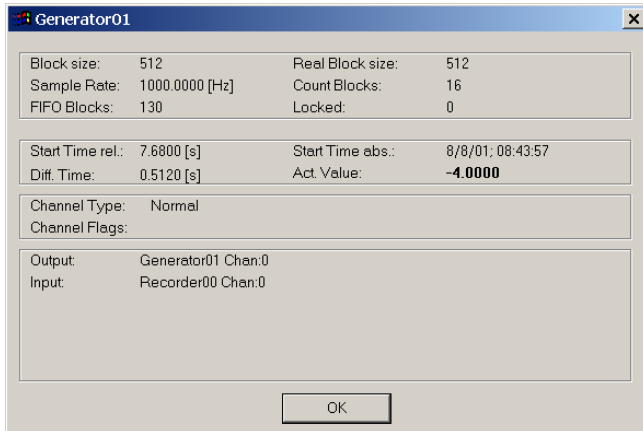
Channel FIFO Status while measurement is running

In addition to the Animation options (View Menu), there are three ways to monitor the flow of data between modules while the measurement is running. This is a useful set of features for ensuring that the worksheet logic is working as designed.

- Use the left mouse button to click on a data line. This simple display shows the data value and block size.



- Press on the **Shift** key and click on the data line with the left mouse button. This auto scaling chart displays all of the data in a block.



- Press the **Control** key and click on the data line with **left** mouse button to display the status of the data channel during measurement.

1.2.1 Creating Data Channels or Branches

The Quick Way

To connect a module, simply drag it against the module to which it is to be connected until the output (O) and input (I) symbols touch. When you release the mouse button, DASYLab will automatically connect the two modules and route the wires (whether the Autorouter option is active or not).

This procedure works with modules with any number of input or output channels, and it is very useful when connecting modules with multiple inputs and outputs.

It works when both modules are configured differently, when different channel numbers have been selected, and when some of their inputs or outputs are already connected to other (i.e., a third) modules.

For example, you can activate four output channels of a **Generator** module, then connect two of them to **Display** modules, and the remaining two to modules from the **Signal Analysis** group.

Once a connection has been established between two modules, no further connections (between the other – still unconnected – outputs and inputs of these two) can be created in this simple way. You must then proceed as described below.

With the Autorouter Option ON

Click the **left** mouse button once at the point where you wish the data channel to begin – the output symbol (O) of a module or – for a branch – any position on the wire. The mouse pointer then changes into a plug symbol.

Then place the **tip** of that plug symbol on the input symbol (I) of another module. Note that the input of the second module must be open. While you do this, a thin black line is drawn from the starting point of the connection.

Click the **left** mouse button again, on the input symbol at the end of the connection, to establish the connection.

- **Undo last Step:** use ALT+BACKSPACE to remove the last connection and restore the worksheet.
- To cancel the process, click the **left** mouse button once anywhere outside the input symbol.

With the Autorouter Option OFF

Click the **left** mouse button once at the point where you want the data channel to begin – the output symbol (O) of a module or – for a branch – any position on any wire. The mouse pointer then changes into a branch symbol.

Draw the new data channel by moving the mouse. While creating each segment, you can lengthen or shorten it only in the vertical or horizontal direction indicated by the branch symbol. You need not move the mouse pointer exactly along the future track of the channel.

Click the **left** mouse button again to freeze the length of the data channel segment you have just created and switch to the other axis (horizontal or vertical) for the next segment.

When the data channel hits a module, you must guide it around it.

When the tip of the new data channel is aligned with the input symbol of the desired module input, click on the input symbol to complete the data channel connection.

- To undo the last segment, click the **right** mouse button once.
- To cancel the process, double-click the **left** mouse button anywhere.
- To **undo** the last data channel connection, use the **ALT+Backspace** key combination.

To Create a Branch

When the output of a module is to supply data to more than one input of a module, simply create a branch. Click the **left** mouse button once anywhere on the data channel where you want the channel to branch off. Create the connection to the module input as described above.

1.2.2 Rearranging Data Channels or Branches

To Rearrange a Data Channel

First delete the data channel by clicking the channel twice with the **right** mouse button, and then create it again on a different track.



Note that the deletion of a data channel segment may delete further segments and/or branches.

To Rearrange A Junction Point On A Data Channel

Use the **left** mouse button to click once at the junction point that you want to move. The mouse pointer then changes into a branch symbol.

Drag the small box that now represents the junction point to its new position on the data channel.

Establish the new position by clicking the **left** mouse button again. All the data channels affected will be automatically rearranged.

Note that you can only drag the junction point **either vertically or horizontally** along a data channel. If you want to move it around a corner you must first drag it right to the corner, click the **left** mouse button, and then move it in the other direction in a second step.

1.2.3 Deleting Data Channels or Segments

The Quick Way

Use two separate **right** mouse button clicks (not a double-click!) on the data channel to be deleted:

- At the first click, the section that is to be deleted will change its color.

- At the second click it will be deleted.

To cancel the process, click anywhere on the screen but on the same section the second time. The data channel will then resume its previous color.

-Or-

Use the **right** mouse button to double-click at the end of the connection (i.e., the input symbol of the second module).

Confirm the deletion in the dialog box that appears, or choose **Cancel**.

If you accidentally double-click the beginning of the connection (i.e., the output symbol of the first module), you will be asked to confirm the deletion of that module (instead of the data channel). Click the **Cancel** button in the dialog box.

To Delete ALL the Input and/or Output Channels of a Module

Use the **right** mouse button to double-click on the module symbol. To use your keyboard, select the module first by repeatedly pressing **TAB** until the module's Title Bar is highlighted, then press **DEL**.

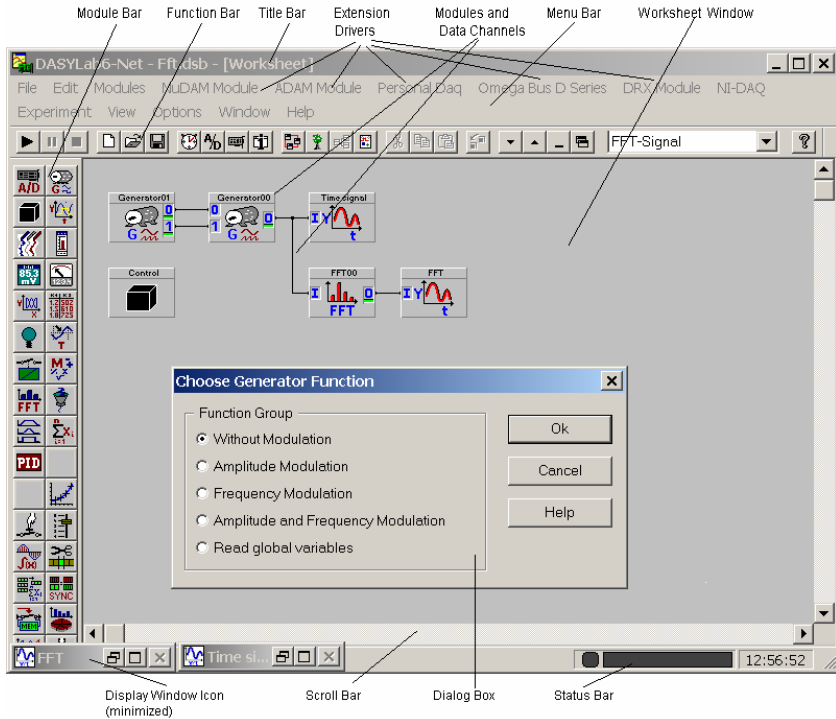
In the dialog box, click the desired option, then choose **OK**, or press **ENTER** on your keyboard.



Please note that any confirmed deletion will always be executed in compliance with the other elements of the worksheet. This means that if, for example, you delete a channel section that divides up into branches in its further course, and all those further branches will be deleted too.

2. The DASyLab Screen

2.1. The Worksheet Window



Work Area: Worksheet Window

The work area is where you create the virtual DASyLab experiment setup (the worksheet). It consists of the module symbols and the data channels connecting them.

You can install modules in the worksheet either by choosing them from the Modules menu or by clicking the corresponding icons on the Module Bar.

Data channels must then connect these modules. Every module input must be connected before you can start the worksheet. You do not have to connect every module output.

A worksheet can contain up to 256 modules. The maximum size of a worksheet in pixels is 2000 (vertically) by 2000 (horizontally) regardless of the screen resolution.

The size of the worksheet segment that is actually displayed in the workspace on your screen depends on your display adapter. The area available for a worksheet is much larger than can be displayed on screen at one time.

- You can pan the window over the full worksheet by using the scroll bars. You can also use the `SPACE` bar. The cursor will change into a `MOVE` cursor within the worksheet area. You can now pan the worksheet just by using the mouse. Press the `SPACE` bar again to switch to normal mode.
- You can drag any module symbol to any location in the worksheet by placing the mouse pointer on it, and pressing and holding down the `left` mouse button while moving the mouse. If you touch the window border while doing this, the worksheet display will scroll until you release the mouse button, placing the module symbol at the new location.
- You can move a group of modules together if the data lines do not have any data branches. Click and drag the mouse to draw a selection frame around the modules. All modules within this range will be marked and can be moved together. Use `Ctrl-Click` to deselect modules that you do not want to move.

To Display More of Your Worksheet

- Remove the Function Bar and/or the Module Bar from the DASYLab window. Choose these options from the `View` menu, or press `ALT, V, F` or `ALT, V, M`.
- To view the complete worksheet in a separate window, choose the `Overview` option from the `View` menu, or click the corresponding icon in the Function Bar. However, you cannot edit or change it there. The display is automatically scaled to the size of the worksheet.
- To enlarge the window to its maximum size, click the `Maximize` button in the upper right-hand corner of the DASYLab window, or choose `Maximize` from the `Windows Control` menu. The worksheet will fill the entire screen. Other `Windows` applications, such as the `Program Manager`, run in the background. After you enlarge the window, the `Restore` button replaces the `Maximize` button. Click the `Restore` button to return the window to its previous size.

To Change the Appearance of the Worksheet

- To change the grid, type of grid, or grid spacing of the DASYLab worksheet, choose the `Window Setup` option from the `Options` menu.
- To change the colors of the DASYLab worksheet, choose the `Colors` option from the `Options` menu.
- To change the colors of the DASYLab window frame, `Menu Bar`, etc., choose the `Color` option from the `Windows Control Panel`.

- **Shortcut menu:** you can right-click over the worksheet work area to display a contextual menu. You can change colors, switch to other modes, or display properties for this view.

Worksheet Documentation Area

You can insert information about the worksheet into text boxes that are shown on the background of the worksheet. Use the right mouse button to click on an empty area of the worksheet background and open a context menu that allows you to **Edit**, **Create** and **Delete** text boxes. You can insert up to 256 characters of text, change the font, or modify the background color/style.

Use the left mouse click to move (“catch“ the upper left corner) or resize (“catch“ the lower right corner) the boxes.

Open a New Layout Window

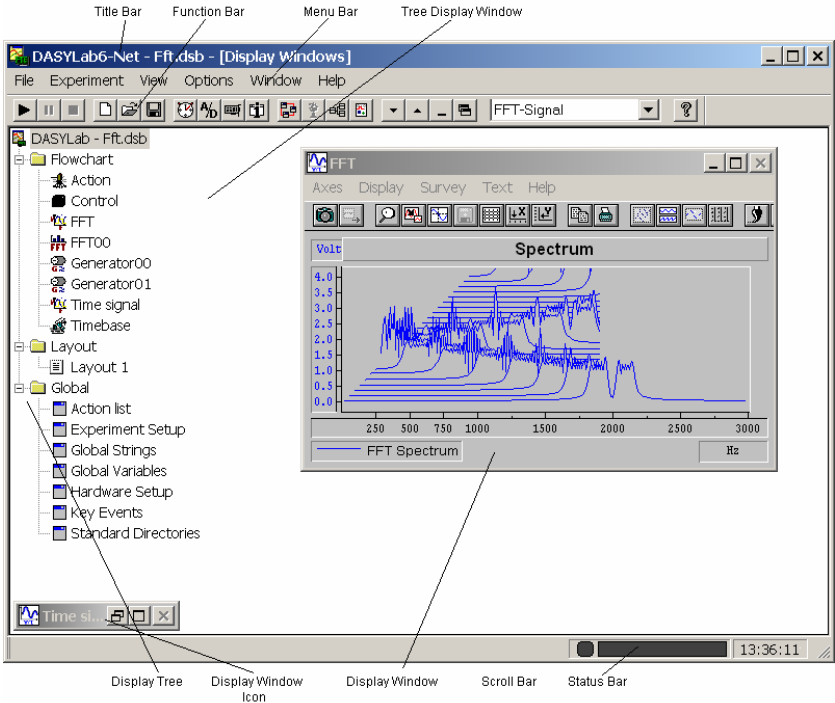
Choose the **New Layout** Option from the **Window** menu. An empty window will appear. The **Layout Window** Function bar and **Tool** box are now available.

You can place graphical objects and imported **bitmaps** on this worksheet. You can create links to visualization modules_of the flowchart. Previously opened display windows stay open.

To hide all elements of the worksheet, choose the **View: Full Screen** option. The **Layout** will be displayed, filling the complete screen. Open display windows are hidden.

Since all control elements are hidden you can only **start** measurement by using the **F5** key. To **stop**, use **ALT+F5**. **ESC** switches to the window mode of the **VITool**.

2.2. The Display Tree View

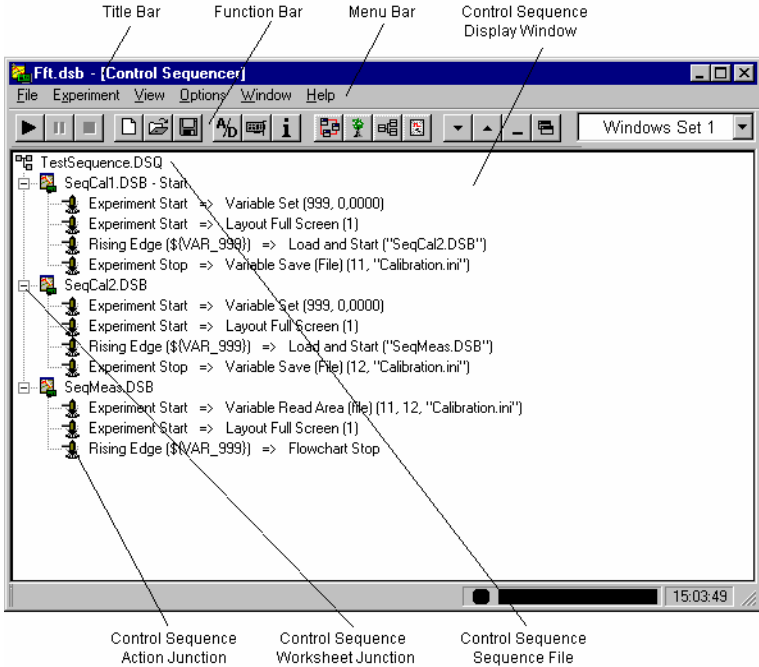


Work Area: Tree View/ Display View

The measurement setup is displayed in a structure similar to the Windows Explorer (32-bit version only). All elements of the worksheet are shown, starting with the layout pages, the modules and black boxes, and finishing with global setup, including global strings and variables. When you click on one of the tree elements, the next branch opens or the appropriate Dialog box opens.

Shortcut menu: you can right-click over the worksheet work area to display a contextual menu. You can change colors, switch to other modes, or display properties for this view.

2.3. The Control Sequencer Window



To control a multi-step application consisting of more than one DASyLab worksheets calling each other, DASyLab offers a new tool, shown as new display window (analogous to the worksheet, display and VITool windows), called the Control Sequencer Window. The contents of the window is stored in a new type of file, the Control Sequencer file (saved with the suffix *.DSQ.)

The window shows a tree display of the control sequence. You can add any number of worksheets into the Control Sequencer File, whose name is shown as root of the tree.

You can also multiple actions for each inserted worksheet to control the flow of the worksheets.

In the Control Sequencer window you can load and save *.DSQ files using the main menu file commands: **New**, **Open**, **Save** and **Save As...**

To insert flowcharts or actions you need to use the pop-up context menu that appears when you right mouse click on one of the junction points on the screen. Depending on the junction (flowchart or action) the pop-up menu offers several commands to add, delete or to edit the object.



The Sequence file is a binary file type. You cannot edit it with ASCII Editor programs such as Notepad.

Work Area: Control Sequencer View

The window shows a tree display of the control sequence. You can add any number of worksheets into the Control Sequencer File. The Control Sequencer filename is shown as the root of the tree.

Also you can define several actions for each inserted worksheet to control the flow of the worksheets.

In the Control Sequencer window you can load and save *.DSQ files using the main menu file commands: **New**, **Open**, **Save** and **Save As...**

To insert worksheets, simply right mouse click on the root symbol to open the context menu. The new flowchart command opens the standard explorer window dialog box to select any flowchart. If there is a flowchart already inserted, the context menu offers additional items to handle flowcharts and actions (insert, delete...).

You cannot load and start another worksheet using an **Stop Measurement => Load and Start** ("next worksheet.DSB") action in the sequence, because the action stops the complete experiment and restarts the whole sequence.

To get the desired result, use a global variable (e.g. Variable 1) with a determined value (e.g. 5) and use the action in the Sequencer: 'Rising edge->({VAR_1}) => Load and start (...)'. This technique does not stop the experiment and the correct worksheet is loaded and starts.

Control Sequencer Flowchart Junction

You can add any number of worksheets into the Control Sequencer File. The inserted flowchart is shown as new flowchart junction.

Double-click on the junction or select the **Comment Flowchart** context menu command to add or edit a description of the junction.

Control Sequencer Action Junction

You can add any number of actions to each flowchart in the Control Sequencer File. The inserted actions are shown as new branch of a flowchart junction.

Each action will be processed if the defined condition is fulfilled. The conditions depend on the settings of global variables or strings or are global events such as Start/Stop of measurement. All global actions are allowed.

Double-click on the junction or use the **Edit Action** context menu command to modify the action

Sequencer Action Dialog

You can edit the actions assigned to each flowchart in the control sequence file. The Action selection field offers all global actions. The dialog box may change depending on the action you have selected. Functions that control changing values are always assigned to global Variables (Event Parameter: Variable No setting.).

Function	The action is initiated...
----------	----------------------------

Rising Edge:	When the variable changes from TTL Low (value 0) to TTL High (value 5).
Falling Edge:	When the variable changes from TTL High (5) to TTL Low (0).
Threshold Overflow:	When the variable rises above the specified threshold value.
Threshold Underflow:	When the variable falls below the specified threshold value.
TTL High Level:	When the variable is TTL High (5).
TTL Low Level:	When the variable is TTL Low (0).
Input larger than Threshold:	As long as the variable value is larger than the threshold value.
Input smaller than Threshold:	As long as the variable value is smaller than the threshold value.
Start/Stop of Measurement:	At the beginning and/or at the end of the measurement.
Global String has changed:	If the named global string has changed during measurement.
Input value has changed(+/- 0.0	If the variable value has changed
Value is reached (+/- 0.001%):	If the variable reaches the defined value.
Always:	The action is constantly initiated.
Never:	The action is never initiated (NOP).



Global variables and strings are always saved with the corresponding flowchart. In exactly the same way, the Global Variables and Strings used in the event-driven actions in the sequence window are stored in the worksheet file of the corresponding flowchart where the action is defined in the sequence. If the variables or strings are to be used in other flowcharts you must save them using the actions Write String/Variable to INI file and Read String/Variable from INI file to save and re-load the values separately.

You will find more information about Event driven Actions parameters in the Action Module description.

Control Sequencer File

The Control Sequencer file stores all settings made in the tree. You can add any number of worksheets into the Control Sequencer File.

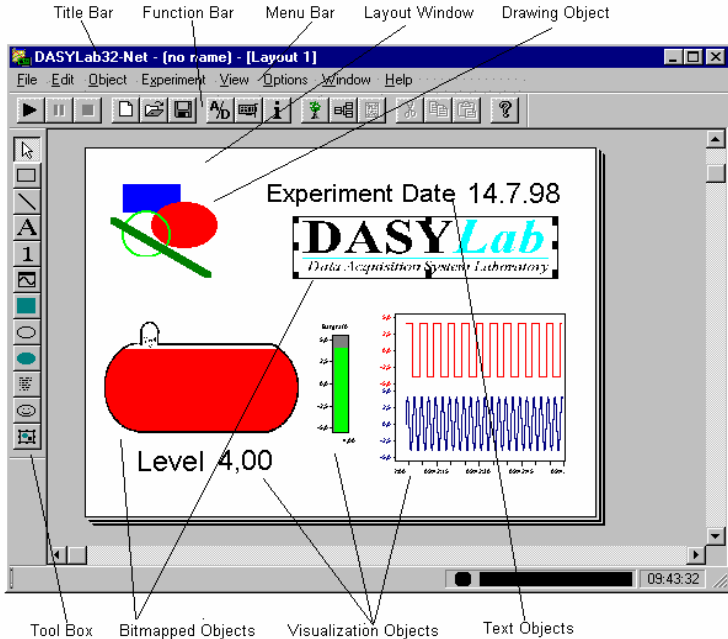
You can define several actions for each inserted worksheet to control the worksheet flow.

The Control Sequencer files (*.DSQ) can be loaded and saved using the main menu file commands: New, Open, Save and Save As....

Sequencer Comment Dialog

This dialog is used to add an additional description to each flowchart in the sequence file. The description is linked in the Control Sequencer mode to the name of the corresponding flowchart.

2.4. The Layout Window



Work Area: Layout Window

The DASYLab Visualization tool (VITool) allows you to connect a bitmapped graphical object with the active Elements of the Layout Window, so you can generate a practical on-line display of relevant data values. You can use technical worksheets or pictures as background and place the Display Windows of DASYLab on the screen. Status Lamps, for example, are symbols of running engines, Digital Meters show rpm, and Bar Graphs can look like thermometers - all to give you quick information about the temperature of a vessel or the status of other parts of the plant.

You can create up to 200 Layout Windows for each worksheet window using the main menu option window. The size of the working area can be specified in one of several DIN formats or adapted to the screen size. The zoom function allows you to scale parts of the screen for better handling.

Full size mode allows you to hide all functional elements such as the Function Bar, Title Bar, etc. This mode is very useful for Online Presentation where you want to display only the custom designed display, not the program elements.

Work Area Layout Window

The work area is where you create a Layout belonging to the DASYLab experiment setup (the Worksheet). The size of the worksheet segment that is actually displayed on your screen varies depending on your display adapter. In any case, the area available for a worksheet is much larger than can be displayed on screen at a time. You can use the scroll bars to pan horizontally and vertically around in the worksheet. You can also use the `SPACE` bar. The cursor will change into a `MOVE` cursor within the worksheet area. You can now pan the layout just by using the mouse. Press the `SPACE` bar again to switch to normal mode.

You can create objects in the work area either by choosing them from the `Object` menu or by clicking the corresponding icons on the `Tool Box`. These objects are placed onto the worksheet by drawing a frame with the mouse. Linked objects are connected to `Display Modules` of the `Worksheet`. You can scale or move objects on the worksheets

Shortcut menu: you can right-click over the worksheet work area to display a contextual menu. You can select objects to add to your layout, switch to other modes, or display properties for this view or the layout page.

New Layout

Window Menu Command: `New Layout`

Use this command to create a new `Layout` window. Up to 200 `Layout` sheets can be created with 512 `Layout` objects. The name of worksheet and the first nine `Layout` windows are displayed below the menu commands. If there are more than ten windows you can use the `more` command to see them.

Properties of the Layout Page

Double-click with the left mouse button on an empty part of the `Layout Window`, or, use the `Properties Object Menu Command` to view the `Properties Dialog Box`.

Tool Box

When a `Layout` window is active, the `Tool Box` will also be shown. Select a tool by clicking on the `Symbols`.

The following tools are available:

- `Selection Tool`
- `Line`
- `Rectangle (filled or not filled)`
- `Ellipse (filled or not filled),`
- `Bitmap,`
- `Text Line,`
- `Text Block,`

- Linked Text
- Linked Graph

Creating a new Layout Object

Select an object type using the menu or the ToolBox. Draw a frame of the desired size. You must create a frame when using a Text Object. The object will be inserted into the frame. To set the object's properties double click with the left mouse button on the object to open the Properties Dialog Box.

The size and position of objects may be changed using the mouse or by using the keyboard. To move the object just use the arrow keys, to resize the objects use CTRL+ arrow key. The degree of movement and scaling depends on the settings in VITool page setup.

Types of Objects:

- **Drawing Elements:** You can create Lines, filled and unfilled Rectangles or Ellipses. You can import Bitmaps.
- **Visualization:** You can create Linked Elements that import strings (Linked Text) or Graphs (Linked Graph) into your Layout Window.
- **Text Elements:** Text frames with Line or Block Text can also be integrated into your Layout. The text itself can be edited in the Properties dialog box

Working with Layout Objects

A single mouse click will select the object. Now you can resize or move it. Backspace will delete the selected object.

A single mouse click with the right mouse button on an object opens a pop up menu. (You cannot change objects while the measurement is running.) Double mouse click on the object to open the Properties dialog box for that object.

Creating an Object

Select an object type using the menu or the ToolBox. Draw a frame of the desired size. You must create a frame for a Text Object. The object will be inserted into the frame. Open the Properties dialog box by double clicking the left mouse button on the object.

Passive Elements

In the DASYLab Layout Window there are some objects that are created on the worksheet although they don't have a direct connection to modules on the worksheet. These passive elements are simple graphical objects such as lines, circles, ellipses (filled or unfilled), or text. Position, size and color are freely selectable for each element. You can modify other properties for each element, too. Passive elements are useful to create an attractive layout page design. Block text with scaleable font size is useful to display information about the layout (for example, the measurement parameters).

You can also specify the text line object: Using field placeholders, you can insert the current time, date or other system information.

Active Elements

Another group of objects shows the unique features of the VITool. These active connected objects create a direct link with modules on the DASYLab worksheet. Information that is displayed in the display window of the visualization module can be integrated into the Layout Window and can be dynamically updated as the data changes. The VITool is a perfect instrument to create an online data acquisition and visualization setup that reflects your ideas and creativity. Available active elements are linked with graphical and text objects.

Linked graphical objects import graphical information from the display windows of visualization modules into a Layout Window. You can show the curves of Y/t, X/Y or Recorder module as well as the display of Analog, Digital Meter or Lamp and Bar Graph or you can display an alert message from the Message module.

A special feature links an object to the Switch module: You can show the state of the switch and operate the module from the Layout Window. This allows you to interact with the measurement when the Layout Window is in full screen mode.

Functions in the Display Windows in VI-Tool

Linked graphical objects also offer additional options in display:

- To Zoom and unzoom the contents of the display:
- Zoom in: CTRL key and drag;
- Zoom out: CTRL key and right mouse click.

You can perform the zoom in function multiple times. The zoom out function has only two steps: first to the previous zoom, then back to the unzoomed display.

If there are cursors shown in the display window in the worksheet or tree view, they are also shown in the linked object in VI-tool. The cursors can be moved with the mouse directly in the layout. If you want to display the cursor data on your layout page you must activate the Survey menu command and select Print Cursor data in VI-Tool in the display window menu.

Graphics

The DASYLab VITool allows you to import bitmapped graphics objects and use them as background in the Layout Window. You can use plant flowcharts and other pictures as background in the Layout Window and you can place other passive or active elements over them. For example, status displays placed over machines show activated engines, a Digital Meter shows their rotational speed, Bar Graphs shaped as thermometers quickly inform you of the temperature of several parts of a plant. You can even insert your own logo into the layout. Only the reference address of the picture files (*.BMP and *.WMF format only) are saved with the worksheet or with the layout file. The original picture file must be separately saved in the correct directory to be displayed in the Layout Window.



You cannot use pictures and drawings created by CAD programs. You must first convert the files into .BMP or .WMF format using appropriate conversion software.

2.5. VITool Toolbox

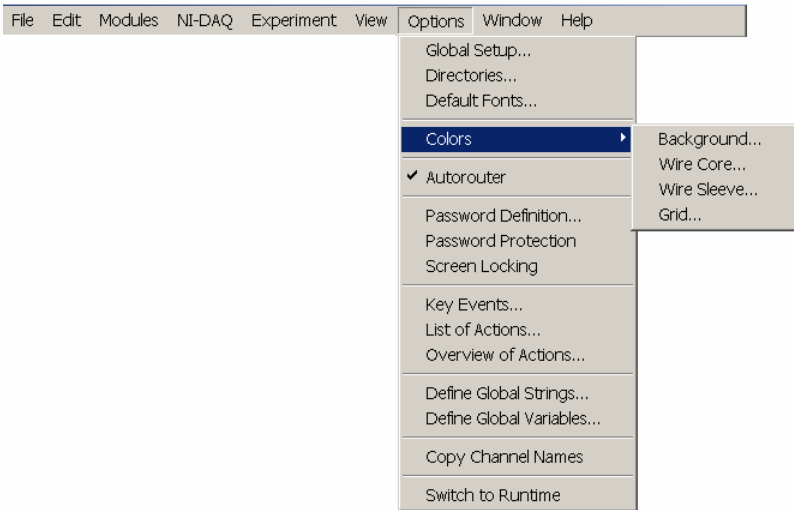


The Layout Window Toolbox allows you to quickly select a Layout Window Drawing Object.

2.6. Title Bar

The Title Bar is the upper border of the DASYLab window and shows the name of the application (DASYLab) and the file name of the current worksheet. If the current worksheet has not yet been saved, “Untitled” appears as a placeholder.

2.7. Menu Bar



Below the Title Bar, the Menu Bar lists the Main Menu Options. Each menu contains a list of commands or actions. You can open each of these lists by clicking the Main Menu Option on the Menu Bar with the **left** mouse button, or by pressing the ALT key and then typing the letter that is underlined in the Main Menu Option.

In the picture above, you can see the list of Options menu commands.

You can then choose an option from that list by clicking it, or by typing the letter that is underlined in the menu item without pressing the ALT key, or by using the arrow keys on your keyboard and pressing ENTER. The display field in the left half of the Status Bar will often contain information describing the current menu item.

In the picture, the **Wire Sleeve** option from the **Colors** submenu is selected (highlighted). Click it, or press the **ENTER** key, to carry out that command.

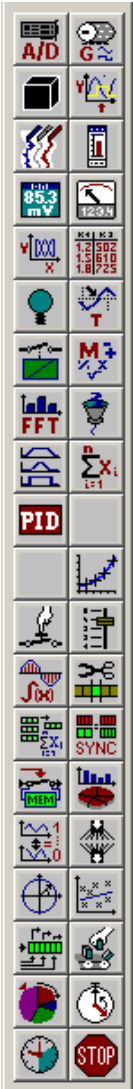
The following Windows menu conventions provide additional information about the menu items.

- An ellipsis (...) following a command indicates that a dialog box appears when you choose that command. There, further options must be selected before the command can actually be carried out. For example:
Output Setup... (Experiment menu)
- A triangle (▶) next to a command indicates that a cascading menu appears when you choose that command. That submenu contains further commands. For Example:
Module Bar ▶ (Edit menu)
- A check mark (✓) next to a command means that the command is already in effect. After selecting that command again, the command is no longer in effect, and the check mark disappears. For example:
✓ Auto Start (Experiment menu)
- Dimmed commands cannot be used at the current time. For example, another command must be chosen first to enable that command. For example:
Stop (Experiment menu)
Stop is only available after Start is chosen, and vice versa.
- A key combination next to a command is a shortcut for the command. To use your keyboard instead of your mouse, the key combination has the same effect as clicking, or choosing, the command from the menu list. For example:
Pause CTRL+F6 (Experiment menu)



The icons on the Module Bar and on the Function Bar also represent menu functions. Clicking these icons with the left mouse button is the easiest and quickest way of choosing a menu command.

2.8. Module Bar



The Module Bar, at the left of the DASyLab window, displays a selection of frequently required modules in icon form. The size of the Module Bar depends on the screen resolution of the computer's display.

Use the **left** mouse button to click on the icon that symbolizes the module you want to add to your worksheet.

There are only a limited number of spaces on the Module Bar; therefore not every available module can be displayed on the Module Bar. You can customize the Module Bar to display only the modules that are needed most frequently.

Module Type Display

The name of the module the mouse pointer is pointing at is displayed when you hold the mouse cursor over one of the module bar icons.

Module Bar Configuration

You can select which modules are displayed as icons on the Module Bar.

Click on a square in the Module Bar with the **right** mouse button to assign any of the modules available in DASyLab to that square. A dialog box appears presenting the complete list of modules including their Module Bar icons.

- Scroll through the list using the scroll bar or the arrow keys on your keyboard.
- To quickly select a module in this list, type the first letter of its name to move to the first matching module. Type the letter again to move to the next module that starts with that letter.
- Click the **Help** button to obtain information on the selected module.
- Choose **OK**, or press **ENTER**, to install the selected module on the Module Bar. The Module Bar will now display the new icon.

Saving a Module Bar Configuration

You can customize several Module Bars for individual experiments.

- All of the Module Bar settings are automatically saved together with information about the window size and position when you **exit** the program. When you start DASyLab the next time, you will find the same work environment as before.

- In addition the settings are saved with the worksheet file when you choose the **Save** or **Save As...** commands from the **File** menu.
- You can individually **save** your customized Module Bars to files and open them when you work with similar tasks or you can open the **Default Module Bar** provided by DASYLab.

Use the **Module Bar** command in the **Edit** menu:

New	provides a blank Module Bar to be configured individually.
Open...	opens a saved Module Bar configuration onto the DASYLab screen.
Save As...	saves the current Module Bar configuration to a file under a name of your choice.
Default	opens the default Module Bar configuration onto the DASYLab screen.
Basic	Displays a limited number of modules, suitable for beginners
Intermediate	Displays more modules, appropriate for experienced users
Advanced	Displays modules appropriate for “power users.”

For details about these menu functions refer to Chapter 4 of this manual.

Removing the Module Bar

To enlarge the display area for your worksheet, you can **remove** the Module Bar from the screen. The visible worksheet then extends to the left border of the DASYLab window.

Use the **Module Bar** command from the **View** menu to hide and to redisplay the Module Bar. A check mark (✓) indicates that the Module Bar is displayed.

After you have hidden the Module Bar, you can still install modules by using **Module** menu commands. To install a **Signal Generator** module, for example, select **Control** from the **Module** menu, then choose **Generator**, or press the **ALT**, **M**, **C**, and **G** keys.

2.9. Function Bar


















The **Function Bar**, below the **Main Menu Bar** of the DASYLab window, displays a selection of icons that provide easy access to menu functions often used during experiments or functions assigned by the user (buttons 1...8 at the right side of the **Function Bar**). Use the **left** mouse button to click on the icon that represents the desired command.










When the mouse pointer is pointing at a Function Bar icon, a tag with the name of that function will appear. (You will find QuickInfo in all of the module windows that provide a Function Bar.)

Function Bar Configuration

The configuration of the Function Bar is fixed. You cannot change it by removing or adding any icons.

The following table contains a list of the icons included and the menu commands they represent. For further details about the menu functions themselves refer to Chapter 4 of this manual.

Icon	Menu	Command	Function	Shortcut
	Experiment	Start	Start experiment	F5
	Experiment	✓Pause	Pause/Resume experiment (toggle)	CTRL+F6
	Experiment	Stop	Stop experiment	CTRL+F5
	File	New	Clear worksheet to create a new worksheet	
	File	Open...	Open worksheet file	
	File	Save	Save worksheet to file	
	Experiment	Time Base	Set up different time bases	
	Experiment	Experiment Setup	Set general experiment parameters (dialog box)	
	Experiment	Hardware Setup	Set hardware-specific parameters (dialog box)	
	File	File Info...	Open File Info dialog box	
	Windows	Control Sequencer	Switch to Control Sequencer mode	
	Windows	Display Windows	Switch to Display Window mode	F3
	Windows	Worksheet	Switch to Worksheet mode	F3
	Windows	Layout	Switch to VITool Layout Window mode	F4
	Edit	Cut	Cut the marked object and copy it to the Windows clipboard	


Icon	Menu	Command	Function	Shortcut
	Edit	Copy	Copies selected Worksheet part or Layout object to clipboard	
	Edit	Paste	Inserts contents of clipboard into Worksheet or Layout Window	
	View	Make Invisible	Hide all the display windows	
	View	Make Visible	Show all the display windows	
	View	Minimize	Minimize all the display windows	
	View	Restore	Restore all the display windows	
	Edit	To Preceding Black Box Level or Back to Main Chart	Leave the <i>Black Box</i> , return to preceding worksheet level (or to the main chart). To enter a <i>Black Box</i> , double-click its module in the worksheet.	
(list)	View	Select Window Arrangement	Re-arrange display windows into one of the ways you have saved	
	Help	Help	Display <i>DASYLab</i> Online Help options	
			Performs any command assigned to the specific custom button (user defined)	

User Defined Function Buttons


All four of the DASYLab Views allow you to define 8 Function Buttons to execute any of the available functions and commands.

Each button is identified with color if it has been configured to execute a function and that function is available in the current view. Each main window uses its own color:

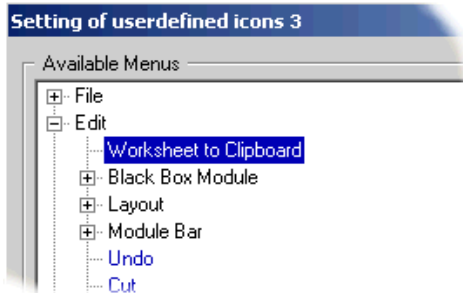
Button (yellow) in Sequence Control Window: 

Button (blue) in Tree-View Window 

Button (green) in Worksheet Window: 

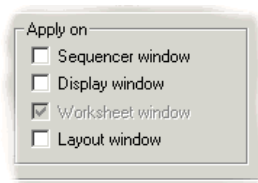
Button (purple) in Layout Window: 

Right mouse click on the desired icon to display the menu opens. Select **New Command...** to change the setting for this button. A dialog box shows a tree view of the complete list of all available commands.



Click the + sign before an item to open the branch to view the commands at the next level. Click the – symbol to close the branch.

Click the desired command to assign the command to the selected button. The item will show in blue to indicate that the function now is directly available using a button. To assign that function in all display windows to the same button use the check boxes at the bottom of the dialog box. If the selected function isn't available in one of the main windows (e.g. the Action list command isn't available in the VITool) the check box is not available.



Click the OK button to confirm the selection and to close the dialog box.

Reset Button: The Reset button deletes the assignment of commands to the selected Button. The button now appears grayed out to show there is no command assigned to it.

Removing the Function Bar

To enlarge the display area for your worksheet, you can **remove** the Function Bar from the screen. The visible worksheet then extends to the Menu Bar of the DASyLab window.

The **Function Bar** command from the **View** menu enables you to hide and to re-display the Function Bar. A check mark (✓) indicates that the Function Bar is displayed.

After you have removed the Function Bar, you can still use any function by selecting it from the menu. To start an experiment, for example, choose **Start** from the **Experiment** menu, or press the **ALT, X, S** keys, or press **F5**.

2.10. Status Bar

The Status Bar at the bottom of the DASYLab window provides the following information:

- On the left of the display you will find an explanation of the menu function you have selected on the Menu Bar.
- The status bar on the right displays the progress of operations, for example, of the Autorouter function arranging data channels, or, during experiments, the driver buffer status.

If the bar turns red, this indicates that the acquisition rate is too fast to collect data continuously. Left of the driver buffer indicator there is a small indicator for lost samples. Many drivers acquire data using interrupts. Some boards allow DASYLab to check whether the program has processed all interrupts. A yellow flashing light indicates that some interrupts have been missed. For more detailed information see the hardware help.

- The current time is displayed on the far right.

2.11. Display Windows

Display Windows of the Display modules show data samples in various graphical ways. You can choose **X/Y, Y/t Chart, Chart Recorder, Bar Graph, Digital or Analog Meter**. You can customize the appearance of Display Windows in many ways.

Hiding and Showing Display Windows

The modules from the Display module group consist of two parts: the module symbol in the worksheet, and a display window where the incoming data is visualized. When a display module is inserted into the worksheet, the display window initially appears minimized.

You can restore each of the display windows contained in your worksheet individually by double-clicking its icon at the bottom of the computer screen, or by choosing **Select Windows/Restore** from the **View** Menu.



You can restore all the minimized display windows contained in your worksheet simultaneously by choosing **All Windows/Restore** from the **View** menu, or by clicking this Function Bar icon.

You can minimize each of the display windows individually by clicking its **Minimize** button (in the upper right-hand corner of the display window).



You can minimize all the display windows contained in your worksheet simultaneously by choosing All Windows/Minimize from the View menu, or by clicking this Function Bar icon.

You can hide a display window without minimizing it. Use the View menu command Select Windows/Make Invisible. You can hide minimized display windows to make your work area easier to read.



You can hide all display windows, including minimized windows, by clicking on the Hide button or choosing All Windows/Make Invisible from the View menu.

You can show (un-hide) a hidden display window by choosing the Select Windows/Make Visible from the View menu.



You can show (un-hide) all hidden display windows by clicking on this Function Bar icon, or by choosing the 36

.All Windows/Make Visible command from the View menu.

Window Arrangement

This field shows the number and name of the current Window Arrangement. DASYSLab allows you to save up to eight different Display Configurations to be used by the experiment: Switch to another arrangement by choosing the name displayed in the list. The Window Arrangement can also be switched using the Action module.

While observing an experiment, with data being displayed on several instruments, you may find it useful to save certain arrangements of these display windows (i.e., their sizes and positions on the screen). You can then easily restore any of these arrangements when it seems most suitable, and you can even switch between various window setups to compare different display modes.

For these purposes, DASYSLab provides the following menu commands:

- Save Window Arrangement
- Select Window Arrangement
- Delete current Window Arrangement

3. Module Groups Overview

DASYLab module functions are divided into ten Module Groups, each containing modules that perform related functions.

The **Module** menu provides all the available module groups. Choose a module group from the **Module** menu to open a submenu with the list of the modules that belong to that group. You can select any of the modules listed by clicking on it. It is then placed on the worksheet as a module symbol.

- The **Input/Output** and the **Files** modules provide data input and output functions, including data archiving using the new **Backup** module.
- The **Trigger Functions** and the **Control** modules perform control tasks.
- The **Mathematics**, the **Statistics**, the **Signal Analysis**, the **Data Reduction** and **Add-On** modules offer a large number of analysis, evaluation and calculation operations.
- The **Display** modules provide several ways of displaying data.
- The **Black Box** module allows you to store complete worksheet segments in one module as ready-to-use units.

Input/Output Module Group

This group provides all the function modules necessary to communicate with the data acquisition hardware, external devices and other programs. The modules **Analog Input**, **Analog Output**, **Digital Input**, **Digital Output** and **Counter Input** represent different functions of the data acquisition hardware, while **DDE Input** and **Output** implements DDE communication with other Windows applications. **Serial Input** and **Output** and the **IEEE488 Interface** modules represent the interfaces to the corresponding devices.

Files Module Group

This module group provides file reading and writing functions. It consists of **Read Data**, **Write Data**, **Backup** and **ODBC Input / Output** modules.

Trigger Functions Module Group

This module group contains the **Start/Stop Trigger** and the **Pre/Post Trigger** modules, which are used to control data flow in the worksheet depending on the acquired signal. The **Combi Trigger** allows you to detect a wide combination of signal changes. The **Relay** module is used in conjunction with the trigger modules to control the flow of data.

Control Module Group

This module group contains two different types of modules. There are four signal generating modules: the **Generator** can generate periodic or random signals; the **Switch** allows manual input of TTL low and high levels; the **Slider** is used to manually define an analog signal; and the **TTL Pulse Generator** will generate a

pulse of specific duration. The PID Control, Stop, Latch, and Time Delay modules may be used to control data flow within the worksheet.

Mathematics Module Group

This module group provides basic mathematical functions including Arithmetic and Trigonometry, Logic Operations, Linear Scaling, Thermocouple Linearization, Interpolation, Differentiation/Integration and the general purpose Formula Interpreter.

Statistics Module Group

This module group provides several statistical calculations including standard deviation, min/max, mean values, and variance in the module Statistical Values. It also contains function modules for Histogram calculation, Counting and the calculation of Regression.

Signal Analysis Module Group

This module group contains several modules for signal analysis applications. It implements digital (IIR) Filters of different types, the calculation of FFTs, frequency spectrum, amplitude and phase spectrum, Correlation functions and cepstrum. Another module provides a number of different Window functions. Polar/Cartesian coordinate transformation is now part of this module group.

Data Reduction Module Group

This module group contains different algorithms for data reduction including Averaging and Block Average, the selection of samples and blocks, and modules that allow you to combine and separate signals from different channels, including Time Slice, Merge/Expand and Cut Block.

Display Module Group

This module group contains all the display modules. It includes the scope display (Y/t Chart), Chart Recorder, X/Y Chart, Analog and Digital Meters, Bar Graph, and List modules.

Network Module Group

The high-speed, TCP/IP network capable modules are available in this optional module group. Additionally, the DataSocket Import and Export Modules are included here.

Special Module Group

This module group contains **Black Box** modules to be “filled” with worksheet segments and with **Export/Import** modules which establish connections for data transfer between the main worksheet and the **Black Box** worksheet embedded in it. It also provides the **Black Boxes** that were saved to disk. Additionally, it includes modules that provide special functions, including the **Action**, **Message** and **Time Base** modules, as well as the **Signal Adaptation** module.

Add-On Module Group

When installed, the Add-On modules appear in the module menu. The following modules are available: **Weighting**, **Transfer Function** and **Convolution**. See **Module Reference Guide** for details.

Chapter 4

Main Menu Options

Chapter 4: Main Menu

1. Worksheet Window Menu

1.1. File Menu

The commands of the File menu enable you to save, open and print worksheets, to manage your worksheet files, and to exit the program. Some of these functions can also be chosen by clicking on the corresponding icons on the Function Bar. The ellipsis (...) following a menu command indicates that a dialog box or sub-menu will appear when the command is selected.



New



Open...



Save

Save As...



File Info...

Print...

Printer Setup...

Page Format...

Exit

Recently Used Worksheet List

1.1.1 New



*Choose the **New** command from the **File** menu, or click this Function Bar icon to create a new worksheet.*

This command will open a new worksheet. If you have a worksheet open and have not saved it, you will be asked to:

- save that worksheet before beginning work on the new one,
- or to reject those changes,
- or to recall the New command.

After creating the new worksheet you can save it to a file by selecting the **Save** or the **Save As...** command from the **File** menu.

You can also click on the **Save** icon in the **Function Bar** to save the current file.

1.1.2 Open...



*Choose the **Open** command from the **File** menu, or click this **Function Bar** icon to open a previously saved worksheet.*

If you have a worksheet open and have not saved it, you will be asked to save that worksheet before beginning work on the new one.

After choosing the **Open** command you can select from a list of files using standard Windows dialog boxes. The default file extension for DASyLab worksheet files is **.DSB**.

You can ...

- Open one of the files from the list directly by double-clicking the file name,
- Select a different directory by double-clicking the directory name,
- Select a different file format for the file display, or
- Select a different drive.

To use your keyboard, press the **TAB** or the **SHIFT+TAB** keys to move from one field to another; select items from the lists by pressing **↑**, **↓**, **SPACE** and the **ENTER** key.

In the **File Name** box you can define the filter for the file list. The default setting for the filter (***.DSB**) will create a list of DASyLab worksheet files, which usually have the extension **.DSB**. DASyLab can also load files with the extension ***.DSA** (DASyLab ASCII file). This format is used to exchange worksheet files between the 16 and 32 bit DASyLab versions. These files may have also other extensions such as ***.txt**, but to be interpreted correctly, the contents **MUST** follow the conventions of the DASyLab ASCII file type.

You can type a different extension, or use wildcards (like ***.***), to get lists of different groups of files. For example, you may do this if you have saved DASyLab worksheets with extensions other than **.DSB**.



*DASyLab can only open files in its own **.DSB** or **.DSA** format, no matter what extension the files have.*



*If **Password Protection** is active, you will first be asked to enter the password unless you have already entered it. Without the correct password, the file will not be opened.*



*When you save a worksheet, the current **Module Bar** configuration is saved with it. When you open a worksheet file, its **Module Bar** configuration will replace the current one on your screen. If you prefer to retain the current configuration, disable the **Replace Module Bar** option in the **Options** menu.*



*You can specify a standard directory for DASYLab worksheet files in the **Options** menu.*



*To create a new worksheet, select the **New** command from the **File** menu, or click the **New** icon in the **Function Bar**.*

1.1.3 Save



*Choose the **Save** command from the **File** menu, or click this **Function Bar** icon to save a worksheet.*

If you have created a worksheet without saving it to a file, the **Save** command will act like **Save As...** If this were a previously saved worksheet, the existing file will be replaced without further messages.

The following settings *are* saved with the worksheet:

- The current **Module Bar** configuration
- All the entries in the **File Info** dialog box
- All the entries in the **Page Format** dialog box
- The settings for **Display Window Arrangement**
- Text strings, with locations of where they were placed in the display window

The following settings are *not* saved with the worksheet.

- The settings for the **Start/Stop at Time** functions (**Experiment** menu)
- The settings for the **Auto Start** function (**Experiment** menu)
- The settings for the display of the **Module Bar**, the **Function Bar** and the **Animation** function (**View** menu)
- The **Options Menu** settings for the **Window Setup**, **Colors**, the **Auto-router** functions



*You can specify a standard directory for DASYLab worksheet files (**Options** menu command).*



*To save the worksheet with a new file name, select the **Save As...** command from the **File** menu.*



*If **Password Protection** is active (**Options** menu, see page 4-48), the worksheet will be protected using the specified password. If a password has not yet been defined, you will be asked to specify it when the worksheet is saved.*



*To save the worksheet with a different file name, select the **Save As...** command from the **File** menu.*

1.1.4 **Save As...**

*Choose the **Save As** command from the **File** menu to save a worksheet under a new file name, in a different directory, or on a different drive.*

See the previous section for a list of the settings and parameters that will be saved together with the worksheet.

After you have chosen the **Save As...** command from the **File** menu you can select the file name, the directory and the disk drive where the file is to be stored.

- Type the file name in the **File Name** box. Note that the file name must be chosen in accordance with MS-DOS conventions.
- If you do not type an extension, DASyLab will automatically add the standard extension (.DSB). DASyLab always saves worksheet files in its own format, even if you select an extension other than .DSB.
- You can...
 - ... Select one of the file names in the list by double-clicking the file name. The file that was originally saved under that name will be replaced with the new worksheet. A warning message will first appear, asking you to either confirm the procedure or to cancel it.
 - ... Select a different directory by double-clicking the directory name.
 - ... Select a different drive for the new file.
 - ... In the **List Files of Type** box you can select the type of files (defined by their extension) to be listed.
 - ... Save the file as DASyLab binary file (.DSB) or DASyLab ASCII format for interchange (.DSA).
 - ... Save the file as DASyLab worksheet documentation (.TXT or .HTML)

To use your keyboard, press the **TAB** or the **SHIFT+TAB** keys to move from one field to another; select items from the lists by pressing **↑**, **↓**, **SPACE** and the **ENTER** key.



*You can specify a standard directory for DASyLab worksheet files (**Options** menu command).*



*To save the worksheet under its current file name, use the **Save** command from the **File** menu.*



*To quickly save the current file, click the **Save** icon on the **Function Bar**.*



If password protection is active (from the Options menu), the worksheet will be protected by a specified password. If the password has not yet been defined, you will be asked to specify it when the worksheet is saved.



DASYLab always saves worksheet files in its own format, even if you select an extension other than .DSB.

1.1.5 File Info...



*Choose the **File Info** command from the **File** menu, or click this **Function Bar** icon to display, enter, or modify information about the open worksheet.*

DASYLab will automatically provide the following fields. The user cannot modify these fields.

Field	Information
Worksheet	The file name of the current worksheet
Created	The date and time the worksheet was created
Modified	The date and time the worksheet was last saved to file

You can add the following information:

Field	Information	Max. Number of Characters
Author	Your name	50
Company	Your company	50
Department	Your department	50
Title	A descriptive worksheet title	80
Info Text	Additional informative text	4000



*To begin a new line in the **Worksheet Info Text** field, press CTRL+ENTER.*

To move from one field to the other, either use your mouse, or press the TAB or SHIFT+TAB keys.

Click on the Clipboard button to copy all of the information to the Windows Clipboard.



*All the **File Info** entries will be saved with the worksheet when you choose **Save** or **Save as...** from the **File** menu. The **Author**, **Company**, and **Department** information is also stored in the DASYLAB .INI file.*



*When you print a worksheet or the display of a module from the **Display** module group, you can include the information about **Author**, **Company**, **Department**, **Title**, and **Worksheet** file name from the **File Info** dialog box. Choose **Page Format** from the **File** menu to select the information you wish to include in the printing.*

1.1.6 Print...

Choose the Print command from the File menu.

Choose **Page Format** from the File menu to select additional worksheet information you wish to include on the printout, and to specify the page layout and page frames.

Choose **Printer Setup** from the File menu to select paper size and paper source, orientation, printer resolution, and other specific settings for your active printer model.



*DASYLab only prints to the default Windows printer. To use a different printer connected to your system, or to install and configure a new printer, choose the **Printers** option in the Windows Control Panel. Refer to your Windows documentation for further information.*

1.1.7 Printer Setup...

Choose the Printer Setup command from the File menu to select paper size and paper source, orientation, printer resolution, and other specific settings for your active printer model.

These settings are also valid when printing Layout Windows. You should pay attention to the settings of the Layout Window, especially the page orientation.

The options vary, depending on the printer you are using.

- Change the specifications as needed.
- To set options specific to your printer driver, choose the **Options** button, set the options as needed, and then choose the **OK** button.
- For information about the printer-driver options, choose the **Help** button or press F1 while using the dialog box.
- Choose the **OK** button.

Some Printer-Drivers allow you to choose user defined page formats. If the minimum useable size (depending on the printer type) is under run, the printer will not print. So if your printer will not work, check the settings in printer dialog box and enlarge the size of page or use one of the preset page formats (e.g. A4, letter...)

1.1.8 Page Format...

Choose the Page Format command from the File menu to format printing. The settings affect the following print commands:

Printout of...	Source module	Print command from module menu
Worksheet	(Work area)	File (Main Menu Option)
Y/t chart	Y/t Chart	Display
X/Y chart	X/Y Chart	Display
Diagram	Chart Recorder	Display
List of values	List Display	Edit

You can select additional information to include in the printout, and you can specify the page layout and page frames.

The upper part of the dialog box mirrors the basic layout of the printed page.

View port

The actual information or display that is to be printed is indicated in the center of this area. Depending on the source module from which the printing will be activated, the worksheet, the graphic display, or the list of values will be positioned here.

The final size of this area on the printed page is defined by the paper size, minus the selected paper frames, and minus the space required for any additional information. The actual display will occupy the entire page if you select no additional information. The more information you select, the smaller the space remaining for the actual display.

Additional Information

- In the text box and the check boxes above the View port area you can select the information that will be printed above the display at the top of the page.
- In the text box and the check boxes below the View port area you can select the information that will be printed below the display at the bottom of the page.

You can enter one text line of up to 80 characters in the text boxes.

Select information already entered and saved elsewhere.

- The Experiment Title, Author, Company, and Department will be printed as entered in the corresponding text boxes of the File Info dialog box from the File menu (see page 4-5). Commas will separate the printed information about Author, Company, and Department.
- The date and the time of the printing will be printed at the position indicated by the Date/Time check box.
- The Worksheet Name to be printed is the file name of the current worksheet.
- When you select Description the worksheet file name will be printed when you print the worksheet itself. The Worksheet Info Text from the File Info dialog box will not be included in the printout.

When you wish to print a graphic display or a list of values, the module description printed will be the Description text box of the source module's configuration dialog box. This dialog box appears when you double-click that module symbol on the worksheet.

Page Frame

Set the margins for the printed page. These are the distances between the paper edge and the printed area of the paper. The measurement system is *always centi-*

meters. The default settings are 2.54 cm (one inch) or the values last saved with a worksheet.

Printer...

Click this button to select paper size, source, orientation, printer resolution, and other specific settings for your active printer model. This function is the same as the Printer Setup command from the File menu.



All the Page Format entries will be saved with the worksheet when you choose Save or Save as... from the File menu.

1.1.9 Exit

Choose the Exit command from the File menu to close DASyLab.



You can also exit DASyLab by double-clicking the system control button in the upper left hand corner of the DASyLab window, or by pressing ALT-F4.

If you have not saved or have changed the worksheet in the work area, you will be asked whether you want to save the changes or not, or cancel the exit request.

The following settings are saved when you close DASyLab:

- Size and position of the DASyLab window on your screen
- The Module Bar configuration
- The information about Author, Company, and Department from the File Info dialog box
- The Autostart option (Experiment menu)
- The Animation option (View menu)
- The display settings of the Module Bar and the Function Bar
- The Window Setup (Options menu)
- The Color settings (Options menu)
- The Autorouter option (Options menu)
- The Password Protection option (Options menu)

If there is a worksheet on the screen which you have changed since you last saved it, you will be asked to either save that worksheet now before exiting DASyLab, or to reject those changes or to recall the Exit command (Cancel).

You can also exit DASyLab by double-clicking the system control button in the upper left hand corner of the DASyLab window, or by pressing ALT+F4.

1.1.10 Recently Used File List

The worksheets displayed as numbers 1 to 5 in the File menu contain the five worksheets worked on last. The list is automatically rebuilt when loading any worksheet and is stored when the program is closed.

1.2. Edit Menu

The commands of this menu allow you to copy the DASYLab worksheet displayed on the screen to the Windows Clipboard and to configure the Module Bar according to your specific requirements. It also provides the functions necessary to organize Black Box files.

Worksheet to Clipboard



Black Box Module

Save As...

Load...

Black Box Info

Back to Main Chart / To Next Higher Black Box Level

Layout to Clipboard

Layout

Save As...

Load...

Module Bar

New

Open...

Save As...

Set to Default

Undo



Cut



Copy



Paste

Delete

Search for Module

1.2.1 Worksheet to Clipboard



Use the **Worksheet to Clipboard** command from the **Edit** menu, or click this icon on the **Function Bar** to create a **Windows Metafile image (WMF / CLP)** of the worksheet on the **Clipboard**.

The worksheet is always copied to the **Clipboard** as displayed on screen, including any changes you have made since last saving it.

The worksheet background is not copied, even if you have selected a color and a grid for it. For further information on these options, see **Customizing the DASyLab Screen**.

The image on the **Clipboard** is automatically scaled to the size of the **DASyLab** worksheet. If the worksheet consists of only a few modules these will appear larger on the **Clipboard** than if you have used a large number of modules all over the worksheet.

Use the **Paste** function provided in any **Windows** application (usually in the **Edit** menu) to transfer the metafile from the **Clipboard** to applications such as **Paintbrush** or **Word for Windows** for further use.

1.2.2 Black Box Module

Use the **Black Box** module to create worksheet elements frequently required in your experiments, integrate them into one module (the **Black Box**) and insert them into future worksheets as ready-to-use units. Similar to an integrated circuit, a **Black Box** module contains a portion of the worksheet.

Use **Black Box** modules to implement standardized modules that perform customized algorithms not provided by **DASyLab**. These menu commands provide all the functions necessary to organize **Black Box** files.

For further information on the modules themselves, on how to create and edit **Black Box** worksheets, and on the corresponding **Module** menu commands refer to **Module Reference Guide**.

Save As...

To save a **Black Box**:

- First, open the **Black Box** you wish to save. You cannot save a **Black Box** while the **DASyLab** main chart is active.
- Make sure you have entered a **Module Name** and an **ID Tag** in the **Black Box Info** dialog box.
- **DASyLab** can only list a **Black Box** file on the **Module** menu if a **Module Name** has been entered for that **Black Box** before saving it.
- **DASyLab** can only install a **Black Box** icon on the **Module Bar** if an **ID Tag** was entered for that **Black Box** before saving it.



*The **Black Box Info** dialog box will appear when you try to save the **Black Box** if the identifying tag is missing.*

- Then choose **Save As...** from the **Black Box Module** submenu of the **Edit** menu. Specify the **Name**, **Directory**, and **Drive** of the file to be saved. DASYLab automatically adds its standard extension for **Black Box** files (*.DBB).



If you save a worksheet containing a **Black Box**, a complete copy of the **Black Box** will be included with the worksheet.

If you modify the original **Black Box** file independently, the **Black Box** saved with the worksheet will not be updated. To insert the new version first delete the previous **Black Box** version from the worksheet.

The advantage to this system is that if you modify or delete the **Black Box** file, it will not cause errors in the worksheets incorporating (and possibly based on) the functions and settings of the original **Black Box**.

Black Box Info

Enter descriptive texts and identifying tags for the **Black Box** module.

- The **Module Name** identifies the module symbol in the worksheet.
 - The **Black Box** module symbol in the main chart (or the preceding worksheet level) displays its name in its **Title Bar**.
 - The first 20 **Black Box** files in the DASYLab directory (not the **Worksheet** directory!) automatically appear as menu items on the **Black Box** module submenu of the **Module** menu after the program has been started. Their **Module Names** appear as menu commands.
- Enter a short comment in the **Description** box to describe the functions implemented by the **Black Box**.
- The **ID Tag** is a string of up to 3 characters that is used to identify the **Black Box** module in the **Module Bar**. The **Module Bar** icon representing that **Black Box** displays that tag.



*A **Black Box** can only be saved if the **ID Tag** has been entered. The **Black Box Info** dialog box will appear when you try to save the **Black Box** if the identifying tag is missing.*

Back to Main Chart / To Next Higher Black Box Level

You can insert another **Black Box** module in a **Black Box** worksheet. The module can then contain a **Black Box** module, and so forth, down to any level. Thus, the worksheet becomes three-dimensional, with the **Main Chart** (the actual DASYLab work area) and several subordinate **Black Box** levels, each one embedded into the preceding level.



You can open any **Black Box** by clicking its module symbol on the worksheet; you can leave it again to return to the next higher worksheet by clicking this **Function Bar** icon, or by choosing the command from the **Black Box Module** submenu on the **Edit** menu.

The command can have two names: either **Back to the Main Chart** (if the current **Black Box** is an element of the Main Chart), or **To Next Higher Black Box Level** (if the current **Black Box** is itself an element of another **Black Box** worksheet).

After a **Black Box** has been closed, the worksheet on the next higher level is displayed.



*If you start an experiment from a **Black Box** worksheet, the program will first return to the Main Chart before acquisition begins.*



*You can enter a **Black Box** and activate its worksheet for editing by double-clicking its module symbol on the worksheet.*

By default the worksheet of a new **Black Box** has a blue background. Color settings can be selected individually for each **Black Box**. Choose the **Colors** command from the **Options** menu to do so.



*Background color can be used as an indicator of the **Black Box** level. It will be easier to find your way through several worksheet levels without losing orientation by attributing a different background color to each of these levels.*

1.2.3 Layout to Clipboard/Layout as Bitmap to Clipboard

Use this command to copy the Layout Window as a WindowsBitmap (BMP) or as a Windows Metafile (WMF/CLP) to the Clipboard.

The layout is always copied to the Clipboard as displayed on screen, including all the changes made since last saving it. The Layout will not be modified.

The size of the Layout Window in the Clipboard is automatically matched to the size of the area used on the DASyLab worksheet. If you arrange only a few small elements they will appear larger on the clipboard.

Use the **Paste** function in any Windows application (usually in the **Edit** menu) to copy the metafile from the Clipboard to applications such as Paintbrush or Word for Windows.

1.2.4 Layout

Save as...

Use this command to save a Layout Window with a new name or to place it into another directory.

You can select the file name, the directory and the disk drive where the file is to be stored.

- Type the file name in the **File Name** box. (Note that the file name must be chosen in accordance with MS-DOS conventions.)
- If you do not type an extension, DASyLab automatically adds its standard extension for Layout file names (*.LAY). (DASyLab always saves Layout files in a specific format, even if you select an extension other than *.LAY.)
- You can...

- ... Select one of the file names offered on the list by double-clicking on the file name. The file will be replaced with the Layout.
- ... Select a different directory (double-click the directory name)
- ... Select a different drive for the new file
- ... You can select the type of files in the List Files of Type box (defined by their extension) to be listed in the box above.

If you wish to use your keyboard, press the TAB or the SHIFT+TAB keys to move from one field to another; select items from the lists by pressing ↑, ↓, SPACE and the ENTER key.



You can specify a standard directory for Module Bar files (Options menu command).

Load...

Choose this command to load a Layout previously saved to a file.

Type the file name in the File Name box. (Note that the file name must be chosen in accordance with MS-DOS conventions.)

You can...

- ... Select one of the file names presented in the list by double-clicking on the file name.
- ... Select a different directory (double-click the directory name),
- ... Select a different drive for the new file.
- ... You can select the type of files in the List Files of Type box (defined by their extension) to be listed in the box above.

If you wish to use your keyboard, press the TAB or the SHIFT+TAB keys to move from one field to another; select items from the lists by pressing ↑, ↓, SPACE and the ENTER key.

1.2.5 Module Bar

- Choose OK, or press ENTER, to install the selected module on the Module Bar. The Module Bar will now display the new icon.

The Module Bar settings are automatically saved when you exit the program.



To save a configuration permanently, or to configure several Module Bars for individual experiment tasks or users, choose the Save As... command from the Edit / Module Bar menu.

Open...

Choose this command to open a saved Module Bar.

You can select the Module Bar file from a list of files presented in a dialog box, using the standard Windows conventions. The default file extension (.DML) will be used to create a list of DASYLab Module Bar files.

Type a different extension here if you have saved DASYLab Module Bars with extensions other than .DML.



DASYLab can only open Module Bar files in its own DML format, no matter what extensions the files have.



When you open a Module Bar file, any modifications of the current Module Bar on the screen are lost, unless you have saved them using the Save As... command from the Edit / Module Bar menu.



You can specify a standard directory for Module Bar files (Options menu command).

Save As...

Choose this command to save the current Module Bar on the DASYLab screen to a file.

You can select the file name, the directory and the disk drive where the file is to be stored. If you do not type an extension, DASYLab will add the standard extension for Module Bar file names (.DML).



You can specify a standard directory for Module Bar files (Options menu command).

Set to Default

Choose this command to open the default Module Bar configuration onto the DASYLab screen.



The default Module Bar will be installed without further dialog. Any modifications of the current Module Bar on the screen will be lost, unless you have previously saved them.



The default Module Bar is not saved in a DML file but is saved internal to the program. Therefore, you cannot change its setup.

The DASYLAB.DML file always contains the Module Bar configuration that was active when you last exited the program.

1.2.6 Undo

Choose this command to undo the last autorouter operation (moving or connecting modules).

Other worksheet changes like changing module settings, adding or deleting module input or output channels cannot be restored. Choose this function using the menu or by the ALT+Backspace key combination.

1.2.7 Cut, Copy, Paste or Delete Flow Chart Parts

Modules and module groups with connections can be deleted, moved or duplicated.

Selection: First select the modules: click and hold the left mouse button inside the worksheet and select the area by dragging the cursor across the area. When you release the mouse button, the selected modules are highlighted. You can select or deselect single modules by clicking the left mouse button on the module while pressing the SHIFT or CTRL key.

Cut: To move modules around the worksheet, choose the Edit/Cut menu command or the SHIFT+DEL or CTRL-X key combinations. All connections to unselected modules are deleted.

Copy: Choose the Edit/Copy menu command or the CTRL-INSERT or CTRL-C key combinations. The selected modules will be inserted onto the worksheet with their channel settings intact.

Paste: Paste the stored worksheet part by choosing the Edit/Paste menu command or by pressing SHIFT+INSERT or CTRL-V at any position on the worksheet. The mouse cursor changes after activating the insert mode. Choose the position where the selection should appear. The entire worksheet can be used. The window is scrolled automatically when the mouse cursor moves outside the window border. Once the mouse cursor is at the destination press the left mouse button to paste the cut chart modules into the worksheet, if there is enough room for the operation. The paste operation can be repeated.



You can use the cut and paste function to integrate worksheet parts into a black box, but references to those modules in Actions will need to be edited to reflect the new name.



You cannot cut or copy hardware modules, including analog/digital inputs, outputs, counter modules or black boxes.

1.2.8 Delete

Choose the Delete menu command or the Delete key to delete the selected modules.

1.2.9 Search for Module

This function offers you an easy way to find each module used in complex worksheets. This menu item opens a list box, in which all used modules are listed (in-

cluding their position in black boxes). Double mouse click on one of the listed modules to move to the module and mark it. This function is also available in the popup menu that will be open with a left mouse click on any empty area of the worksheet.

The modules may be sorted by name, module type or by **Black Box**.

Double click on one of the listed modules to move to the module and mark it. This function is also available in the popup menu that will be open with a left mouse click on any empty area of the worksheet.

The **Open Button** at the bottom of the list window opens the **Properties** dialog box for the selected module.

1.3. Module Menu

Full details for each module are in the DASYLab Module Reference Guide, published as a separate volume.

1.3.1 Module Groups

Use the **Module** menu functions to select any of the modules provided by DASYLab to insert into your worksheet.

Within the **Module** menu, select a **Module Group**. A **Module Group** is made up of a number of modules providing similar functions. The **Module** menu provides the following module groups:

Input/Output

Trigger Functions

Mathematics

Statistics

Signal Analysis

Control

Display

Files

Data Reduction

Network*

Special

Add-On**

* This Module Group is available only with DASYLab-Net

** This Module Group is available only with the purchase of the Optional modules.

1.3.2 Modules

Choose a module group to display a submenu with the individual modules belonging to that group. Modules that are available in the DASyLab basic version or the full (+) version are indicated by symbols as described in Chapter 1 of the Module Reference Guide.

Module Symbols

A module represents a functional element in the DASyLab experiment setup (worksheet). A worksheet can contain up to 256 modules. Each Black Box module can also contain up to 256 modules, including other Black Box modules.

The **functions** symbolized by the modules provide all the operations required for an experiment,

- From data acquisition (by a data acquisition board) or signal generation (simulated by a virtual generator)
- To data analysis, evaluation and processing (mathematics, statistics, control, trigger and other functions)
- Up to their presentation on screen (display instruments) or export for documentation purposes (printer, metafile, etc.).

Each of the available modules in DASyLab is shown in two forms, both indicating the module's function: Module Bar icons and worksheet symbols.

A limited number of module icons can be installed on the Module Bar. They can be placed on the worksheet by a single mouse click on the Module Bar icon. Any module can be installed on the Module Bar, including Black Boxes that you have previously saved.



You can configure the Module Bar according to your specific requirements. You can save various configurations to files for later use. For details, please refer to Chapter 4 of this manual.

Installing Modules

A module can be installed on the worksheet either by choosing it from the **Module** menu or by clicking its icon on the Module Bar. Either way, the module will be placed on the worksheet as a module symbol. For modules that provide more than one basic operation, you must also select the function type.

Choose a Module Group from the Modules menu to display a submenu with the individual modules that belong to that group. The submenus list **all** the modules currently available. You can select any of the modules by clicking on its name. If a module is not available in your version of the software it will be gray, and you will be unable to select it.

A worksheet can contain up to 256 modules, including Black Box modules.

Configuring Modules

Use the **left** mouse button to double-click on the module's worksheet symbol to open the Properties dialog box to configure the module. The following parameters can generally be specified in the dialog box:

- The Module Name,
- A short Description,
- The number of inputs/outputs (up to 16 for most modules).

Once you have activated more than one channel, you can select each of them to display and define specific channel parameters.

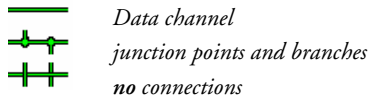
Use the F7 / F8 function keys to easily configure several channels for one module.

For specific module settings, please refer to the individual module descriptions. The general parameters are described in the Module Reference Guide. The specific module settings are described in the sections for each module.

Connecting Modules

A data channel is the connection between the output of a module and the input of another module. Data is transferred between modules via these connections.

In the DASYLab work area, lines like the ones shown below show connections, which always connect the output and input symbols of the module symbols. By creating junction points and branches, you can connect each module output to up to 16 inputs of other modules.



For details on how to **create**, **delete** and **rearrange** data channels and branches, refer to Chapter 3 of this User's Guide.



While the experiment is running, you can hold the CTRL Key while you left click on the data channel to get further information about the connected modules.

Moving Modules

A module can be moved to any position on the worksheet by dragging and dropping its worksheet symbol. Click on the worksheet symbol with the **left** mouse button and, while holding the mouse button down, drag it to any position. When the mouse button is released, the module symbol will automatically be aligned based on the **spacing value** entered in the Window Setup box of the Options menu.

Select Modules

Click on the worksheet symbol with the **left** mouse button or draw a box around the module (or modules) while holding the mouse button down. All modules within the frame will be selected.

Copy Modules

Selected modules can be copied using the Main Menu command Edit: Copy.

Paste Modules

Selected modules can be pasted into the worksheet using the Main Menu command Edit: Paste.

Deleting Modules

Modules can be deleted by double-clicking the worksheet symbol with the right mouse button. This opens a dialog box allowing you to remove the module or to delete its input or output connections. Modules also can be deleted using the Edit command of the Main Menu.

Search for Modules

You can search for installed modules with the Search for Modules command. You can select the command from the Edit menu or from the dialog box that appears when you double-click on the worksheet symbol with the right mouse button. The Search for Modules command opens a list box with all installed modules and black boxes. When you double click with the left mouse button on the desired module, DASyLab jumps to the module icon in the worksheet.

1.4. Experiment Menu

The most frequently required commands from this menu can also be chosen by clicking the corresponding icons on the Function Bar or by using keyboard shortcuts (Hotkeys).



Start

F5

Start experiment



Stop

CTRL+F5

Stop experiment



✓Pause/Resume

CTRL+F6

*Pause or resume
paused experiment*

Start/Stop at Time...

Remote Control

(DASyLab-Net only)

Auto Start

Select Driver...



Hardware Setup...



Experiment Setup...



Time Base Setup

Serial Devices

1.4.1 Start



Choose the **Start** command from the **Experiment** menu or click this Function Bar icon, or press F5, to start an experiment.

1.4.2 Stop



Choose the **Stop** command from the **Experiment** menu or click this Function Bar icon, or press CTRL+F5, to stop an experiment completely. All pipes will be cleared of data.

1.4.3 Pause/Resume Experiment



Choose the **Pause** command from the **Experiment** menu or click this Function Bar icon, or press CTRL+F6, to pause the running experiment. (✓ indicates that the experiment has been interrupted.)

This command stops the acquisition of new data, for example from a signal generator module, an A/D or digital input module, a PID or manual control. Data already acquired and still in the pipes will be retained, however, and processed completely.

The Pause/resume command is available only if the worksheet does not contain any module accessing the data acquisition hardware. The reason is that DASYLab derives its own clock from the board's master clock. This is not available if the measurement is paused. To pause a running experiment, use the Stop module.

1.4.4 Start/Stop Experiment at Time...

Choose this command to start, stop, and repeat an experiment at a specified time.

The dialog box that appears provides three fields where you can specify the time at which an experiment is to start, the duration of that experiment, and the interval after which that experiment is to be repeated.

Select the function by clicking its option button: Start Experiment at Time, and/or Stop Experiment after Time, and/or Restart Experiment after Time. A check mark (✓) next to the option button indicates that the function has been activated.

Then enter the time specifications:

- **Start Experiment at Time/after delay:** Specify the time at which the experiment is to begin. The default setting is the current date and time plus five minutes. You may either type the values for the date, the hour, the minutes, and the seconds, or press the UP ARROW (↑) or DOWN ARROW (↓) keys to scroll, or choose the values from the drop-down list.
- **Stop Experiment after Time:** Specify the duration of the experiment. The default setting is five minutes.
- **Restart Experiment after Time:** Specify the interval after which the experiment is to be repeated. There is no default setting for this interval. When this function has been activated, the experiment will be repeated according to the specified data until you:
 - Stop the experiment, or
 - Deactivate this function by clearing the option button in this dialog box, or
 - Modify the current worksheet, or
 - Open or create another worksheet.

While any of the Start/Stop by Time functions are active, a message is displayed on the status bar reminding you of the time at which an experiment is due to start or stop.



The settings specified here are not saved when you exit the program nor with the worksheet when you choose the Save or Save As... commands from the File menu.

1.4.5 Remote Control (DASYLab-Net only)

The Remote Control Dialog box allows you to define whether this computer acts as a Client or a Server. In Client mode (default) you can list all controlled servers by name. This option won't appear in Server mode. See DASYLab-Net: Communication with Other DASYLab Programs on page 5-11.

1.4.6 Auto Start

Choose Auto Start, indicated by a check mark (✓), to prepare the experiment setup for an automatic start later on. Enter the DASYLab command followed by the worksheet file name (for example, in the DOS Command Line box of the Program Item Properties dialog box of the Windows Program Manager) to start the experiment directly.

See Automatic Experiment Start in Chapter 6 for further details.



This setting is automatically saved with information about the window size and position when you exit the program. The same configuration will appear the next time you start DASYLab.

*These settings are **not** saved with the worksheet when you choose the Save or Save As... commands from the File menu.*

1.4.7 Select Driver...

DASYLab supports a wide range of data acquisition hardware from different vendors. You will typically need a different hardware driver for each manufacturer's data acquisition hardware. If you have more than one hardware driver installed on your system you may switch between them using the Select Driver function.

Note that only one driver can be used at a time.

The Select Driver dialog box lets you select one out of the installed hardware drivers. The change only occurs after exiting and restarting DASYLab.

If you do not see your hardware driver in the list, ensure that you have correctly installed the driver.

1.4.8 Hardware Setup...



If you have installed a data acquisition device in your system, you must set its parameters in this box.



The values entered here must correspond exactly to the configuration of your data acquisition hardware to ensure correct data processing by DASYLab.

Choose the Help button, or press F1, or choose Hardware from the Help menu, to obtain help on the settings.

If you have to exchange worksheets between several PC's (as in runtime applications), you must guarantee that the selection and sequence of measurement in DASYLab is exactly the same as in your target PC.



Read the Hardware Installation Manual for further information concerning installation and operation of your data acquisition device.

1.4.9 Experiment Setup...



Use this command to set the general parameters for data acquisition and measurement control.

Together with the resources provided by your system and the size of the worksheet you have designed, these settings determine the overall data processing performance as well as the response time of the individual functions. Available settings are:

- The Sampling Rate per Channel
- The Global Block Size
You can use **Global Variables** to define the sampling rate and block size settings. The variables are read once at the start of the experiment. You **CANNOT** use variables to change these settings while the experiment is running.
- The global settings for Analog Output and Digital Output
- The Synchronization mode that determines the clock source for all internal data sources of DASYLab (Generator, Slider, etc.). The two modes available are PC Clock and Data Acquisition hardware.
- Disk Streaming options
- The Driver Settings, which contain - depending on the installed hardware - the driver buffer size, the acquisition mode and the connected parameters Blocks per Series and Delay.



To internally equalize measurement time and system time in the analog input, digital input and counter hardware modules, use the following settings:

- Synchronization: PC clock
- Sampling rate: ≤ 5 Hz
- Block size: = 1

Sampling Rate per Channel

If you operate channels at differing sampling rates, enter the highest sampling rate here. The value entered here always defines the sampling rate for **all** the channels. You can specify whether this value represents Hertz, Kilohertz or Megahertz or minutes, seconds or milliseconds respectively.

You can also use **Global Variables** to define the sampling rate and block size settings. The variables are read once at the start of the experiment. You **CANNOT** use variables to change these settings while the experiment is running.

If you wish to operate some channels at lower rates, you must reduce the data rate by using the **Separate** or **Average** modules. This procedure yields channel rates that are true divisors of the fastest rate (the global rate).



If you set a sampling rate which is too high for the data acquisition board type in your system, or if the overall sampling rate is too high because you have too many channels at high sampling rates, you will be alerted by DASYLab, either before exiting this box, or before exiting the Analog Channel selection box. The sampling rate will automatically be rounded up or down to the nearest acceptable value.

With many of the data acquisition boards supported by DASYLab, the board itself generates the sampling rate. It is possible to enter a value not supported by the hardware. However, DASYLab will automatically adjust the value.

If you use interrupt-driven boards at acquisition speeds too high for the system, some interrupts and the corresponding samples may be missed. The indicator at the bottom left of the DASYLab window right to the buffer indicator shows whether DASYLab has detected such a situation. If this indicator flashes in yellow, interrupts have been lost. If the amount of lost samples is greater than 2%, the experiment is aborted.

Some boards are not able to indicate lost interrupts by a hardware flag. In this case, DASYLab tries to look for lost interrupts by software. This software solution does not guarantee that all lost samples are detected. With these boards it is possible that samples are lost without any indication.

Driver Buffer

Use this option to specify the temporary driver buffer memory size for the hardware driver to use to store data.

The hardware Driver Buffer temporarily stores data coming in from the data acquisition hardware before the software processes it. The driver first stores the acquired data to this buffer, and then DASYLab reads the data from the buffer.

During time-consuming operations, such as moving windows on the screen, the driver continues writing data to the buffer, so that no data is lost. Data acquisition will be stopped when the buffer memory is full. You may see the error **Sampling Rate too Fast** when this happens.

You can enter a driver buffer size between 4 Kbytes and 16,384 Kbytes. The default setting is 64 Kbytes. If the on-board memory resources of your computer are limited, enter a smaller value. You will be warned if the value you have entered is not valid.



The board driver will use the memory buffer selected; neither DASYLab nor Windows can use it.



The buffer size should be increased if you use a high global acquisition rate. Note that the driver buffer setting should not exceed 50 to 75% of the total available physical memory.

Block Size

Use the Block Size to set the number of samples that will be processed by worksheet modules during a single processing cycle.

Any value from 1 to 32768 can be entered here; powers of 2 are preferred.

The input modules collect the specified number of samples before passing them on to other modules.

You can also use **Global Variables** to define the sampling rate and block size settings. The variables are read once at the start of the experiment. You **CANNOT** use variables to change these settings while the experiment is running.

Computing the data in blocks increases the speed of the measuring process considerably; but it strongly influences the real-time performance of the system. Therefore, the block size should be selected carefully, taking the following principles into account:

- For a high data transfer rate, but a long latency period where the response time of subsequent modules, like control modules, is slower, use a large block size.
- For a short latency period, where the response time of subsequent modules is faster, but the data transfer rate is lower, use a small block size.

The actual data transfer capacity of a system depends upon many factors, therefore, a general formula for how to determine the ideal block size cannot be provided.

Generally, fast data acquisition operations require large block sizes, while small block sizes work well for slow data acquisition and control operations.

We suggest that you initially set the block size to half the sampling rate (the default setting), and then try out various other values to determine the best value for your individual task.

Acquisition Mode

The available Acquisition modes depend on the installed hardware and the modes supported by the driver.

- **Continuous mode:** When continuous mode has been activated, indicated by a check mark (✓), the data will be acquired without interruption at the specified **sampling rate** and processed by DASyLab.
- **One Series:** After the experiment start, the data will be acquired without interruption at the specified **sampling rate** the amount of data defined by the parameter **Blocks per Series** setting has been reached.
- **Running Series:** This mode is a repeated one series mode. After the specified number of blocks the acquisition is interrupted for at least the time specified by **delay**. If the delay is too short for DASyLab to process the data, the acquisition is delayed for a longer time.

The display modules do not recognize the delays. That means that in this mode there is no correspondence of time of day for the data samples. They are treated as continuous in DASYLab.

This mode is especially useful for fast scope applications.

- **Isolated Series:** This is the same mode as the **Running Series**, except that DASYLab recognizes the gaps. The resulting data stream is not continuous.

Quite obviously, this method leads to **acquisition gaps** between the blocks. Their size depends on the number of active channels, on the block size, on the complexity of the ensuing processing arrangement, and on the hardware resources.

This mode may be useful in cases where a high sampling rate is essential, while continuous high-speed data acquisition and processing cannot be realized, e.g. due to limited hardware resources.

If you wish the acquisition to stop after a certain time, enter the corresponding number of values in the **Count** field. (This value can be freely specified for each channel.) After that number of data has been acquired, the acquisition will be stopped automatically. (The default setting for this field - **zero** - means that the acquisition process is **not** supposed to be aborted when a certain number of values have been acquired.)

Analog Output and Digital Output

Set the general output parameters for analog and digital output individually.

Output Mode: The output mode determines whether the data samples are sent out synchronously with the acquisition rate or asynchronously, which means as fast as possible but in undetermined intervals.

- In the **synchronous** mode, data samples are sent out according to the acquisition rate specified for each output channel.
- In the **asynchronous** mode, data is sent out as fast as possible. The maximum rate depends on your hardware, the speed of your PC and the complexity of the worksheet. You should experiment with these rates to find out the best combination for your individual task.

Output Buffer

- If the **Fill once** option is selected, the output buffer will be filled only once, with the first block of data coming in after the experiment start. When the buffer is full, that first block of data will be sent out repeatedly, always beginning with the first data again. Any further values coming in from the worksheet will be ignored.
- If **Continuous refill** is chosen, the output buffer will continuously be filled with the data samples coming in from the worksheet, and these samples will then be sent out.

- **Output Rate:** The output frequency defined in this list box only takes effect when the **synchronous** mode is selected. Only frequencies that are an integer divider of the global acquisition rate are allowed. Changing the global acquisition rate also affects the output rate.
- **Output Start:** The value entered in the **Output Start** list box defines the number of samples that are to be collected before the analog output actually starts. This value must be the same as the **global block size**, or a multiple of it. This feature can be used for a defined delay or to synchronize the values that come from the worksheet.

Disk Streaming

This option enables or disables the fast storage of measurement data samples as they are acquired.

Disk Streaming provides the ability to write DASyLab data onto a mass storage media. Unlike the **Save Data** module that writes data of the data stream of up to 16 data channels into a file, **Disk Streaming** stores the data of all channels in a highly compressed 2-byte integer format. The amount of required mass storage space is reduced and the time to write the data procedure is much faster since only a fractional part of the data is produced. Additionally, the conversion of the integer data of the driver into the floating-point data of DASyLab is skipped. This is the main reason why **Disk Streaming** can write data sampled at high Acquisition rates to the mass storage device.



*No other channels should be connected to the **A/D**, **Digital** or **Counter input** modules, since this would significantly reduce the time advantage.*

Disk Streaming settings are made in the **Experiment Setup** dialog box. **Disk Streaming** can be enabled or disabled by checking the **Active** box.

Select the **File Name** button to change the name of the streaming file. Then, a file selection window opens to enter a file name.



*You can set the **Default Directory** for **Disk Streaming** files in the **Options** menu.*

Data samples are stored in the DASyLab data format (Universal Format 0). You can find a description of the data format in Chapter 6 of this manual.

Options

- **Warning if Channels are Connected:** If this option is enabled, a warning message will be issued and the measurement is immediately stopped if channels are connected to the Analog, Digital or Counter Inputs.
- **Don't Overwrite Existing Files:** This option prevents overwriting an existing Disk Streaming file. The measurement is stopped immediately after starting. A message is displayed if a file with the specified name exists and would be overwritten.
- **Circular Buffer:** This option implements an in-memory buffer, containing the last *n* Blocks per Channel.

Disk streaming files are read (as other data files) using the Read Data module. If the file to be loaded is a Disk Streaming file, the information Universal 0 is shown in the Data format text field of the dialog box of the Read data module. DASYLab data files written without Disk Streaming are stored in the Universal 1 data format.

Use the Channel group combo box to select which channels you want from the data stream: Analog 0 identifies the first 16 scanned analog channels, Analog 1 the next 16 scanned analog channels and so on. The same applies to Counter X. For Digital port X the selected port will always be displayed, as it was saved with the original worksheet.

Hints for Optimal Measurement Settings

Block Size/Sampling Rate

The performance of DASYLab depends primarily on the sampling rate and block size.

The sampling rate controls the resolution of the received signal (data bytes). The block size affects the response time of the worksheet. The response time is determined by the ratio of sampling rate and block size (S/B ratio). A **poor setting** causes data to accumulate in the driver buffer, shown by the Status Bar (the green/red bar lower right in the worksheet main window.) If the driver buffer is filled, DASYLab displays the “**Experiment stopped. Sampling rate too fast!**” error message.

General Hints for Sampling Rate and Block Size

In the data acquisition program the data is sent as data blocks via the connected data channels between modules. DASYLab works in a block dependent mode. Each module output has a 64 Kbyte buffer to hold the processed data. The module at the end of a branch periodically checks whether a data block is available in the buffer. If the answer is yes, the block is transmitted, processed and placed in the output buffer to be processed by the next module.

Each block contains measurement data, called samples, and a block header. The header contains information about the block, including the data type, the start time of the block and the sample interval. The program calculates a time stamp

for each sample. Many modules verify the time stamp and data type to ensure that only samples with the same characteristics are processed together.

Many multi-channel modules start processing data only if all inputs have data with the same time stamp. If there is no data at available one input, the module cannot process data at other inputs, and may start to block the data flow.

The module input buffer will fill until it is full. Because that module is unable to process data, the buffer of the preceding module will be filled up. The end result is that several branches of a worksheet will stop to work.

The first hint will be the “Animation bar” shown at each output in each module symbol. If the animation stops, the module is no longer processing data. Detailed information can be found in the channel debugger. Left click with CTRL key pressed on the data channel (with measurement running!). Important entries are “FIFO blocks” (max. buffer size) and “used” (buffer usage).

If you use different kinds of data in a multi-channel module (sampling rate, block size or type of channel...), the module can't process the different samples together. DASYLab will show a message like “Time information or block size is different. These channels can't be processed together.” and measurement stops.

The response time of DASYLab depends mainly on the ratio of block size and sampling rate.

- The block size defines how many samples are collected as a data packet and are sent as a block to subsequent modules.
- The sampling rate defines how fast the data is generated or acquired by the data acquisition board.

The resulting update interval of the worksheet depends on the fact that a new block will only be released and processed once it is filled with samples.

The following example will show the context:

The following response times are will be expected with different setting for block size and sampling rate.

<i>Block size</i>	<i>Sampling rate (1/sec)</i>	<i>Minimum response time (sec.)</i>
1	1	1
1	1000	0.001
1000	1	1000

The **smaller** the **ratio of block size to sampling rate**, the **more frequently** the **work-sheet will refresh** (Visualization/Display elements).



If you use too small a block size (e.g. 1) the message "Measurement stopped. Sampling rate too high" may appear, and the program stops!

Explanation of Response Time

When a new module is placed on the worksheet, it is placed in a module management list. The DASYLab dispatcher manages the distribution of CPU time to each module in that list. There is a physical speed limit that depends on the size

of the worksheet (number of modules and data channels) and the hardware configuration of the PC, because the dispatcher has to process all modules during the refresh time. For example, take a worksheet with 100 modules/data channels and a sampling rate/block size ratio (S/B ratio) 1/1000. In this case, the dispatcher has just 1 msec to process 100 modules. Each module gets 10 μ sec to process the received data. That time simply is too short, data will start to back up, and eventually the program will be halted!! An accurate examination of your experiment should define the sampling rate (resolution) of your measurement. The dispatcher's cycle time is defined by the block size and parallels the time to process the acquired data. The block size also defines boundary conditions such as the refresh rate of the visualization elements, range of the FFT and so on.



In our experience it is advisable to select a S/B ratio from 1 to a maximum of 10.



DASYLab has the option to show the system capacity usage (ratio of needed CPU time and max. available CPU time). You can see at the start at the measurement whether your system has enough capacities to fulfill the requirements of the measurement.

Hints for the resulting amount of data

The quantity of data to be transferred that loads the system also depends on the S/B ratio and increases with a rising S/B ratio. Each block of data includes a 26 Byte sized Header that has to be transferred with each block. If you use a block size of 1, the block has 4 actual data bytes and 26 bytes Header data, causing the system to transport more overhead information than actual data.

Example:

S/B ratio: 1000

Block size 1; Sampling Rate 1 kHz; 100 Data channels

*Data Bytes: 4 Byte * 1000 Hz * 100 = 400.000 Byte*

*Header: 26 Byte * 1000 Hz * 100 = 2.600.000 Byte*

Sum: 3.000.000 Byte

S/B ratio: about 2

Block Size 512; Sampling Rate 1 kHz; 100 Data Channels

*Useful Bytes: 4 Byte * 1000 Hz * 100 = 400.00 Byte*

*Header: 26 Byte * 1000 Hz / 512 * 100 = 5.078 Byte*

Sum: 405.078 Byte

The same principle has to be considered when storing data to hard disk when using the DASYLAB file format. Long duration measurement sessions with small block sizes may create unexpectedly large files. For low speed, long duration files, consider using the ASCII or IEEE32 file formats to minimize file size. You may want to experiment with different settings to determine the optimum configuration.

1.4.10 Time Base Setup

Time Base Global Setting



Use this command to configure the available time bases for your experiment.

You can use different Time Bases to synchronize data flow.

All time base settings can be configured here. Each available Time Base generates a tab on the top of the dialog box, to directly select the corresponding time base setup.

Basically DASyLab offers two time bases:

- **PC Clock:** The standard time base is a free-running timer synchronized with the PC clock. The default setting for the sampling rate is **10Hz**, with a block size of 1. You can change these settings to meet your specific requirements. Use this time base in modules that don't have a direct connection to the regular driver based data flow (e.g. Switches to control actions).
- **Driver:** The driver time base is synchronized with the driver interface and is used for data acquisition with the installed hardware. The available settings depend on the installed DAQ Hardware.

There are additional DLL drivers that use their own sampling rates (NI-DAQ, NI-CAN, instruNet, etc.). If one or more of these drivers are installed, the Time Base Setup... will display additional tabs in the dialog box.

Selecting Time Bases in a Module

Data generating modules (such as Generator without Modulation, Switch, Slider, Coded Switch, TTL Generator, Time Base without control input, and Sequence Generator without control input) provide a setting to select one of the available time bases allowing you to synchronize the module to a specific data flow. In most cases you don't need to use a control input or synchronization.

Tips for using different Time Bases

If you need a quick reaction to an event, it is recommended that you use small block sizes (1 if possible). If you set up your flowchart with a "useful" relation between sampling rate and block size (~ 1:10), you must set the block size from 100 up to 1000 using a sampling rate of 1 kHz. That block size is too large to get a fast reaction. You can now use the second time base PC Clock with a separate setting of the block size to 1.

(Also see **Hints for Optimal Measurement Settings** on page 4-29.)

Time Bases of imported (reloaded) worksheets



A time base (controlled by hardware), that was used while the worksheet was created, but is not available on the PC at the time that the worksheet is loaded, is still shown, but placed in brackets in the time base dialog.

Example: The worksheet was created on a system using the NI-CAN hardware. Now it is loaded on a PC without the NI-CAN hardware. In the time base dialog you will find the entry for the NI-CAN time base placed into brackets indicating that time base hardware isn't available.

Regardless, all settings can be made for the unavailable time base and these settings will be stored in the worksheet. If you run the worksheet without the hardware, all modules that use that time base are synchronized to the PC clock. It is likely that they will work correctly with only a small time shift. Please use caution, and ensure that you test the worksheet with the correct hardware to ensure that all timing related functions work correctly. For example, a relay controlled by a PC-clocked switch may work correctly in this mode, but may fail when the actual hardware time base is available.

1.4.11 Serial Devices

You can set up multiple Serial Devices using saved configuration files. This dialog links serial devices to a saved configuration file. When you insert a Serial or ICOM Input or Output module into the flowchart, available linked devices are shown in a selection list. You don't need to load an additional configuration file.



*Please note that any settings made directly in the module properties after saving a configuration file are **not automatically** stored with the flowchart. To save these changes you must use the **Save** button in the module dialog box. Please pay attention that you select the correct configuration file name linked to the selected device name.*

Selection of the Type of Serial Module

You can select one of the available module types:

- Serial In (Master)
- Serial In (Slave)
- Serial Out
- ICom Input (Master)
- ICom Input (Slave)
- ICom Output

Buttons

- **OK:** Verifies and saves the changes and closes the dialog box.
- **Cancel:** Closes the dialog box without any changes. Any changes to settings are lost.
- **Help:** Opens the DASYLab Help.
- **Add:** Adds a new entry to the list of predefined devices. You can name the new configuration and link an existing configuration file to that

entry. If you don't enter a name DASYLab will create a default name by using the name of the assigned configuration file.

The file types to link are

- for RS232 Input Master module = (*.SIM)
- for RS232 Input Slave module = (*.SIS)
- for RS232 Output module = (*.SOU)
- for ICOM Input Master module = (*.IIM)
- for ICOM Input Slave module = (*.IIS)
- for ICOM Output module = (*.IOU)



Use a descriptive name to save your configuration files to easily identify a specific device. Then you do not need to enter a specific name for configuration because DASYLab creates a suitable name.

- **Remove:** Deletes an entry from the list of devices. You cannot cancel the deletion in the dialog. To restore the entry, leave the dialog using the **Cancel** button.
- **Change:** You can rename an entry or change the link to the configuration file using that button.

1.5. View Menu Commands

The commands of this menu allow you to change the appearance of the DASY-Lab worksheet on the screen. You can click on the corresponding Function Bar icons to choose some of these functions.

Overview

Animation (Worksheet View only)

Block State

FIFO State

Function Bar

Module Bar

Status Bar

All Windows



Make Visible (Show)



Make Invisible (Hide)



Minimize



Restore

Select Windows

Make Visible (Show)...

Make Invisible (Hide)...

Minimize ...

Restore...

Save Window Arrangement

ALT-x

Select Window Arrangement (1-8)

Delete Current Window Arrangement

1.5.1 Overview

Choose this option to display the complete DASYLab worksheet at a reduced size in a separate window.

The display gives you an overview of your complete worksheet. The display is automatically scaled so that the entire worksheet is shown in the window. A check mark (✓) indicates that this function has been chosen.



You cannot edit or change the worksheet in the overview window.

1.5.2 Animation

Choose this option to visualize the data flow by switching the animation (Block Status and FIFO Status) of the worksheet on or off. A check mark (✓) indicates that the function has been activated.

When Animation is active, small colored indicators in the output symbols of each module will display the data flow and buffer (FIFO) status.

Block Status: Displays the status of data block processing. The bar will toggle from red to green, indicating that the module is processing data.

FIFO Status: Choose this option to switch the animation of the FIFO Status in the worksheet on or off (✓ indicates that this function has been activated.)

When Animation is active, the load of the FIFO buffer of each module will be displayed by a bar indicator replacing the output symbols of the respective modules above the small bar indicator of the Block Status indicator). The size of the bar changes in **steps of 10 %** depending on the load of the buffer.

To guarantee that the worksheet runs smoothly, the bar should not exceed 10 %. Larger values point to data flow problems that may cause delayed actions, loss of data and, in the worst case, may force the program to stop.



Data may be processed more slowly when the Animation function is active, since graphics operations use more system resources.

1.5.3 Function Bar

Choose this option to display or remove the Function Bar below the Main Menu Bar of the DASYLab window.

A check mark (✓) indicates that the Function Bar is displayed.

The Function Bar displays a selection of icons that provide easy access to menu functions often used during experiments. Click the icon representing the function. (For a detailed description of the Function Bar configuration, refer to Chapter 3 of this manual.)

To enlarge the work area for your worksheet, remove the Function Bar from the screen. With the Function Bar removed, use the menu commands or hot-keys. To start an experiment, for example, choose **Start** from the **Experiment** menu, or press the ALT, X, S keys, or press F5.

When the mouse pointer is pointing at a Function Bar icon, a QuickInfo tag with the name of that function will appear. You will find such tags in all of the module windows providing a Function Bar, such as the display windows of the Y/t Chart or the List Display modules.

To redisplay the Function Bar, choose this command from the View menu.

1.5.4 Module Bar

Choose this option to display or to remove the Module Bar on the left hand side of the DASYLab window.

A check mark (✓) indicates that the Module Bar is displayed.

The Module Bar displays a selection of frequently used modules in icon form. Use the **left** mouse button to click on the icon that symbolizes the module you want to add to your worksheet. (For a detailed description of the Module Bar configuration, refer to Chapter 3 of this manual.)

To enlarge the work area for your worksheet, you can **remove** the Module Bar from the screen. With the Module Bar removed, use the **Module** menu commands to add modules to the worksheet. For example, choose **Display** from the **Module** menu, and then choose **Chart Recorder**.

To redisplay the Module Bar, choose this command from the View menu.

1.5.5 All Windows

You can use the View Menu to control the state of the Display Windows. There are two mode: Visible/Invisible, and Restored/Minimized. Invisible windows are hidden from view, whether restored or minimized. Invisible windows cannot be restored or minimized. The follow commands apply to All Windows. To change one or more windows, use the Select Windows command of the View menu.

All Windows: Make Visible



Choose this function, or click the icon on the Function Bar, to show all the hidden display windows and icons contained in the worksheet as restored windows or in icon form. This command does not restore iconized windows.

To show only selected hidden display windows, see the **Select Windows: Make Visible** function.

All Windows: Make Invisible



Choose this function or click on the icon on the function bar, to hide all display windows contained in the worksheet. Minimized windows (represented by an icon at the bottom of the screen) are also hidden.

To hide selected display windows, see **Select Windows: Make Visible** function.

All Windows: Restore



Choose this function or click on the icon on the function bar, to restore all the minimized display windows contained in the worksheet. This command has no effect on invisible windows or icons.



When you first activate several display windows of the same type (e.g. Y/t Charts or Bar Graphs) using this function, they will all be automatically opened in the center of the screen, on top of each other. Drag the top window to one side to view the next display window.

All the minimized display windows will be restored. To restore only one display window, double-click its icon at the bottom of the computer screen or choose Select Windows: Restore from the View Menu.

All Windows: Minimize



Choose this function or click on the icon on the function bar, to minimize all activated display windows contained in the worksheet..

To minimize one display window, click its Minimize button (in the upper right-hand corner of the display window).

To re-activate all the display windows contained in your worksheet, choose Normalize Display Windows from the View menu, or click the corresponding Function Bar icon.

1.5.6 Select Windows

You can use the View Menu to control the state of the Display Windows. There are two modes: Visible/Invisible, and Restored/Minimized. Invisible windows are hidden from view, whether restored or minimized. Invisible windows cannot be restored or minimized. The follow commands apply to one or more selected Windows. To change all windows, use the All Windows command of the View menu.

To select more than one window at a time, use the standard windows controls: click and drag to select a contiguous range of lines; SHIFT-click to select contiguous lines; or CTRL-click to select any two or more lines.

Select Windows: Make Visible

Choose this function to open a list box with all hidden (invisible) display windows or display icons contained in the worksheet. To show one or more display window, select them from the list. Press the OK button to accept the selection and leave the dialog box. The selected will be shown as a restored window or an icon, depending on the state that it was in when hidden.

Select Windows: Make Invisible

Use this function to hide one or more display windows or icons. A list of all visible display windows and icons will be listed. To hide one or more display win-

dows or icons, select them from the list, and press OK to accept the selection and leave the dialog box.

Select Windows: Restore

Use this function to open a list box with all visible iconized windows. To restore one or more display windows, select one or more from the list and press the OK button to accept the selection. The selected windows are restored and shown as windows.

Select Windows: Minimize

Choose this function to open a list box with all visible restored display windows. To minimize one or more display windows to an icon, select them from the list and press the OK button to accept the selection. The selected windows are minimized and shown as icons at the bottom of the Windows Desktop.

1.5.7 Window Arrangements

Save Window Arrangement

Choose this function to save the sizes and positions of all the activated display windows and to define an identifying tag for that arrangement.

Use this function to easily switch between different display window arrangements even while an experiment is running. You can save up to 8 different display window setups.

To activate this function,

- Press ALT+SHIFT+Arrangement Number (1–8) on your keyboard, or
- Choose the Save Window Arrangement command from the View menu.

The Window Arrangement dialog box appears, displaying the Arrangement - Number and Text either of the current setup, or, if you have used the keyboard shortcut, of the setup whose number you have typed after ALT+SHIFT.

You can now save the current arrangement under any Arrangement Number from 1 to 8 and add a name or short description of your choice in the Text field. Click OK, or press ENTER, to complete the procedure. If an arrangement has already been saved under this number, you will be warned.

The name or description you have entered in the Text field appears in the list of window setups on the Function Bar.



Choose Select Window Arrangement to re-arrange the display windows in one of the arrangements you have previously saved.



Choose Delete Current Window Arrangement to delete the current setup from the list of saved arrangements.

Select Window Arrangement

Choose this function to re-arrange the activated display windows on the screen in one of the arrangements you have previously saved. Each of the activated display windows appears in the same position and size as previously saved.

Additional display windows (not contained in the arrangement when it was saved) remain in their positions while the others return to their defined places on the screen.

To activate this function,

- Click on the list box on the Function Bar (or on the down arrow on its right), or
- Press **ALT+0** on your keyboard, or
- Choose the **Select Window Arrangement** command from the **View** menu.

In the Function Bar list box, the **nametags** of all the saved arrangements are listed. Click on the name of the arrangement that you want to restore, or choose that tag by pressing the arrow keys on your keyboard; then press **ENTER**.

Using a keyboard shortcut, you can select any of the saved arrangements by pressing **ALT+Arrangement Number (1–8)**.



If you restore one of the saved window arrangements as described, the sizes and positions of the current display windows will be lost, unless you have saved them under another Arrangement Number.



If you delete one of the display modules contained in the saved window arrangement from the worksheet, its display window is permanently removed from the saved arrangement, too. To restore the original setup, you must re-install the display module in the worksheet, and save the display window arrangement again.



*Choose **Save Window Arrangement** to save the current sizes and positions of all the activated display windows.*



*Choose **Delete Current Window Arrangement** to delete the current setup from the list of saved arrangements.*

Delete Current Window Arrangement

Choose this function to delete the currently displayed setup of display windows from the list of saved arrangements.

Only the information concerning the sizes and the positions of the display windows are removed; the display windows themselves remain in the worksheet unchanged.

To activate this function, press **ALT+CTRL+Arrangement Number (1–8)** on your keyboard, or choose the **Delete current Window Arrangement** command from the **View** menu. You will be asked to confirm your decision before the information is actually deleted.



*Choose **Save Window Arrangement** to save the current sizes and positions of all the activated display windows.*

⇒ *Choose Select Window Arrangement to re-arrange the display windows in one of the ways you have saved before.*

1.6. Options Menu

The commands of this menu allow you to change the display of the DASYLab worksheet and to switch the Autorouter function on and off.

- Global Setup...*
- Directories...*
- Default Fonts...*
- Hot Keys...*
- Colors...*
- Autorouter*
- Global Worksheet Parameters*
- Password Protection...*
- Password Definition*
- Screen Locking*
- Key Events...*
- List of Actions*
- Overview of Actions*
- Global Variables and Strings...*
 - Define Global Strings...*
 - Define Global Variables...*
 - Export Global Strings/Variables*
 - Import Global Strings/Variables*
 - Overview of Global Strings/Variables*
 - Configure Startup Dialog*
- Copy Channel Names*
- Switch to Runtime*

1.6.1 Global Setup...

Choose this command to change the DASyLab screen settings and program start options.



The settings are automatically saved when you exit DASyLab. The same window setup will be used the next time DASyLab is started. These settings are *not* saved with the worksheet when you choose the **Save** or **Save As...** commands from the **File** menu.

Window Type

Select this option to place a background grid on the worksheet.

Type of Grid

- **Dots** The grid intersections will be marked by dots.
- **Lines** A complete grid will be displayed.

Spacing

Choose a value between 8 and 48 points to specify the minimum distance between the module symbols in the work area and to specify the size of the screen grid.

After setting the spacing, new modules will be placed using this setting. When the spacing value is changed, it will not affect the layout of existing modules on the worksheet. When you move a module, it will be positioned using the new settings.



The spacing value should be at least 16 points, to ensure that there is enough space for data channels between the module symbols.

Start Options

- By default, DASyLab copyright information is displayed at program start. In the **Show Copyright Information** box you can choose if you wish this information to be displayed each time or not.
- When you open a worksheet, the **Module Bar** settings that were saved with it will be loaded, possibly modifying the current **Module Bar** settings that you'd rather maintain.
 - **Activate the Load Module Bar with Flow Chart** box if the current **Module Bar** configuration is to be replaced with the new one from the worksheet file.
 - **Deactivate this box** if you wish to retain the current **Module Bar** configuration whenever you open a worksheet file.

Common Options

- Choose **Open dialog box when Module is created** to automatically open the module properties dialog box when the module is added to the worksheet.

- Choose **Show File Information with Flow Chart** to display the **File Info** each time the experiment starts.
- Choose **Show Warning if Data Stream stops** to cause the program to display a message if one module isn't able to process the incoming stream of data.
- Choose **Show Warning if Flow Chart changed** to cause the program to display a message if the worksheet has not been saved when the program is closed.
- In all write data operations, the **Create Directory if Necessary** option causes DASYLab to create the named directory when it does not exist

Example:

Bad entry in Edit field:

Default Directory: C:\DASYLAB\DATA

New Directory: C:\DASYLAB\DATA\

Correct entry in Edit field:

Default Directory: C:\DASYLAB\DATA

New Directory: C:\DASYLAB\DATA\\${STRING_001}

Where {STRING_001} contains the advanced path and file name, such as <NEW-DIR\FILE1>.

The full path of the newly created directory and file will be:
C:\DASYLAB\DATA\NEW-DIR\FILE1.DDF

For example, creating new directories is useful when writing files into subdirectories with a time stamp, such as creating day, month or year to store the files into them using an event driven action.

To create the time stamp, don't use the global string \${DATE}, because the punctuation marks (dots) in this string may be incompatible with the Windows file structure. Instead, combine the \${DAY} - \${MONTH} - \${YEAR} strings and use another punctuation mark.

- The **Hide Flowchart Load Progress Bar** option turns off the progress bar when the elements of the worksheet are loaded.
- Choose **Create Module via Drag & Drop** to insert new modules onto your selected location on the worksheet under user control. The modules are not inserted at default places, but DASYLab first shows an insert cursor to allow you select the position the new module will be placed.
- If the **Release CPU time if idle** Option is active DASYLab releases the reserved CPU time to other programs
- Choose **Load user defined colors from Flow Chart** to import the user-defined colors of a worksheet. These colors are then available as additional colors in all color dialog boxes..
- Choose **Show Module Tooltips** to enable the program to display a small box with information about the module under the mouse cursor.

Start/Stop Options

- If the **Save Backup Flow Chart** setting is active, the current worksheet is saved under the file name LAST.DSB when the DASYLab worksheet is started.
- The **Copy Channel Names at Start of Experiment** option enables or disables the DASYLab default setting to **Copy The Channel Names** of the connected modules into newly connected modules
- The **Switch to Displays at Start of Experiment** option allows you to specify that the **Worksheet** view will be hidden, and the **Display Window** view will be activated when the experiment starts.
- The **Switch to Layout 1 at Start of Experiment** option allows you to specify that the **Worksheet** view will be hidden. The **VITool Window** will be activated with **Layout page 1** when the experiment starts.
- The **Switch to Worksheet at Stop of Experiment** option allows you to specify that the **Worksheet** view will be restored when the experiment stops.

1.6.2 Default Directories

Use this menu item to set and modify the locations of drives and directories that DASYLab uses by default for loading or saving files. Different directories can be set up for various file types.

When you select this menu item, a dialog box is opened, displaying each file type with the currently valid directory. Clicking on the respective switches can change the setup.

Default drives and default directories can be specified for the following file types:

Item	File type
Worksheet	DASYLab worksheet files (extension *.DSB)
Streaming	data files for fast disk streaming
Data	data files of the Write Data module
Devices	configuration files for the serial interface and the IEEE interface
Other	Module Bar, Interpolation and other files

By clicking on a switch a dialog window opens allowing the selection of a drive and a directory. New directories can also be created here.

The drives and directories specified here are only used as defaults. If a file name must be assigned while working with DASYLab, these pre-set locations are shown in the input window for the respective file type. If required, a different drive and directory can be selected.

After the initial installation, the DASYLab installation directory is used for all default settings.

The settings made here are saved in the DASYLAB.INI file in the Windows directory.

1.6.3 Fonts

This option allows you to define the module display windows font style and size. Choose from the following 4 options:

- **One Font, Fixed Size**
If this option is used, all text elements of the display windows use the same type of fonts. The size is fixed and is always used even if the display window is stretched or compressed. Use the Font... button to select type and size.
- **One Font, Variable Size**
If this option is used, all text elements of the display windows use the same type of fonts, but the size is adapted to the proportions of the text areas of the display window if the window is stretched or compressed.
- **Variable Font, Fixed Size**
This setting allows you to select several types of fonts for the elements of the display window. Use the buttons on the bottom of the dialog box to select individual font styles and sizes for these elements. The selected fonts size is always used even if the display window is stretched or compressed.
- **Variable Font, Variable Size**
This setting allows you to select several types of fonts for the elements of the display window. Use the buttons on the bottom of the dialog box to select individual font styles for these elements. The size of fonts is adapted to the proportions of the text areas of the display window if the window is stretched or compressed.



The buttons to select the different text elements in display windows depend on the kind of display window module. For example the buttons names for the Digital Display module are Channel Name..., Value... and Scale..., or while the Status Lamp module only shows Channel Name... and Status text...



If you activate these functions from the Options menu, the setting is applied to all newly created modules on the worksheet; but existing modules are not affected. You can change this default setting by opening the individual text dialog box of the modules.

- **Apply Button**
Use this button to change the font of all text elements to the chosen default type. All existing modules are changed.

1.6.4 Hotkeys

Use this command to assign combinations of keys to all available DASYLab menu functions. After a Hotkey is assigned to a function, it can be used by simply pressing

the key or key combination. Use the Hotkeys menu command to open a window listing all defined Hotkeys.

Add Button

- Click the Add... button to open a window, listing all available menu function/instructions in form of a menu tree. To assign a Command to a Hotkey or hotkey combination select the command in the tree, click in the **New Key** edit field and **press the keys** you want to assign.
- If a combination of keys is assigned to a selected menu instruction, it is shown in the **Current combination of keys** field.
- You can also use the **Free H(ot)Keys** button to open a list with all available unused keys and key combinations. You can select the Hotkey directly in this list and click **OK** to close the window and move the selection into the **New Key Combination** field.

Delete Button

- The **Delete** button removes the selected HotKey.

Defaults Button

- The **Defaults** Button deletes **all user-defined** Hotkeys and loads the default settings.



Some keys and combinations of keys are reserved by Windows. These keys are not available for redefinition.

1.6.5 Colors

Use this command to choose the colors for the DASYLab worksheet display. You can specify colors for the background, the grid and the data channels wire core and sleeve.



The settings are automatically saved with information about the window size and position when you exit *DASYLab*. The settings are not saved with the worksheet when you choose the **Save** or **Save As...** commands from the **File** menu.

Standard Colors

- Select the item you want to change. The **Windows** color selection dialog box appears.
- Click on the color of your choice in the **Standard Colors** palette using the **left** mouse button.
- If you prefer to create your own custom color, click **Edit Colors**.

Edit Colors

You can create custom colors for the background, the grid and the data channels, wire cores and sleeves.

- Select the item you want to change. The **Windows** color selection dialog box appears.
- Click on the color you want to edit using the **left** mouse button.

- Choose **Edit Colors**.
- To increase or decrease the amount of primary color, brightness and/or saturation used in a color, drag the crosshairs and/or the vertical scroll bar keeping the **left** mouse button depressed.

You can also type numbers from 0 to 255 in the corresponding boxes. The resulting color is displayed in the Custom box.

To reset all the values for the standard color that comes nearest to the custom color you have just defined, double-click the Standard box.

- Choose the **OK** button to change the color of the selected screen element to the custom color.
- To save the custom color you have defined:
 - Click any of the boxes in the Custom Colors palette first.
 - Then modify its color as described above.
 - Click **Add Color to Palette**.
 - Specify further colors from the Custom Colors palette and modify them.
 - Choose the **OK** button to change the color of the selected screen element to the custom color.
 - To return to the color originally displayed on the screen, choose the **Cancel** button.

1.6.6 Global Worksheet Parameters

Activate the **Error Handling** function to increment the specified global variable by 1 if the stream of data in worksheet has blocked.

This setting is stored in the worksheet.



The global variable used in this dialog is not shown in the **Global Strings/Variables overview!**

1.6.7 Autorouter

Choose this option to switch the Autorouter function on or off. A check mark (✓) indicates this function has been activated.

When the Autorouter is active, DASYLab automatically finds the correct paths for your data channels. DASYLab ensures that the data channels do not run across modules or hide other data channels. The Status Bar displays the progress of the autorouting operation.

When the Autorouter is not active, you can determine the paths of your data channels.



*The Autorouter function **cannot** automatically rearrange existing data channels to take the shortest or most direct way between modules. You must manually rearrange a data channel or move a junction point to a different position to improve the clarity of your worksheet structure.*

1.6.8 Password Protection/Password Definition

Use a password to protect a worksheet against unauthorized use or modification. A check mark (✓) indicates that this function is active.

Password protection is activated by

- Clicking the Password Protection command,
- Specifying the password itself by using the Password Definition command,
- And then saving the worksheet.

Password protection applies to the entire worksheet. Black Boxes may also be protected via Passwords. The settings are made in an active Black Box in the Edit: Black Box Properties.

If Password Protection is activated without entering a password at the same time, you will be prompted to specify the password when the worksheet is saved.

Once Password Protection has been activated and the worksheet has been stored, it can only be opened again by entering the correct password.

This function is only relevant when you save a worksheet or use the Screen Locking function. It does not affect any other function or module.



*If you have forgotten or do not know the password of a worksheet, you will **not be able to open the worksheet**. Take this into consideration when you choose a password, and take adequate precautions so that you will always remember your passwords.*

A password must contain at least 4 and up to 10 alphanumeric characters. If the number of entered characters is less than 4, a warning message will appear when you close the dialog box.

For security reasons, the password must be entered twice. If the two passwords are not identical, you must reenter the password.

While you type the password, the characters are not echoed, but appear as asterisks (*). Password recognition is case-sensitive; the same combination of upper and lower case characters must be specified.

A correctly entered password is valid

- Until you exit DASyLab, or
- Until a different password is entered, or
- Until you open a different worksheet requiring a different password, and you enter that new password correctly.

1.6.9 Screen Locking

Activate Screen Locking to disable all keyboard and mouse inputs after starting measurement.

To unlock, use the ESC key. If Password Protection is active, the password will be requested. You must enter the correct password to Unlock.

Screen locking also can be activated and deactivated via Event Driven Actions.

When Screen Locking is activated, Key Events, as defined in the Options Menu, are available.

1.6.10 Key Events

Use Key Combinations to cause actions on the worksheet.

It is possible to cause all Actions of modules that are used in a worksheet by using an Action module or using key or key combination (1 or 2 Special key + one normal key for example CTRL+SHIFT+S).

Select the option menu command key events. If the Show Window with defined Key Events switch is set, the window shows all defined key actions. You can hide single key events in the dialog box define key events

The New button opens a key events dialog box where you can define parameters used by the key actions.

To change existing Key Events, choose the line and click the Change button. The dialog box will show the active parameters. Click in the parameter field to change them.

The Delete button deletes selected key action.

The Reset button deletes all defined key events.

To use Key Events you need:

- The key or key combination,
- The Receiver for the action,
- The Action itself and
- The Action-dependent Parameters

Receiver

The Receiver entry specifies the module that is to execute the initiated action.

- In the Module pull-down list box, all the modules in the worksheet (which can perform actions) are listed together with the DASYLab main window.
- Use Channel to specify which channel(s) of the selected module is to perform the actions. Individual channels can be separated with spaces or commas. Channel groups are entered with hyphens.

Example: To use the channels 1, 3, 7 and 9 up to 12 of the Receiver module for the event, enter: 1 3 7 9-12 or 1, 3, 7, 9-12.

This setting does not influence actions relating to the entire module.

Parameters

You can define **Parameter** values to be used by the action (Worksheet name, Layout number, Global String, etc.).

Screen Lock mode

You can allow key events while Screen Locking is active. The default setting is **Do Not Execute Action**.

Description

While the **Show Window With Defined Key Events** option is active, key actions will be displayed in an overview window. The default is **Display**. You can insert a descriptive text string in the entry field that will be shown in the window. If the string is empty, the **Action** text will be displayed.

1.6.11 List of Actions

The **List Actions ...** item opens a dialog box that allows you to copy a description of any actions and their parameters, as defined in the worksheet, into the clipboard or to store it into a text file.

You can select one of the defined action modules from the list window. The parameters of the selected action module are shown in the display area.

You can also select one of the actions defined in the selected module. The parameters of the selected action are shown at **Event Parameter**, **Receiver Channel** and **Parameter of action (Number, Value)**.

Buttons

- **Copy:** This button opens a dialog box to copy the data into the clipboard. You can select whether the parameters of the selected or all defined action modules are copied. Click on **OK** to start the copy.
- **Save:** This button opens a dialog box to save the data into a text file. You can select whether the parameters of the selected or all defined action modules are stored. The **File name** button opens the file menu to select/create the file the data become stored. Click on **OK** to start saving data.

The text file has the following format:

```
Module name:  Action00
Channel:      0
Channel name: Action 0
Event:        Rising Edge
Receiver:     <DASYLAB>
Receiver Channels: All Channels
Action:       Activate Layout
Layout:       1
Asynchronous action

Channel:      1
```

```

Channel name:  Action 1
Event:        Falling Edge
Receiver:     Generator00
Receiver Channels:  All Channels
Action:       Change Amplitude
To:          2,0000
Asynchronous action
...
Module name:  Action01
Channel:     0
Channel name: Action 0
Event:       Rising Edge
Receiver:    <DASYLAB>
Receiver Channels:  All Channels
Action:      Activate Layout
Layout:      2
Asynchronous action
And so on.

```

1.6.12 Overview of Actions

The Overview of Actions... command opens a list box, showing all Event Driven Actions defined in the actual flowchart.

The four columns show the name of the action module, the defined condition, and the event such as the receiver of the action. You can choose each of these four items to be displayed in each column. The entries in the list will be ordered alphabetically.

- **Copy:** This button opens a dialog box to copy the data into the clipboard. You can select whether the data of the selected or all defined actions are copied.
- **OK** button starts copying the information
- **Save:** This button opens a dialog box to save the data into a text file. You can select whether the parameters of the selected or all defined actions are stored.
- **File Name** opens the file menu to select/create the file where the data will be stored.
- **OK** button starts saving data.

To get more detailed information about the defined actions you can use the List of Actions... command. There you can select each action module defined in worksheet and display all of its settings and parameters.

1.6.13 Global Variables and Strings

This Options menu item allows you to configure Global Strings and Variables. The next sections describe each menu item.

1.6.14 Define Global Strings

Global Strings allow you to define and modify ASCII text strings used in DASYLab while a measurement is running. You can pass text strings to DASYLab

worksheets running in succession (See the Working Example below). You can define up to 999 Global Strings. When the measurement is running a Global String can be defined or modified using the menu command **Define Global Strings**. Defined strings are stored with the worksheet.

You can display Global Strings as text objects in Layout Windows. Use the placeholder `#{STRING_xxx}` in the line text object. Replace xxx with the number of the string.

Several System/Program Information strings and variables (such as Free Memory, System Resources, Author, Company, etc.) are implemented in DASyLab as fixed placeholder strings/variables. If an Edit field will accept placeholders, right mouse click in the Edit field to open a Popup menu with the Global Strings displayed as a menu item. This Item opens a list with all available strings. Double-Click on the requested placeholder to insert it into the Edit field

You can use the RS232 Input module to receive strings instead of measurement values and then assign them to a Global String.

Optionally, you can to load a Global String after starting a worksheet or save a string into the DASyLAB.INI file when you stop. Other applications are able to modify strings via DDE. And, you can define, load or save a Global String using Event Driven Actions or key events.

Each Global String consists of a number, text (max. 255 char.) and options. The **Reset** button sets all strings in the list to the default settings. The **Reset all** button deletes all strings.

You can select and modify more than one string simultaneously using the **SHIFT** and **CTRL** keys to select the strings.

You can define the following **Options** to handle Global Strings:

- Read from INI file at start of experiment
- Write to INI file at stop of experiment
- No DDE access to Global String
- Write to data file (DASyLab or ASCII) Header
- Show Global String in window
- Type In at start of experiment
- Do not overwrite description
- Input is required to close dialog box
- File Name Dialog

You can also define a short description.

Buttons

There are several buttons to the right of the dialog box:

- **Reset**
- **Reset All**
- **Extended...**
- **Overview...**

- Copy...
- Save...

Reset

Return the selected variable to default settings. Any values, names, Extended options and parameters will be lost.

Reset All

Return all variables to default settings. Any values, names, Extended options and parameters will be lost.

Extended...

Click on the **Extended** button to make additional settings for Global Strings.

- **Name:** You can define a name to be used with variables and strings. You can refer to the String/Variable using the defined name: $\{\text{NAME}\}$ or by its number $\{\text{VAR_xxx}\}$ or $\{\text{STRxxx}\}$.
- **Expressions:** If the **Calculate Expression** automatically option is activated you can define a mathematical expression similar to the **Formula Interpreter**. The expression is allocated to the variable or string. If one of the parts in the expression is changed, the variable or string is automatically recalculated.

Each expression is a special type of data (numeric <variable> or alphanumeric <string>). You only can link string expressions with strings and numerical expressions with variables; otherwise the program generates an error message.

The numerical expressions are the same as in the **Formula Interpreter**.

Mathematical functions:

+	Addition	-	Subtraction
*	Multiplication	/	Division
>	greater	<	less than
>=	greater than or equal	<=	less than or equal
=	equal	<>	not equal
^	raise to a power	MOD	Modulo remainder of Division operation
OR	logical OR	XOR	logical XOR
AND	logical AND	NOT	logical NOT

Trigonometric functions:

sin	Sine	sinh	Hyperbolic Sine
arcsin	ArcSine	cos	Cosine
cosh	Hyperbolic Cosine	arccos	Arc Cosine
tan	Tangent	tanh	Hyperbolic Tangent
arctan	ArcTangent	sqr	Square
sqrt	Square root	frac	Fractions
trunc	Truncate	round	Round

abs	Absolute value	rand	Pseudo random function
exp	Exponential function	ln	Logarithm, base e
log	Logarithm, base ten	sign	Sign

String functions: Relational Operators

+	Link/concatenate		
>	Greater than	<	Less than
>=	Greater or equal	<=	Less than or equal
=	Equal	<>	Not equal

Results are: true=1; false=0



For comparison operations with strings, the characters of the strings are weighted corresponding to the value in the ASCII Table, shown in the ASCII Table on page C-1. The strings are checked character by character and sorted by priority.

Additional String Operations

Operation	Parameter	Description
strlen	(String)	Length of strings (numerical result)
strind	(String, Search-string)	Position of the search-string in a string (numerical result)
strval	(String)	String-value, Numerical value of the strings.
substr	(String, Start, Length)	Substring, Result is a substring with defined length and start position (Start and Length are numerical and also may be expressions!).
upper	(String)	Convert characters of string to upper case
lower	(String)	Convert characters of string to lower case
strsel	(Condition, TrueString, FalseString)	Select string depending on a special condition

Constants

PI	Pi (π)	E	e function
True	Is true (=1)	False	Is false (=0)
(Open parenthesis)	Close parenthesis

Priority of Strings

	Sort =>	1 st Step	2 nd Step = Result		
sand	Position 1	<u>S</u> and(1)	<u>S</u> ANd(1.1)		
Sand	Position 2	<u>S</u> ANd(1)	<u>S</u> and(1.2)		
sAnd	Position 3	<u>s</u> ANd(2)	<u>s</u> ANd(2.1)		
SANd	Position 4	<u>S</u> ANd(2)	<u>s</u> ANd(2.2)		
SANd > Sand > sAnd > sand					
	Sort =>	1 st Step	2 nd Step	3 rd Step	4 th Step = Result
Sund	Position 1	<u>S</u> und(1)	<u>S</u> ANd(1.1)	<u>S</u> ANd(1.1.1)	<u>S</u> ANd(1.1.1.1)
sOnd	Position 2	<u>S</u> ANd(1)	<u>S</u> und(1.2)	<u>S</u> und(1.2.1)	<u>S</u> und(1.2.1.1)
Sand	Position 3	<u>s</u> Ond(2)	<u>s</u> Ond(2.1)	<u>s</u> Ond(2.1.1)	<u>s</u> ONa(2.1.1.1)
sOna	Position 4	<u>s</u> ONa(2)	<u>s</u> ONa(2.1)	<u>s</u> ONa(2.1.1)	<u>s</u> ONd(2.1.1.2)

Sand > Sund > sOna > sOnd

Characters that influence the sort are bold! The priority after each step is shown in the brackets. If all strings have a different priority, the operation is aborted because the resulting step is reached.

Value of Strings

The string has to start with a numerical character or decimal point (point or comma); otherwise the string value is 0. Leading blanks are ignored. If there is a blank within a numerical string it is interpreted as an alphanumerical character. Any following numerical characters are lost.

String	Value	String	Value
1.0	1	.2	0.2
1.05	1.05	12. 35DM	12
1 DM	1	1DM 95Pf	1
3.045.23	3.045	DM 1.05	0

Overview...

Click on the Overview... button to open a dialog box that shows all available global variables and strings in a tree view. Use this overview to easily and quickly explore the places where variables and strings are used in the worksheet.

Global Strings used in Modules

Most modules can process Global Strings. DASYLab is constantly improving, and adding places where you can use Global Strings. One way to determine if a parameter box permits a Global String is to right click in the parameter box. If the popup menu shows Global String... then you can use a string successfully in that location.

Predefined Global Strings

The global strings in the following list are predefined and are offered in selection list for quick insert:

Strings with System Information:

<u>String</u>	<u>Description</u>
\${DATE}	Current Date
\${TIME}	Current Time
\${DAY}	Day of current date (numeric, 1-31)
\${MONTH}	Month of current date (numeric, 1-12)
\${YEAR}	Year of current date (e.g. 2001)
\${HOUR}	Hour of current time
\${MINUTE}	Minute of current time

\${SECOND}	Second of current time
\${DAY_LZ}	Current day with leading zero (e.g. 07)
\${MONTH_LZ}	Current month with leading zero
\${YEAR_2}	Current year with last two digits (e.g. 01)

Worksheet specific Strings

<u>String</u>	<u>Description</u>
\${FLOWCHART}	Name of Flowchart without path
\${FULL_FLOWCHART}	Name of Flowchart with full path
\${CREATION_DATE}	Date of Worksheet Creation
\${CREATION_TIME}	Time of Worksheet Creation
\${MODIFY_DATE}	Date when Worksheet was last changed
\${MODIFY_TIME}	Time when Worksheet was last changed
\${START_DATE}	Measurement Start Date
\${START_TIME}	Measurement Start Time
\${AUTHOR}	Author, as defined in DASyLab File Info
\${COMPANY}	Company, as defined in DASyLab File Info
\${DEPARTMENT}	Department, as defined in DASyLab File Info
\${TITLE}	Title, as defined in DASyLab File Info
\${DRIVER_MESSAGE}	Driver specific message

1.6.15 Define Global Variables

You can define and modify Global Variables while a measurement is running. You can pass variables to subsequent worksheets running in succession (see the Working Example below). You can define up to 999 Global Variables. When the measurement is running a Global Variable can be defined or modified using the menu command **Define Global Variables**.



Defined variables are stored with the worksheet.

Optionally, you can load a Global Variable after starting a worksheet or save a variable into the DASyLAB.INI file when you stop. Other applications are able to modify variables via DDE. And you can define, load or save a Global Variable using Event Driven Actions or Key Events. You can display Global Variable as text objects in Layout Windows. Use the placeholder `${VAR_xxx}` in the line text object. Replace xxx with the number of the variable.

Several System/Program Information strings and variables (such as Free Memory, System Resources, etc. /Author, Company, etc.) are implemented in DASyLab as fixed placeholder strings/variables. If an Edit field will accept placeholders, right mouse click in the Edit field to open a Pop-up menu with the additional

menu item **Global Variable...** This Item opens a list with all available variables. Double-Click on the requested placeholder to insert it into the Edit field



*Use the **Action** module to save the variable to the INI file while the experiment is running*

Each Global Variable is composed of a number, numerical value (max. 255 char.) and one or more Options. The **Reset** button sets all variables in the list to the default settings. The **Reset all** button deletes all variables.

You can select and modify more than one variable simultaneously using the mouse to select a range, using the **SHIFT** key to select a contiguous range and the **CTRL** key to select non-contiguous variables.

You can define the following Options to handle Global Variables.

- Read from INI file at start of experiment
- Write to INI file at stop of experiment
- No DDE access to Global Variable
- Write to data file Header (DDF and ASCII)
- Show Global Variable in window
- Type In at start of experiment
- Do not overwrite description

You can also define a short description.

Buttons

There are several buttons to the right of the dialog box:

- **Reset**
- **Reset All**
- **Extended...**
- **Overview...**
- **Copy...**
- **Save...**

Reset

Return the selected variable to default settings. Any values, names, Extended options and parameters will be lost.

Reset All

Return all variables to default settings. Any values, names, Extended options and parameters will be lost.

Extended...

Click on the **Extended** button to make additional settings for Global Strings.

- Name: You can define a name to be used with variables and strings. You can refer to the String/Variable using the defined name: $\$(NAME)$ or by its number $\{\$VAR_xxx\}$ or $\{\$STRxxx\}$.
- Expressions: If the Calculate Expression automatically option is activated you can define a mathematical expression similar to the Formula Interpreter. The expression is allocated to the variable or string. If one of the parts in the expression is changed, the variable or string is automatically recalculated.
- The settings made in the Extended... dialog box are not permanent until the main Define Global Variables... dialog is closed using the OK Button.

1.6.16 See Global Variables and Strings

This Options menu item allows you to configure Global Strings and Variables. The next sections describe each menu item.

Define Global Strings Buttons

There are several buttons to the right of the dialog box:

- Reset
- Reset All
- Extended...
- Overview...
- Copy...
- Save...

Reset

Return the selected variable to default settings. Any values, names, Extended options and parameters will be lost.

Reset All

Return all variables to default settings. Any values, names, Extended options and parameters will be lost.

- Extended... on page 4-53 for details of the settings and features.

Global Variables used in Modules

The following list shows you the modules that can process Global Strings. DASYLab is constantly improving, and adding places where you can use Global Variables. One way to determine if a parameter box permits a Global Variable is to right click in the parameter box. If the short menu shows Global Variable... then you can use a variable successfully in that location.

Predefined Global Variables

The global variables in the following list are predefined and are offered in the selection list for quick insert:

Variables with system information:

Variable	Description
\$(SYS_RES)	Free System Resources: This variable shows the load of the Windows system resources. If the value decreases (in %), the load increases.
\$(GDI_RES)	Free GDI Resources: This variable shows the load of the resources of the Windows Graphic Device Interface. If the value decreases (in %), the load increases.
\$(USER_RES)	Free User Resources: This variable shows the load of the Windows user resources. If the value decreases (in %), the load increases.
ACTUAL_YEAR}	Actual Year: shows actual year as numerical value, shown in 4-digit format (yyyy).
\$(ACTUAL_MONTH)	Actual Month: shows actual month as numerical value.
\$(ACTUAL_DAY)	Actual Day: shows the actual day as numerical values.
\$(ACTUAL_HOUR)	Actual Hour: shows the actual hour as numerical values.
\$(ACTUAL_MINUTE)	Actual Minute: These Variables show the actual time (Year, Month, Day, Hour, Minute or Second) as numerical values.
\$(ACTUAL_SECOND)	Actual Second: actual time (Second) as numerical value.
\$(WEEK_DAY)	Actual Day of the week: This Variable shows the day of the week as numerical value. The order starts with Sunday (value=0) end ends with Saturday (value=6).

DASYLab / Worksheet specific Variables

Variable	Description
\$(BLOCK_SIZE)	Global Block Size: This value shows the preset global block size

<code>\$(SAMPLE_RATE)</code>	Sampling Rate: This value shows the preset global sampling rate
<code>\$(TOTAL_LOAD)</code>	<p>Total Program Load in percent: This variable shows the loading of the data acquisition program. Values of 100% and higher are displayed if the program is fully loaded or overloaded. In this case, it threatens to interrupt the running measurement by the program. To reduce the load, decrease the sampling rate, increase the block size, disable the animation and so on.</p> <p>The displayed value isn't very precisely calculated because the time base used is 55 msec. So fluctuations in display are normal.</p>
<code>\$(TOTAL_DELAY)</code>	<p>Total Program Load in milliseconds</p> <p>Time delay shows the time a sample needs to pass all modules in worksheet. This may give an impression of the processing time that is needed to perform all operations defined by the function modules. The displayed value isn't very precisely calculated because the time base used is 55 msec. Fluctuations in the display are normal.</p>
<code>\$(USED_BUFFER)</code>	<p>Used Driver Buffer: This value (in %) shows the usage of the driver buffer of the program. If the buffer is completely filled (100%), the measurement stops with an error message <i>Sampling rate too high</i>.</p> <p>First check your flowchart and optimize it as much as possible (see also Tips & Tricks in the User Guide). Then check the buffer settings in Experiment setup and increase if possible. Also check whether other applications are running in the background, which may delay data processing in the program. Decrease the sampling rate and/or increase the block size.</p>
<code>\$(DAPx_FREE_MEM)</code>	<p>Free Memory on DAP Boards x (x=1 ... 8): This value (in %) shows the usage of the driver buffer of the Microstar DAP board. If the buffer is completely filled (100%), the measurement stops with an error message <i>Sampling rate too high</i>.</p> <p>First check your flowchart and optimize it as much as possible (see also Tips & Tricks in the User Guide). Also check whether other applications are running in the background, which may delay data processing in the program. Decrease the sampling rate and/or increase the block size.</p>
<code>\$(DRV_DATA_LOST)</code>	Driver specific: shows the number of values lost in the driver since the start of measurement. May indicate per-

formance problems with the driver's ability to capture data at the specified sampling rate.

`$(ELAPSED_TIME)` Elapsed time of measurement in seconds from the start of measurement

Options for Global Strings and Variables

Read from INI File at start of experiment

If this option is chosen, entries in the INI file will be read and imported as actual settings. DASYLab will start the experiment with these Global Strings and Variables.

Write to INI File at stop of experiment

If this option is chosen, all defined Variables or Strings are written to the INI file when the experiment stops. These Global Strings/Variables are available in INI File the next time you start the experiment.

No DDE access to Global String/Variable

If this option is chosen, there is no DDE access to Variables or Strings. The Default setting is DDE access allowed.

Write to data file Header (DDF and ASCII)

When this option is chosen, this Variable/String is written into the file header when you save data using the DASYLab or ASCII format file formats. When using the ASCII format you must define whether the strings/variables should be written as readable entries or just as information in the Write Data module. This information can be read back using the Read Data module.



If Take variables or Take strings option in the Read Data module is active, previously defined strings or variables will be overwritten.

Show Global String/Variable in Window

Choose this option to open a display window showing the contents of selected Global Strings and Global Strings. The display will update when the values change. The description and the contents are displayed, but not the number of the Variable or String. Use this option to display the current file name when the File Name -> Global String option is selected in the Read Data or Write Data modules.

Type In at Start of Experiment

When this option is chosen, a dialog box will open when the experiment starts. All defined Strings or Variables are listed in the input area. Up to 10 Strings and Variables are displayed on each page. If there are more than 10 entries, you can select the next page. You can change each String or Variable before starting measurement.

If the **Read from INI File at start of experiment** option is also chosen, all entries in the INI file are read and displayed in the dialog box.

Click the **Start** button to start measurement with the defined parameters. If you choose **Cancel**, measurement will not start and the program will switch to the DASyLab worksheet window.

To change the order of the Variables/Strings shown in the startup dialog box, use the **Design Startup Dialog** command in the Options menu.

Do not overwrite description

If this option is chosen, only the value or string of the global variable or string stored in the INI is read (at start of experiment or via action), but not the text used as description.

Input is required to close dialog box

With this option activated, the input dialog box will not close unless at least one character is entered into the entry field. This option affects the input of global strings at start of measurement or using event driven actions.

File Name Dialog

Select this option to specify that the string will be used as a file name. At the start of the experiment or via an **Event Driven Action**, an Explorer window will be opened to select an existing file name. Double click on the file name to copy it directly into the string window. In the Pull down window you can select the type of file to be loaded. Choose whether the selected file will be used to load data (**Read Data**) or to write it (**Write Data**).

Working Examples of Global Strings and Variables

Global Strings and Global Variables are useful in several modules. To use Global Strings, an identifier `${STR_xxx}` is inserted into an arbitrary alphanumeric string, where `xxx` is a numeric character from 1 to 999 (`${STR_0001}` to `${STR_999}`). Spelling is not case sensitive. You cannot have blanks between the `$` character and the curly bracket. Terms that are not recognized return an empty string. Global Variables are specified by the identifier `${VAR_0001}` to `${VAR_999}`. DASyLab automatically recognizes whether it should be used as text or as a numerical value. The preset format is used for text. Maximum number of characters in Strings or Variables is 256.

To manipulate Global Strings or variables via DDE, there are 4 new DDE items available to the **Menu** topic: `SetGlobalString`, `GetGlobalString`, `SetGlobalVar` and `GetGlobalVar`. With both `Get` functions, only the number is transferred as an ASCII value (in which case DASyLab acts as a DDE Server. The connection is a Cold Link). The result is sent back by DASyLab as an ASCII value. When there is no result (wrong number, etc.) DASyLab answers with a string containing "Parameter Error." To set Strings or Variables (DASY-

Lab acts as a DDE Server. Connection has to be a DDE Poke) the number and the defined character string or the numerical value is sent separated by a semicolon. DASYLab doesn't send an answer message.

Input strings/variables using actions

The Action Module has two global (DASYLab) actions: **Set Variable** and **Set String** which allow you to enter strings and variables. In the Action Module parameter settings you can define any string that will then be displayed as the title of the input window.

These entries are only accepted if each global string **With Input Required ...** contains at least one character.

To access the variable/string **No 1**, the entry in channel 1 has to be **0**, for **No 2** use **1**, in **No 3** use **2** and so on. Only **first 16** variables or strings can be accessed (channel = 0 ... 15)

Automatic Creation of directories with time stamp

To store data files automatically into separate directories with names containing the actual month and day in their name, and with the hour of storing in the file name, use the following entry in the **Write Data** module:

C:\DASYLAB\DATA\\${MONTH}-\${DAY}\\${HOUR}h

Additionally, the worksheet has to contain an Action module with the **Close/open worksheet** action with the **Global String has changed** event on two channels. The event parameter for the first channel is the $\${DAY}$ string and on the second it is the $\${HOUR}$ string. On the third channel, the **Save Data** action must be initialized on the $\${HOUR}$ event.

After measurement has started the following actions will happen:
(Starting date and time of measurement: May, 28th, 1998, 13:30)

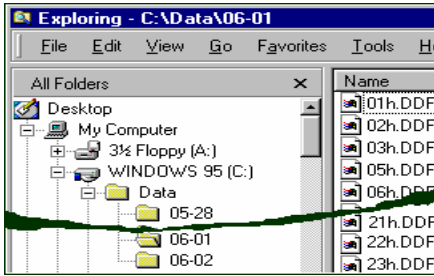
Reaching the next full hour, a new directory

C:\DASYLAB\DATA\05-28 is created and the file **14h.ddf** is stored in that directory.

When starting the next full hour, a new the file **15h.ddf** is written into the same directory and so on, until midnight is reached.

Now the new sub-directory **05-29** is created in **..\DATA** and the first file **00h.ddf**. Until the next change of date is reached, each hour a new file is written into the sub-directory.

This cycle repeats until measurement stops. The following file structure is created:



1.6.17 Export and Import Global Strings and Variables

Use this menu commands to export or import all Global Variables and Strings into or from a file with the extension *.VAR. This feature allows you to exchange the of Global Strings and Variables settings between several worksheets.

This file format is binary, so you cannot edit it directly.

In addition to the *.VAR file format (generated by the Global Variable Export function) you can now select the *.CSV and *.TXT (Excel format) file formats. To import an Excel table the values need to be separated by a comma. The entries to configure the global variables are (Strings are not valid.):

Col 1	,	Col 2	,	Col 3	,	Col 4	,	Col 5	,	Col 6	,	Col 7
Num-ber	,	Name	,	Descrip-tion	,	No. Chars	,	No. digits	,	Value	,	Expres-sion

In this way you can configure the global variables in an Excel table. It is very easy to use Copy and Paste functions to create similar configurations. You must use caution to ensure that you do not enter the same entries several times into the global variable dialog box.

Blanks at the beginning and end of the entries are removed. If the entry is longer than the maximum length (name 19, description 23, and expression 255), it is truncated.

If errors in are found when the file is read (for example, if the name contains a reserved character, VarNumber is out of range, the expression is not defined, etc.) then the offending entry is ignored. If the Expression field is empty then no expression is defined for the variable.

You cannot import Variables/Strings while the worksheet is running.

1.6.18 Design Startup Dialog

Use this command to configure the order of the dialog box that is displayed when the program starts. All Strings/Variables with the Type in at Start of Experiment option activated are listed in the dialog box. Only the Short description is displayed (not the String/Variable number.) If there is no description the line is empty, but is still available. Use the mouse or the cursor keys to select an entry. Use the arrow button to move the selected line up or down. When the experiment starts the next time, the Startup dialog shows the Variables/Strings in the new order.

If you disable the **Type in at Start of Experiment** option for one or several Variables/Strings, the entries are removed from the list and the following items move up to the next free position. If you subsequently re-enable the option, the Variables/Strings are re-inserted at the first line of the list.

1.6.19 Variable/Strings Overview

Use this menu command to open an additional window that shows all available global variables and strings figured in a tree-view.

Use this overview to easily and quickly explore the places where variables or strings are used in worksheet.

The left side of the window shows a tree with all variables and strings and its use. The right side of the window shows any additional information that may be available for the selected element at the left.

Variables or strings that might be written in multiple places are marked in red to highlight possible conflicts.

Free Variables/Strings are shown separately, so you can easily find available (unused) ones.

You can open the variables/strings overview window from different places in the program:

- Main Menu: Options -> Global Variables and Strings -> Overview Global Variables/Strings.
- Use the Overview... button in the Select global Variable, Select Global String, Define Global Variables and Define Global Strings dialogs
- Use the context menu command by right-clicking in Dialog box parameter Edit lines.



If there is a global variable or string placed in the edit box, it will already be selected when the Overview is started. To change the variable/string you may select another directly from the variable overview and insert it into the edit box by right-clicking and choosing the **Return with Variable** command “.

The Overview Window

Elements of the window

The left of the Overview window shows the following items:

- Used Variables
- Free Variables
- Used Strings
- Free Strings
- Modules to check manually

Only those items are shown which contain information.

Used Variables/Strings: Variables/Strings are marked as used if they are defined at one of the following places in the worksheet:

Variables/String supporting ...

- Modules
- Layout Objects
- Variables Expressions
- Keyboard Actions
- Sequencer Actions
- Time Bases

Free Variables/Strings: Variables/Strings are marked as unused if they don't match the definitions for "Used Variables/Strings". The "Used" definition is not fulfilled if only a value or name is assigned to the variable or string.

Modules to check manually: The overview mechanism has to exchange information with all modules to be able to check whether a module uses variables or strings. This function was first implemented in **Name1 Version 8. If a custom made module is used in the worksheet, the overview engine may not be able to connect to the module. To show the user these unchecked modules, they are listed as an additional entry in the window. You can check the modules manually for used variables or strings.

Hints and Restrictions

Read or Write Access indicates the possibility that variables or strings might be written or read or both when the experiment is started. The check for real reading or writing a variable or string is not implemented. The variables/string check is only performed in the Off-line phase. A check for "real" access to variables or strings when the worksheet is running is not available.

The Variables Overview is **not able to detect** the **following usage** of variables or strings:

- The global Variable used in the Dialog Global Worksheet Parameter is **not shown in Overview of the Global Variable/Strings!**
- NiDAQ and DAP (Microstar Laboratories) have an option to write the load of the internal buffer into a global variable. The usage of that variable is not detected by the variable overview algorithm.
- The **Read File** module also allows you to read global variables from the header of a file. These variables are not recognized by the variables overview (also because the file name can be build by global variables and so the file name is determined only while the worksheet is running.)

Status Line

The Status line shows messages and progress information in reading the variables/strings information. If no message is available and the reading of information is completed the text of the selected entry is shown (may be in modified style). You can copy that information into the clipboard.

Main Menu

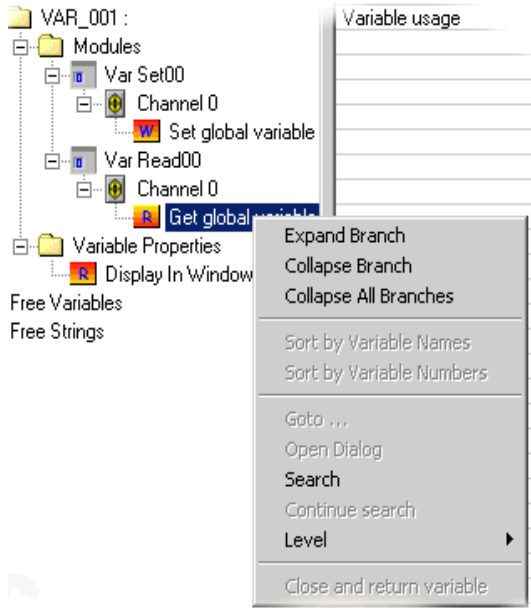
File

- **Refresh:** The worksheet is completely checked again for the usage of variables and strings. The tree-view is refreshed. Use this option if you have modified any string or variable in some module dialog. Automatic refreshing is not implemented so you should use the Refresh function each time you change global variables/strings settings.
- **Exit:** Close the Overview-Window. If you opened the window from an edit box there will be no change to the value in the edit box although you may have made a change. To keep the changed value you must right click to open the context menu and select the Close and return variable command.

Help: Opens this help page.

Context Menu

The context menu opens if you click with the right mouse button on one of the elements in tree.



- **Expand:** Opens recursive all sub-entries of the selected item.
Available in: All items in tree.
- **Collapse:** Reduces recursive all sub-entries of the selected item. If you expand the branch again all previously opened displayed branches are shown collapsed, as opposed to reducing the tree using the minus sign at the beginning of each open branch. In this case, all branches are shown as before (open or closed) when you click the plus sign in front of the branch.
Available in: All items of tree.
- **Collapse all:** Reduces recursive all entries of the tree. It works like the **Collapse** command performed at the first level entry **Variable Overview**
Available in: All items of tree.
- **Sort by Variable Names:** By default, the entries are sorted numerical order. This command changes the order to alphabetical by name. Variables without a defined name are listed after the named variables (ascending order).
Available in:
 - Used Variables
 - Free Variables
 - Used Strings

- Free Strings
- Sort by Variable Numbers: By default all variables are sorted in ascending order.
Available in: see "Sort by Variable Name"
- Go to...: Some of the displayed elements in tree can be accessed directly from tree.

Available in:

- Modules
- Layout-Objects: Text line, Text block, Text grid, linked Text
- Time base.



If the Variables Overview wasn't opened from the main menu, this command is not available.

- Open Dialog: The properties for some of the tree objects can be opened directly from the variable overview to allow you to easily change its properties.



After making a modification in the properties dialog box, use the **Refresh** command to bring the Variables Overview up-to-date, correctly reflecting the actual status of the worksheet.

Available in: Modules

- Layout-Objects: Text line, Text block, Text grid, linked Text
- Time base.



If the Variables Overview wasn't opened from the main menu, this command is not available.

- Search: This command allows you to search recursively for strings in the structure of the tree. The search is restricted to the entries in the left side of the window. Items in the right are not searched.

Available in: All entries in tree.



- Continue Search: You can continue the search, looking for the next matching entry using this command. The search starts at the last found entry. If you mark another entry in the tree, the search will still start at the last found search string. Use the <F3> key as a shortcut key to continue the search. The search direction is always down. You cannot search back up through the tree.

Available in: All entries in tree, if the last search has found any string.

- **Level:** Offers the selection of "level 0" to "level 6". Choose one of the levels to expand all entries up to the level n . The selected entry defines the level 0.

Available in: All entries in tree.

- **Close and Return Variable:** Shut down the Variable Overview window and returns the Variable or String of the selected entry to the dialog box where the variable overview was selected.

Available if: The Variable Overview was called up from a context menu of an edit box. If the edit box only allows numerical variables only these values are returned to the modules.

Global Variables/Strings are called up using one of the following dialogs:

- Select Global String
- Set Global String
- Select Global Variable
- Set Global Variable

1.6.20 Copy Channel Names

This function causes DASyLab to copy the channel names from each module to connected modules. By default, the option is activated in the module dialog box

1.6.21 Switch to Runtime

Choose this function or click on the icon on the function bar, to reduce the DASyLab worksheet window to its Runtime size. In its place, a minimized control panel appears which contains only the status bar (displaying the current time and the buffer status) and the control icons from the function bar which allow you to start, stop, pause and continue the experiment.

Additionally, all active display windows (analog/digital meters, scopes etc.) are displayed on screen.

This option allows you to determine how your worksheet will appear when loaded with the DASyLab Runtime version; you can concentrate on those elements that are essential for the control and evaluation of the actual experiment.

1.7. Window Menu

Use the commands of this menu to switch between Worksheet, Display and Layout windows or to create new VITool Layout pages.

New Layout

Control Sequencer

Display Windows

Worksheet

Layout

DASYLab lists the names of all created windows, starting with the display and followed by name of the worksheet. Then all Layout windows are listed. Click on the name to activate a window. The Menu Bar will change depending on the type of the activated window (Control Sequencer, Display, Worksheet or Layout).

You can also switch between display modes by clicking on the function bar icon.



1.7.1 New Layout

Use this command to create a new Layout Window. The name of worksheet and the first nine Layout Windows are displayed below the menu commands. If there are more than ten windows you can use the MORE command to see them.

1.7.2 Control Sequencer



Use this command or click on the function bar icon to switch to the Control Sequencer View.

1.7.3 Display Windows



Use this command or click on the function bar icon to switch to the Display Tree View

1.7.4 Layout



Use this command, or click on the function bar icon, to switch to the Layout View

1.7.5 Worksheet



Use this command, or click on the function bar icon, to switch to the Worksheet View.

2. Control Sequencer Menus

The commands of the Control Sequencer File menu enable you to save and open Control Sequence files, to print worksheets, to manage your worksheet files, and to exit the program.

Control Sequencer File

To control a multi-step application consisting of more than one DASyLab worksheets calling each other, DASyLab offers a new tool, shown as new display window (analogous to the worksheet, display and VITool windows), called the Control Sequencer Window. The contents of the window is stored in a new type of file, the Control Sequencer file (saved with the suffix *.DSQ.)

The window shows a **tree display** of the **control sequence**. You can add any number of worksheets into the Control Sequencer File, whose name is shown as root of the tree.

You can also multiple actions for each inserted worksheet to control the flow of the worksheets.

In the Control Sequencer window you can load and save *.DSQ files using the main menu file commands: **New**, **Open**, **Save** and **Save As...**

To insert flowcharts or actions you need to use the pop-up context menu that appears when you right mouse click on one of the junction points on the screen. Depending on the junction (flowchart or action) the pop-up menu offers several commands to add, delete or to edit the object.



The Sequence file is a binary file type. You cannot edit it with ASCII Editor programs such as Notepad.

2.1. File Menu

See Worksheet Window Menu: File Menu (page 4-1).

2.1.1 New

Choose this command to create a **new** Control Sequence file. The DASyLab Control Sequencer work area will be cleared completely.

If there is already a Control Sequencer file loaded on the screen that has changed since you last saved it, you will be asked to

- save that file before beginning work on the new one,
- or to reject those changes,
- or to recall the New command.

After creating the new Control Sequencer file you can save it to a file by selecting the **Save** or the **Save As...** commands from the **File** menu.

Click on the **Save** icon in the function bar to save the current file.

2.1.2 Open...

Choose the **Open** command, or click the function bar icon, to open a Control Sequence file that has been previously saved. The DASyLab Control Sequence work area will be cleared completely.

If there is already a Control Sequencer file loaded on the screen that has changed since you last saved it, you will be asked to

- save that file before beginning work on the new one,
- or to reject those changes,
- or to recall the Open command.

After choosing the **Open** command you can select the file on which you want to work from a list of files.

You can ...

- open one of the files from the list directly by double-clicking the file name,
- select a different directory by double-clicking the directory name,
- select a different file format for the file display, or
- select a different drive.

To use your keyboard, press the **TAB** or the **SHIFT+TAB** keys to move from one field to another; select items from the lists by pressing **-**, **~**, **SPACE** and the **ENTER** key.

In the **File Name** box you can define the filter for the file list. The default setting for the filter (*.DSQ) will create a list of DASYLab Control Sequencer files, which usually have the extension *.DSQ.

Type a different extension, or use wildcards (like *.*), to display lists of different groups of files. For example, if you have saved DASYLab Control Sequencer files with extensions other than *.DSQ (using the **Save As...** command from the **File** menu).

However, DASYLab can only open files in the special own DSQ format no matter what extension the files have.

2.1.3 Save...

Choose the **Save** command, or click the function bar icon, to save a Control Sequence file.

If you have created a new Control Sequence file (New from the File menu) without saving it to a file (**untitled** is displayed in the DASYLab window title bar), you can select the file name, the directory and the disk drive where the file is to be stored:

- Type the file name in the File Name box.
- If you do not type an extension, DASYLab will automatically add the standard extension (*.DSQ). DASYLab always saves worksheet files in its own format, even if you select an extension other than *.DSQ.
- You can...
 - select one of the file names in the list by double-clicking the file name. The file that was originally saved under that name will then be replaced with the new worksheet. A warning message will first appear, asking you to either confirm the procedure or to cancel it.

- select a different directory by double-clicking the directory name, or
- select a different drive for the new file.

(To use your keyboard, press the `TAB` or the `SHIFT+TAB` keys to move from one field to another; select items from the lists by pressing `-`, `↑`, `SPACE` and the `ENTER` key.)

If you have previously saved the Control Sequence to a file (using the `Save As...` or `Save` commands from the `File` menu), or if you have opened an existing file (command `Open...` from the `File` menu), its name is displayed in the DASyLab window title bar.

Select the `Save` command, or click the function bar icon, to save the current Control Sequence file. The existing file will be replaced without further messages.

2.1.4 Save As...

Choose the `Save As` command to save a Control Sequence with a new file name, in a different directory, or on a different drive.

After you have chosen the `Save As...` command from the `File` menu you can select the file name, the directory and the disk drive where the file is to be stored.

- Type the file name in the `File Name` box.
- If you do not type an extension, DASyLab will automatically add the standard extension `(*.DSQ)`. DASyLab always saves Control Sequence files in its own binary format, even if you select an extension other than `*.DSQ`.)
- You can...
 - select one of the file names in the list by double-clicking the file name. The file that was originally saved under that name will then be replaced with the new Control Sequence. A warning message will first appear, asking you to either confirm the procedure or to cancel it.
 - select a different directory by double-clicking the directory name, or
 - select a different drive for the new file.
 - (To use your keyboard, press the `TAB` or the `SHIFT+TAB` keys to move from one field to another; select items from the lists by pressing `-`, `↑`, `SPACE` and the `ENTER` key.)

2.2. Edit Menu

This view does not include an Edit Menu.

2.3. Experiment Menu

See Worksheet Window Menu: Experiment Menu (page 4-21).

2.4. View Menu

See Worksheet: View Menu (page 4-35).

2.5. Options Menu

See Worksheet: Options Menu (page 4-85).

3. Tree View Menus

3.1. File Menu

See Worksheet Window Menu: File Menu (page 4-1).

3.2. Edit Menu

This view does not include an Edit Menu.

3.3. Experiment Menu

See Worksheet Window Menu: Experiment Menu (page 4-21).

3.4. View Menu

See Worksheet: View Menu (page 4-35).

3.5. Options Menu

See Worksheet: Options Menu (page 4-85).

3.5.1 Tree Display Setup

Use the menu command to change the properties of the Display Window.

Display:

- Normal: In the 32-bit version, this setting shows the measurement setup as a structured tree similar to the Windows Explorer. Click onto the elements of the tree to open the next branch or an accompanying dialog box.

In the 16-bit version, the window is empty.

- Bitmap: Choose this option to insert any picture in BMP or WMF format into the Window. Use the Bitmap... button to select the bitmap file.



The bitmap is not stored with the worksheet, but only a link to that file is stored. The specified bitmap file has to exist in the named directory to be displayed.

- Sorting (not available in 16 bit version): Select the order the modules are displayed in the tree:

Alphabetically: All modules are listed in alphabetic order.

Alphabetically, Black Boxes separately: All modules are listed alphabetically, but the modules inserted into Black Boxes are listed separately.

Class of modules: Modules are assigned to the several module groups and then are listed in alphabetic order.

Creating order: Modules are listed in the order they were inserted into the worksheet.

- **Bitmap Display:** The **Original Size of Bitmap** option shows the inserted bitmap scaled 1 / 1 (Pixels) centered in window. The background of the window is colored as selected in the **Option Menu** of the **Worksheet Window**.

The **Stretch Bitmap** switch adapts the Bitmap to the window frame. Proportions of picture may be distorted.

The **Tiled** setting fills the complete frame with pictures of the bitmap (sized 1/1).

- **Background:** Click on this button to choose a color for the background.

3.6. Window Menu

The options of this menu are described in **Worksheet: Window Menu** (page 4-4-71).

4. Layout Window Menus

4.1. File Menu

See **Worksheet Window Menu: File Menu** (page 4-1).

4.2. Edit Menu

The commands of the **Edit** menu allow you to copy, paste and delete the **DASY-Lab** Layout Elements displayed on the screen.

Layout to Clipboard (Metafile)

Layout to Clipboard (Bitmap)

Layout...

Undo

Select



Cut



Copy



Paste

Delete

4.2.1 Layout to Clipboard (Metafile or Bitmap)

Use this command to **copy** the Layout Window as a Windows Metafile (WMF/CLP) or as a Bitmap (BMP) to the Clipboard.

The layout is always copied to the Clipboard as displayed on screen, including all the changes made since last saving it. The Layout itself will not be modified.

The **Size** of the Layout Window in the Clipboard is automatically matched to the size of the area used on the worksheet. If you arrange only a few small elements they will appear larger on the clipboard.

Use the **Paste** function in any Windows application (usually in the **Edit** menu) to copy the meta or bitmap file from the Clipboard to applications such as PaintBrush or Word for Windows.

4.2.2 Layout...

Use this command to **save** or **load** Layout Windows onto the worksheet. See *Worksheet Window Menu: Layout* (page 4-12).

4.2.3 Select Layout Window

Use the menu function to activate the toolbox selection tool.

4.2.4 Undo

Use this command to **undo** the **last operation**. All changes to Layout Objects (like modifying colors, size or other properties) are canceled. Choose this function using the **Undo** menu command or by using the **ALT+Backspace** or **CTRL-Z** key combinations.

4.2.5 Object Cut, Copy, Paste and Delete

You can copy and paste objects of the Layout Window including their properties:

- **Selection:** First select the objects: click and hold the **left** mouse button inside the worksheet and select the area by dragging the cursor. When you release the mouse button, the selected modules are highlighted. You can select or deselect single objects by clicking the **left** mouse button on the module while pressing the **SHIFT** or **CTRL** key.

- **Copy:** Choose the **Edit/Copy** menu command or the **CTRL-INSERT** or **CTRL-V** key combinations. The selected objects are inserted onto the worksheet with their properties settings intact.
- **Cut:** To move modules around the worksheet, choose the **Edit/Cut** menu command or the **SHIFT+DEL** or **CTRL-X** key combinations to remove the objects from the worksheet and to save them for a **Paste** operation.
- **Paste:** Now paste the stored objects by choosing the **Edit/Paste** menu command or pressing **SHIFT+INSERT** or **CTRL-V**. After activating the insert mode, the mouse cursor changes. Choose the position where the selection should appear. The window is scrolled automatically when the mouse cursor moves outside the window border. Once the mouse cursor is at the destination, press the **left** mouse button to paste the objects into the **Layout Window**. The paste operation can be repeated.
- **Delete:** Choose the **Delete** menu command or the **Delete** key to delete the selected objects

4.3. Object Menu

Choose the objects you want to insert into the **Layout Window**. You can also choose objects using the **Layout Window Toolbox**. The **Properties** command allows you to change the characteristics of the selected object.

Drawing Elements

Visualization

Text Elements

Properties

Placement

4.3.1 Drawing Elements

Choose this command to select Drawing Elements to be inserted into the Layout:

- Line
- Bitmapped Graphics
- Ellipse – filled or not filled (outline)
- Rectangle – filled or not filled (outline)

You can also choose an element by using the **Tool Box** buttons.

Click the **left** mouse button inside the **Layout Window** to define the start position of the Element. Click and hold the mouse button to draw a frame that defines the size of the element. Release the **left** mouse button to complete the

command. To set properties of an element, select it with a **left** mouse click. Display the Properties Dialog Box by double clicking on the frame.

Properties (all objects)

Placement: Units for Position and Size are set in Centimeters or Inches depending on the settings in Main Menu File: Page Format.

Color: Use the Color button to select the color in the Windows Color Menu Box. The object will be drawn in the selected color.

Bitmapped Graphics Properties

Drawing Mode:

This Option changes how the imported bitmap is shown in the frame.

- **Adjusted:** The Bitmap is resized to the borders. Because the aspect ratio is not maintained, the picture can be contorted.
- **Scaled:** The picture is completely shown in the frame. It is displayed enlarged or reduced with original aspect ratio
- **Original:** The Bitmap is displayed in its original pixel size (number of pixel in the bitmap = number of pixels on the screen). If the frame is smaller than the bitmap, all parts of the picture rising above the lower and right border are cropped (not displayed).

File Name: This entry shows the name of the Bitmapped Graphics File that will be displayed. You cannot edit this entry. To change the File you must use the File... Button.

The left window of the dialog box shows all available files in directory, the right window shows the directory file structure. The File Format command selects the Bitmapped Graphics File Format (*.BMP, *.WMF). The Drive command selects the drive you want to read from.



External Bitmapped Graphics are not stored in the worksheet. Only the name and path of the files will be stored. To display the specified bitmap, the file must be available in the specified directory. Bitmapped Graphics inserted by using the clipboard are stored with the worksheet.

4.3.2 Visualization

Choose this command to select a Visualization Element to be inserted into the Layout. These elements are linked with the Display Modules of the worksheet. You can create a maximum of 512 linked elements in the VITool Layout Windows.

- Text

This Visualization Element shows the contents of the alphanumeric displays such as List module or Digital Meter module as dynamic text elements on the Layout page. Only the alphanumeric characters are

displayed but not window elements such as borders or window caption.

- Graph

This Visualization Element shows the contents of the display modules on the Layout page. Only the contents of the display area are displayed but not window elements such as borders or window caption.

You can also choose an element by using the Tool Box buttons.

Click the **left** mouse button inside the Layout Window to define the start position of the Element. Click and hold the mouse button to draw a frame that defines the size of the element. Release the **left** mouse button to complete the command. To set properties of an element, select it with a **left** mouse click. Display the Properties Dialog Box by double clicking on the frame.

Properties (all objects)

Placement: Units for Position and Size are set in Centimeters or Inches depending on the settings in Main Menu File: Page Format.

Linked Text Properties

Link: Choose the name of the module that will send the strings.

Text: Insert the text that should be shown in front of (*pre*) and after (*post*) the linked string.

Options

Alignment: Text can be aligned right, left or centered.

90° Rotation: The text Frame will be rotated 90° counter clockwise.

Font: Use the Font button to select font and size in the Text Menu Box.



Use only TrueType fonts with rotated Linked Text Objects to prevent problems.

Linked Graph Properties

Link: Choose the name of the module that will send the graphical information.

Auto Update: If this option is turned off, the display of linked graphical objects is not updated when new data is received. To update manually, use Key Events or Event Driven Actions.

Sync Event Handling: Use this function with synchronous Event Driven Actions to synchronize the Layout display with an event driven action. While this function is disabled, there may be incorrect or inconsistent data when printing a Layout Window (premature or late blocks).

Fast Draw Function: While this Option is active, only the dynamic Elements of the Graphical Object are updated. You will get a better screen view, with less “flashing” as the data is updated.

Display:

- **Background:** While this option is active, the background in the object frame will not be transparent but will be opaque and colored. To select the color, use the **Color...** button.
- **With frame:** While this option is chosen, the object frame will not be transparent but will be visible and colored. To select the frame color, use the button **Color...**
- **Frame as shadow:** While this option is chosen, a shadow is displayed on the object frame.
- **Width:** This entry defines the thickness of the drawn object frame.

Zoom: X/Y, Y/t or Recorder Chart modules can be zoomed as well as in the display windows on worksheet:

- **Zoom-In:** With the Ctrl-key pressed, you can draw a rectangle with left mouse button pressed. The marked area will be scaled to the size of the display area in the graph link.
- **Zoom-Out:** You can resize the zoomed display with Ctrl-key pressed and a right mouse click in the display area.

Cursors: If there are cursors shown in the display window in worksheet or display views, they are also shown in the linked object in the VI-tool Layout Window. You can move the cursors using the mouse. If you want to display the cursor data on your layout page, you must activate the **Survey→ Print Cursor Data** in VI-TOOL menu command in the display window menu. You can access this menu in from the Layout Windows object by right-clicking the mouse. A tear-off menu will appear where you can select command.

Setup: This button opens the Display window Setup dialog of the module linked to that graphic object.

4.3.3 Text Elements

Choose this command to select between two types of Text Elements that can be inserted into the Layout.

- Text Line
- Text Block
- Text Grid

Also you can choose the Elements by using the Tool Box buttons.

Click the **left** mouse button inside the Layout Window to define the start position of the Element. Click and hold the mouse button to draw a frame that defines the size of the Element. Release the **left** mouse button to complete the command. To set properties of an Element; select it with a **left** mouse click. Display the Properties Dialog Box by double clicking on the frame.

Text Line / Block Properties

Placement: Units for Position and Size are set in Centimeters or Inches depending on the settings in Main Menu File: **Page Format**.

Text: Insert the text that will be shown on Layout.



A Text Line is always shown in one line. It will be cut (truncated) at the end of the line. The text of a Text Block will be broken at the end of the line and continued in the next line.



*A Text block is always shown in **one complete block**. It will be broken at the end of line and continued on the next line.*



You can use placeholders to insert special system information including the date, time, file name, or global variables and strings.

Grid Text Properties

Select the following Properties:

- Placement: Units for Position and Size are set in Millimeter or Inches depending on the Main Menu File: Page Format settings. Depending on the number of columns, the List is split into columns of the same width. The height of rows depends on the selected font size.
- Setup: The list is shown with the defined number rows and columns.
- Text Setup: The input of row and column number selects the cell to be edited. The text has to be inserted into the edit field below. You can use placeholders to insert special system information (e.g. data, time...).



*Text in the cells **will not be wrapped** at the cell border but written above the text of the next cell*

- Alignment: You can set the alignment to left, right or centered.
- Font: Use the Font button to select the font and color in the Text Menu Box. The font size takes effect to the height of the rows of the list on the layout.
- Display

Background: when this option is active, the background in the object frame will not be transparent but will be opaque and colored. To select the color, use the Color... button.

With frame: when this option is chosen, the object frame will not be transparent but will be visible and colored. To select the frame color, use the button Color....

Frame as shadow: when this option is chosen, a shadow is displayed on the object frame.

Width: This entry defines the thickness of the drawn object frame.

Options

Alignment: Text can be aligned right, left or centered.

90° Rotation: The Text Frame will be rotated 90° counter clockwise.

Font: Use the Font button to select the font and size in the Text Menu Box.



Use only TrueType fonts with rotated Linked Text Objects to prevent problems.

Placeholders in Text Objects

You can use placeholders to insert special system information including the date, time, file name, or Global Strings and Strings. The following placeholders are available:

Placeholder	Information Inserted	Available in
<code>\${DEPARTMENT}</code>	Department from File Info	Text line
<code>\${AUTHOR}</code>	Name of Author from File Info	Text line
<code>\${DATE}</code>	Actual System Date	Text line
<code>\${COMPANY}</code>	Name of Company from File Info	Text line
<code>\${TIME}</code>	Actual System Time	Text line
<code>\${KEY_ACTIONS}</code>	List of defined Key Actions	Block text
<code>\${STRING_[No]}</code>	String No X, defined in Options Menu	Text line
<code>\${STR_[No]}</code>	String No X, defined in Options Menu	Text line
<code>\${VAR_[No]}</code>	Variable No X, defined in Options Menu	Text line



Insert Strings and Variables Number without the square bracket inside the curly brackets, for example, `${STRING_33}` will insert the Global String number 33.

Right-click on the text entry box to see a pop-up menu that allows you to choose from available Global Strings or Variables, including system variables.

4.3.4 Properties

This command opens the Properties Dialog Box for the Layout page or for the selected Layout object.

4.3.5 Placement

Choose this command to change the position of layered elements. You can move the selected element one layer Up or Down or move them into the Front or Background.

4.4. Experiment Menu

See Main Menu: Worksheet Window Menu: Experiment (page 4-21).

4.5. View Menu

The commands of this menu allow you to change the appearance of the DASY-Lab layout on the screen. Some of these functions can be chosen by clicking the corresponding icons on the Function Bar.

Function Bar

Module Bar

Status Bar

The above options of the menu are described in the Worksheet: View Menu (page 4-35).

Zoom / View

Full Screen

Zoom / View Layout Window

Use this command to zoom the Layout Window (25% to 200%). Use command Fit to Screen and Fit to Page to adapt the Layout Window format of the screen or the page.

Full Screen

Use this command to show the Layout Window in Full Screen Mode. Its size will be adapted to show the whole Layout Window. All elements such as Function Bar, Menu Bar and so on are hidden. Use the ESC key to change to normal mode.



To get best results for Full Screen Display use the screen Page Format. You can select it using the properties command of the Object Menu.

4.6. Options Menu

The commands of this menu allow you to change the display of the DASYLab Layout window.

Global Layout Properties

Layout Page Properties

Default Directories

Hot Keys...

Password Protection

Password Definition

Screen Locking

Key Events

Define Global Strings

*Define Global Variables**Variables/Strings Overview...*

The above options of the menu are described in Worksheet Window Menu: Options Menu (page 4-41).

*Layout Window...**Layout Page...***4.6.1 Global Layout Properties**

This option allows you to define the starting options of all defined Layout Windows. These options apply to all layouts of the open worksheet. The following settings are available:

- **Mouse:** While **Mouse To Interact With Instruments** is active, you can only operate elements like switches or push buttons. You are not able to create objects or modify them.
To create or modify elements in the Layout Window, you have to switch to the **Mouse to interact with Layout Window** option.
- **View:** Choose the **Load As Full Screen** option to load the first Layout Window into the foreground when DASYLab is next started. If the worksheet window was active when DASYLab was closed, it will be placed in the foreground.

4.6.2 Layout Page Setup

Use this menu command, or double click anywhere on the Layout Window to open the Properties dialog box. You can change the following:

- **Format:** Select between DIN or US page formats (Landscape or Portrait) or choose **Screen** format.
- **Name:** In the edit field below the format you can define an individual name for this layout window. Instead of the default name, Layout X, the title of the Layout window will be Name X. The layout number is still used by in Action modules to control switching between several layouts.
- **Border:** You can define Borders. All text objects outside the defined border will be cut off. The **Visible** option allows you to fade out/in lines that mark the defined borders. The **Use border** switch activates the clip function.
- **Grid:** The **Snap to grid** option places all objects according to the defined grid.

The default **Distance** of the grid is 5 mm (0.2 inch). To display the grid on the screen, activate the **visible** option.

The following settings control the display properties of layout objects.

Object Display:

- **Show objects only:** Only the origin object is displayed on the layout.
- **Objects with frames:** Objects with their position borders are shown.
- **Only frames:** Only the position borders are shown.

Objects outside the page

- **Hide objects:** This selection hides all objects that are placed out of the defined working area.
- **Show objects:** This option shows all objects, regardless of where they are placed.
- **Delete objects automatically:** All objects placed out of the working area are deleted automatically.

Moving Objects via keyboard:

This setting defines the steps objects are moved using they arrow keys of keyboard:

- **Pixel Size:** The selected objects are moved pixel by pixel. Absolute movement of object depends on the chosen zoom factor and resolution of screen.
- **Steps of XXX mm:** All objects move in steps of millimeters. Relative width of step on the screen depends on the chosen zoom factor and defined size of page.
- **Grid Distance:** The objects move in steps of the chosen width of grid. Relative width of step on the screen depends on the chosen zoom factor and defined width of grid.

Color Buttons

- Use the **background...** or **Grid...** color button to change the colors of the background of the layout sheet or the grid.
- The **Default** button loads the default settings of that dialog box.

4.7. Window Menu

The options of this menu are described in *Worksheet: Window Menu* (page 4-71).

5. Help Menu

The commands of the **Help** menu allow you to obtain on-line help for the following program functions and for your data acquisition hardware. It also provides overviews and on-line tutorials.

5.1. Index

This option activates the Help system and displays the index of topics for which help can be obtained.

5.1.1 Instruction



Click this button to display on-line instruction on how to use the DASYLab Help System.

Printed instructions on how to use the Help system are found in Chapter 2 of this manual.

Further information on how to use the Windows Help system can be obtained by pressing the F1 function key while using a Help window, or by choosing Using Help from the Help menu.

5.1.2 References

Alphabetic Index of Help Topics / Alphabetic List of Modules

Choose this menu function to view the alphabetical lists containing all the topics for which help is available. Use the scroll bars or press the ↑, ↓, PgUp or PgDn keys to scroll through the lists then click on the topic for which you want information. You can also select a topic by pressing the TAB key until the topic is highlighted, then press ENTER.



Click the Search button at the top of the Help window or press the S key on your keyboard for information on a specific topic.

Glossary

Choose this menu function to view the alphabetical list of terms with definitions that can be displayed as pop-ups on the screen.



A line indicates the end of each of these definitions. If a line does not appear at the bottom of the text box, your Help window is too small. Enlarge its size by dragging its borders or corners while pressing the left mouse button, and click the term again. Or, you can use the Scroll Bar to move around the window.

Main Menu Options

Choose this menu function to view the Help pages for all of the DASYLab menu options and commands.

Module Selection Menu

Choose this menu function to view the Help pages for all of the module groups and modules.

5.1.3 Step by Step Instructions

The Elements of the DASyLab Screen

Choose this menu function to view the overview of the DASyLab screen elements found in Chapter 3.

Module Configuration and Manipulation

Choose this menu function to view general comments on how to install, configure, connect, move and delete modules. This information can be found in Module Reference Guide.

Creating your First Worksheet

Choose this menu function to view the instructions found in Chapter 2 of this manual.

5.1.4 Surveys

How to Start/Stop an Experiment

Choose this menu function to view the overview of the menu commands and instructions for automatic experiment control methods that can also be found in Chapter 6 of this manual.

Customizing the DASyLab Screen

Choose this menu function to view the information found in Chapter 3 of this manual.

Worksheet Examples

Choose this menu function to view instructions for using the sample worksheets that are installed with DASyLab.

DASyLab by Keyboard

Choose this menu function to view the instructions found in Chapter 6 of this manual.

5.2. Hardware

If you have installed a data acquisition board in your system, choose this menu function to obtain specific help about that board.



Read the Hardware Installation Manual for additional information concerning installation and operation of your data acquisition device.

5.3. Glossary

Choose this menu function to view the alphabetical list of terms with definitions that can be displayed as pop-ups on the screen.

5.4. Using Help

This option provides help for how to use the online help system.

5.5. Getting Started Tutorial



This symbol in the Online Help will mark all modules/items with an available **Getting Started** Tutorial. Click on the symbol to start **Getting Started**!

Click the Getting Started Button in the Online Help or choose this command from the Help Menu.

The Getting Started guide is a supplement to the Online Help and the manuals. The different parts of the program are shown in several worksheets that will show you the function and interaction of the different modules in the data flow. They include suggestions for creating your own worksheets and make it easier and more meaningful to use the functions of the software and to take full advantage of the power of the software. The worksheets shown run without external DAQ hardware. Exceptional cases are indicated.

The Getting Started Tutorial supports new DASYLab users with useful tips and examples for creating typical worksheets. You can open demonstration worksheets in a second DASYLab session and test them in parallel to the user's own worksheet.

The Getting Started Guide shows the function mode and cooperation of the different DASYLab modules. The tutorial contains different worksheets that describe the module functions in the data flow. They are intended to give you suggestions using the actual structure of the worksheet and to make it easier to use the DASYLab functions meaningfully, taking full advantage of the potential of this powerful software. This tutorial is in addition to the on-line help and the manuals supplied with the program. The example diagrams are mostly usable without external hardware. Exceptions are marked.

The Getting Started Tutorial covers the following topics:

Data Acquisition

Data Acquisition

Signal Sources without Hardware

Signal Sources in DasyLab

Data Processing

Time-Critical Data Processing

Signal Data Transformation

Signal Amplitudes Modification

Signal Flow Control

Signal Output/Visualization

Data output on Hardware, on Displays

Data storage

Special DASyLab Functions

Additionally, some information and examples are included for the “special” features that make DASyLab a flexible, powerful application development tool:

The Black Box

The Worksheet Sequencer

Global Strings/Variables

The Event-Driven Action

Other Functions

In the appendix of the Getting Started Tutorial includes references that are interesting for the ongoing use of DASyLab:

DasyLab In Context Of Other Software And Computers

The Different Operating Systems And DasyLab

The Data Backup Module

The E-Mail Module

5.6. Report...

Choose this menu function to view information on your hardware, operating system, Windows version, system resources, etc.

5.7. About DASyLab...

Choose this menu function to view information on the current DASyLab version.



Your own company logo can be displayed in the INFORMATION box (see Chapter 6 for details).

6. Customizing the Main Menu: External Programs

You can easily insert menu items into DASYLab's main menu to start external programs directly from within DASYLab.

Use a text editor, such as Notepad, to make the following entries in the DASYLAB.INI file (located in the DASYLab directory):

```
[External Tools]
ToolNumber=number

ToolMenuText1=&name1
ToolMenuText2=&name2
.....Etc.

ToolPathName1=path\programname1
ToolInitialDir1=startingdirectory1
ToolArguments1=startingparameters1
ToolAskArguments1=0

ToolPathName2=path\programname2
ToolInitialDir2=startingdirectory2
ToolArguments2=startingparameters2
ToolAskArguments2=0
.....Etc.
```

Each external program has a separate entry as described above. Items shown in *italic* text must be replaced with the actual name, path, and any parameters necessary to start your program. Up to 16 external programs can be defined.

Chapter 5
Files and File Formats /
DDE / Network

Chapter 5: Files and File Formats / DDE / Network

1. Files and File Formats

1.1. Worksheet Files (.DSB)

A worksheet file (standard extension .DSB) contains the complete worksheet with its most important settings.

The following worksheet settings will be saved:

- The type and screen position of all the modules,
- The number of inputs and outputs of each module,
- The settings specified in each module configuration dialog box,
- All the data channels, branches and their exact positions,
- Global settings including the acquisition rate and the block size (Experiment menu),
- All the entries in the File Info dialog box (File menu).

The following environment settings will be saved with the worksheet:

- The mode (normal, minimized...), position and size of the main window and the visualization window,
- The Module Bar configuration,
- All the entries in the Page Format dialog box (File menu).

The following settings will **not** be saved with the worksheet:

- The settings of the Start/Stop at Time functions (Experiment menu),
- The settings of the Auto Start function (Experiment menu),
- The View menu settings for the display of the Module Bar, the Function Bar, and the Animation function,
- The Options menu settings (Window Setup, Colors, and the Auto-router function).

A worksheet file can be viewed in part by using the MS-DOS command TYPE. Some global information like the current time and date, comments, etc., is contained in human readable format at the beginning of the file.

1.1.1 Worksheet Exchange Files (*.DSA)

The file with the extension *.DSA stores a worksheet with the same information as the original DASYLab worksheet file (*.DSB), but formatted in ASCII. This format is used to exchange worksheets between different program versions (16 bit and 32 bit). Saving ASCII format will take a longer time and needs more disk space than storing in DSB format

⇒ *In addition to the *.DSA file DASYLab creates a file with the extension DMX, which contains the graphical matrix of the worksheet, such as data channels position of modules and so on. To load a worksheet as ASCII file both files *.DSA and *.DMX has to be available.*

1.1.2 Worksheet Text Files (*.TXT)

This file format with the extension *.TXT contains simple text, which describes the modules and settings used in the worksheet. This file is only useful to rebuild worksheets manually. DASYLab is **not able to reload** these files, because all graphical information, such as position of modules or data channel links, is not stored

1.1.3 HTML Text Files (*.HTM)

This file format is used to save worksheets as HTML files, using HyperText Markup Language, as used in the Web. These files contain all elements and important settings of a worksheet. The files cannot be reloaded but are a powerful help for documentation and rebuilding your projects

1.2. Control Sequencer Files (*.DSQ)

To control large application controlled by more than one worksheet calling each other use the Control Sequencer Window. The contents of this window is stored in a binary file, the Control Sequencer file with the suffix *.DSQ.

You can add any number of worksheets into the Control Sequencer File and also you can define several actions for each inserted worksheet to rule the course of the worksheets.
The contents of the Control Sequencer File is shown and edited as new display window (in analogy to the worksheet, display and VITool windows).

⇒ *The file format type is binary, so you cannot edit it in a standard ASCII Editor.*

1.3. Module Bar Files (.DML)

These files contain configurations of the Module Bar and are used to define DASYLab environments for different application areas. They can be created by choosing the Save As... command from the Module Bar submenu of the Edit menu.

The current configuration of the Module Bar will be saved by DASYLab in the file DASYLAB.DML. This file will by default be used for the next start of DASYLab.

1.4. Layout File (.LAY)

These files contain configurations of the Layouts and are used to save user defined Layout settings to import into different worksheets. They can be created by choosing the Save As... command from the Edit submenu: Layout...

1.5. Serial Port Settings (.SIN/ .SOU)

The settings of the serial interface are stored in these files. They can be created by choosing the Save Button in the module dialog box of the serial modules. Load these files to quickly configure the ports with previously defined settings.

1.6. ICOM Port Settings (.IIN/ .IOU)

The settings of the ICOM interface are stored in these files. They can be created by choosing the Save Button in the module dialog box of the serial modules. Load these files to quickly configure the ports with previously defined settings.

1.7. Initialization File (DASYLAB.INI)

DASYLab automatically creates this file in the Windows directory. It contains the current global settings concerning the main windows and parts of the file info. Also in these files defined Global Strings or variables are saved. If necessary DASYLab can read them while measurement is running.

1.8. Files with Reference Points (.DPF)

These ASCII files contain lists of reference points that are required for Interpolation in the Scaling module. Use an ASCII editor such as Windows Notepad or any other non-formatting text editor to create such a file.

The file can be created as one channel file or multi channel file and must be structured as follows:

```
Line 1:      INTERPOLATION
Line 2:      identifier (maximum 40 characters)
Line 3:      number of columns (minimum 2)
Line 4:      number of pairs of data
              The lines containing the data pairs follow.
              Their total number must correspond exactly
              to the value specified in line 4.
Last line:   EOF
```

The reference pairs are arranged in one line with the independent value first and the dependent value second. Blanks or Tabs must separate the two columns. The lines must be sorted in increasing order.

Example of an Interpolation file:

```

INTERPOLATION
This is an example file.
2
5
-2000    0
-1500    1.5151
-100     3.7456
10       7.78569
400      0.12
EOF
    
```

Example of a Multi Channel Interpolation file with 3 channels separated by blanks:

```

INTERPOLATION
This is a 3-channel example file.
3
5
-2000    0.00    1.00
-1500    1.5151  2.50
-100     3.7456  3.5678
10       7.87569  2.222
400      12.587   3.334
EOF
    
```

1.9. Data Files

DASYLab can store data in different formats so that data can be used by other applications. It can read data stored as IEEE-32 or ASCII formats, in addition to its own format. Use the **Read File** and **Write File** modules from the **Files** module to read and write files.

ASCII Format (.ASC)

Data is stored as ASCII strings, so that it can be read without an additional converting program.



Only continuous time-dependent data can be stored in the ASCII format.

IEEE Format (.I32)

Data is stored as IEEE 32 bit floating point values in the Intel format.



Only continuous time-dependent data can be stored in this format.

External Formats

DASYLab supports saving data in any of the following formats:

Format	Extension	Format	Extension
ASCII	*.ASC	IEEE-32	*.I32

DADiSP	*.DSP	Remus	*.DAT
DIA/DAGO	*.DAT	Signalys	*.VH, *.K??. *.D??
Famos	*.DAT		



FFT, Histogram, or Relay data cannot be stored in the DIA/DAGO format. The same block size and sampling rate must be specified for all the channels if data is to be stored in this format.

There are no restrictions for the Famos or the Signalys formats.

DASYLab Data Format (.DDF / .DDB)

This format is the DASYLab format that exactly fits the requirements of DASYLab.

Data can be stored and read in this format. All types of data can be saved and the full information is stored together with the raw data.

Please refer to the section 1.10 for further details.

1.10. DASYLab Data Format (.DDF / .DDB)

(Extended Version 1.01 / Oct. 1994)

1.10.1 Basics

The header can either be stored in the same file as the data or in another file with a different extension.

The extension for the main file is .DDF (“DASYLab[®] Data Format”). If a separate data file is created, its extension will be .DDB (“DASYLab[®] Data Block”).

The format itself is not fixed completely, but contains options for future development. Any variants of the format that are not described explicitly here are not fully developed and should not be used.

1.10.2 Basic File Structure

Each file consists of four sections, of which the one containing the data may be stored in a separate file:

1. Two global headers,
2. A number of channel headers (one for each channel),
3. One or several series of data blocks,
4. The End of File mark;

Or

1. Two global headers,
2. A number of channel headers (one for each channel),
3. The End of File mark,

Plus an additional file containing only the series of blocks of data.

The current version allows only one series of blocks of data.

1.10.3 Storing Different Types of Data

Binary data are stored following the conventions of the Intel Format. This documentation uses the following identifiers for data types:

- o CHAR single character
- o CHAR[n] an array of exactly n characters
- o INT 2 Byte signed
- o LONG 4 Byte signed
- o WORD 2 Byte unsigned
- o DWORD 4 Byte unsigned
- o DATUM date and time in the current MS-DOS format
- o FLOAT 4 Byte real
- o DOUBLE 8 Byte real
- o STRING a series of characters with NULL Byte terminator (variable size)

Strings will be encoded according to Windows 3.1 conventions.

1.10.4 The First Global Header

The first global header has the following structure:

CHAR[4]	fixed file identifier: 'D', 'T', 'D', 'F'
CHAR	fixed file identifier: CTRL-M (\$0D)
STRING	data source, comments, etc. (see below)
CHAR	fixed terminator: CTRL-Z (\$1A)
CHAR[2]	fixed CPU identifier: 'I', 'N'
WORD	size of this header in Bytes
WORD	file type (see explanation below)
WORD	version number (currently: 1)
WORD	size of the second global header in Bytes [*] (see explanation below)
WORD	size of a channel header in Bytes [*]
WORD	size of a block header in Bytes
WORD	flag for a separate data file
WORD	number of channels
DOUBLE	time delay between two samples
DATUM	start time

The "Data Source" string is structured by DASYLab as follows:

```
DASYLab v 3.00 [APRIL 15, 1993] -- Copyright
(c) 1992,93,94,95 by NATIONAL INSTRUMENTS
WORKSHEET = WIND.DSB
AUTHOR = W. Inner
COMPANY = Faster Than Light Inc.
DIVISION = Development
TITLE = Wind channel experiment 4711
SAMPLE RATE = 1000.0 Hz
DATA FORMAT = 1
DATA CHANNELS = 5
START TIME = MAY 25, 1995 11:55
```

If data blocks are stored in a separate file, the following line is added:

```
DATA FILE = NAME.DDB
```

You can view this information using the MS-DOS command `TYPE`.

“File Type” may be one of the following values:

0	streamer format (data are raw data in WORD format, coming directly from the DAQ)
1	Universal Format 1 (FLOAT)
2	Universal Format 2 (DOUBLE)
3 – 1000	reserved
1001 – 65535	unused

Currently only File Type 1 is supported.

The second global header is dependent on the file type.

For the above sizes marked with an asterisk [*] (and only those), strings are counted as 1 Byte each. Otherwise the real size will be entered. The data block headers cannot contain any strings.

The flag for separate data files may have either of these values:

0	(FALSE)	one file only / header and data are in the same file.
1	(TRUE)	separate file for data blocks. Both files must have the same file names, but the extension of the main file is .DDF (“DASYLab® Data Format”), and the extension of the separate data file is .DDB (“DASYLab® Data Block”).

1.10.5 End of File Mark

The end of file is marked by:

CHAR[4]	fixed label: 'D', 'T', 'D', 'F'
---------	---------------------------------

1.10.6 The Universal Format 1

This is the standard format of DASYLab. All the different types of signals can be stored in this format.

Global Header for Universal Format 1

This header has the following structure:

WORD	size of this header
WORD	number of channels (with multiplexed data total amount of channels)
WORD	Flag, whether the data are multiplexed (0=no; 1 = yes)
WORD[16]	Array of the channels collected on each input channel

Channel Header for Universal Format 1

Each channel has its own header:

WORD	size of this header
WORD	channel number
WORD	maximum size of a block in samples. The maximum value is 8192. The actual sizes of the blocks may be smaller.
DOUBLE	time delay between two samples in this channel
WORD	channel type (see explanation below)
WORD	channel flags (see explanation below)
DOUBLE	unused, must be 0.0 for future extensions
DOUBLE	unused, must be 0.0 for future extensions
STRING	channel unit
STRING	channel name

The following channel types may be used:

Value	for a channel containing data of the following type:
Channel Type = 0	continuous time dependent signals
Channel Type = 10	frequency dependent data (full block size)
Channel Type = 11	frequency dependent data (half block size)
Channel Type = 20	Histogram values
Channel Type = 21	Histogram values with time information

The channel flags may be used for special properties of a signal or block; currently only one flag is defined:

Channel Flag \$0001	data in this channel may have gaps
Channel Flag \$0002	this channel may contain shorter blocks

The different channel headers follow one by one without gaps. The first header corresponds to channel 0, the second to channel 1 and so on.

1.10.7 Data Block Header for Universal Format 1

Each series of data blocks is preceded by a small header structured as follows:

CHAR[4]	fixed label: 'D', 'A', 'T', 'A'
WORD	overall number of bytes in this channel
DATUM	start time for the following blocks
DWORD	unused, must be 0.0 for future extensions
DWORD	unused, must be 0.0 for future extensions

This header is followed by the corresponding series of data blocks, each of which is again introduced by its own separate header.

The individual pairs of headers and blocks directly follow each other. The blocks are not sorted according to channels but according to their start time.

Channels of types 0, 1, 10, 11 or 12 have headers as follows:

WORD	channel number
------	----------------

DOUBLE	start time
DOUBLE	time delay between samples
WORD	block size

This header is immediately followed by the data in 4-byte float format.

Channels of type 20 (Histogram data) have the following header:

WORD	channel number
DOUBLE	position of the first histogram value
DOUBLE	width of the classes
WORD	number of samples

This header is immediately followed by the data in 4-byte float format.

These data are not provided with time information.

1.10.8 The Universal Format 0

Universal Format 0 is used for streaming data. It may contain more than 16 channels and it may contain data in raw integer format.

Global Header for Universal Format 0

This header has the following structure:

WORD	overall number of bytes in this header
WORD	number of analog channels
WORD	number of counter channels
WORD	number of digital ports
WORD	number of bits in each digital port
WORD	original block size when data was stored
DWORD	sample number of the first sample (when cyclic buffer is not activated, always zero)
DWORD	number of samples per channel

Channel Header for Universal Format 0

WORD	number of bytes in this header
WORD	channel type 0: analog, 1: digital, 2: counter
CHAR	array 16 by 24 with channel names (channel names with 24 chars for digital ports)
WORD	data format 0 unsigned integer, 1: signed integer
DOUBLE	factor for calculation of Volts
DOUBLE	offset for calculation of Volts

1.11. Vector File (*.VEC)

The vector file (Extension *.VEC) stores information used in the module Convolution.

You can create this file with an ASCII editor such as Windows Notepad or any other non-formatting text editor. The file must be structured as follows:

(Quotation marks are inserted for better view. They are not allowed to be used in original vector file!)

1st line: "VECTOR"
 2nd line: Name (free text, max 40 characters)
 3rd line: Number of columns; only „1“ is allowed
 4th line: Number of data lines
 Next lines: Data (number of lines exactly as defined in previous line)
 Last line: „EOF“

Example of Vector file

```
VECTOR
Example of vector file name
1          number of columns „1“
5          number of data lines „5“
121       Data line 1
244       Data line 2
305       Data line 3
476       Data line 4
599       Data line 5
EOF
```

1.12. FGEN File (* .TXT)

The FGEN file (Extension * .TXT) stores Coefficients of Filter, which are used in the Convolution module.

It is possible to use the program FGEN for Windows (Version 1.00, 20 October 1995, Microstar Laboratories) to import immediately coefficients of digital filters into the convolution module. Because the FGEN program isn't able to store the coefficient matrix you must use the menu item „View...“ to show the coefficient values and copy them into the clipboard.

You can import this data into an ASCII editor such as Windows Notepad or any other non-formatting text editor and store it as a TXT file.

Example FGEN FILE

```
; vector v: Taps = 95, Type = Lowpass, Window = Blackman
; vector v: Actual Taps = 101 (before zero stripping)
; vector v: Edges = 0,09, 0,14
; vector v: Scale = 8
vector v = (-1, -1, -2, -1, 1, 6, 14, 24,
35, 43, 44, 34, 8, -36, -97, -170,
-243, -300, -321, -284, -173, 20, 288, 608,
937, 1214, 1369, 1332, 1045, 479, -356, -1398,
-2530, -3589, -4372, -4665, -4268, -3023, -848, 2246,
6140, 10610, 15343, 19968, 24091, 27345, 29429, 30147,
```


29429, 27345, 24091, 19968, 15343, 10610, 6140, 2246,
-848, -3023, -4268, -4665, -4372, -3589, -2530, -1398,
-356, 479, 1045, 1332, 1369, 1214, 937, 608,
288, 20, -173, -284, -321, -300, -243, -170,
-97, -36, 8, 34, 44, 43, 35, 24,
14, 6, 1, -1, -2, -1, -1)

2. DASYLab-Net: Communication with Other DASYLab Programs

DASYLab-Net is able to control other DASYLab-Net programs running on connected machines. A typical configuration is a central computer that controls all functions (a master) and many measuring points that are controlled (slaves).

There are always two machines involved in any communications connection. Usually they are called Client/Server. Also we will use the terms Master/Slave or Active/Passive Partner.

The computer that actively builds and controls the connection is the Client, Master or Active Partner. It sends commands and performs supervising functions. It also sends or receives data initiated by itself. The Client or Master computer always has the main control.

The Server, Slave or Passive Partner is the computer that waits for another computer to contact it. It accepts commands, receives data and sends data controlled by the far side. Server or Slave computers are not able to operate without the control inputs of the Server. It only executes commands of the Master unit.

Each DASYLab-Net can be defined as Client (= Master) or Server (= Slave). The DASYLab Server is able to send data to several Clients; the DASYLab Client is able to control several Servers.

The Remote Control Dialog Box allows you to define DASYLab-Net as Client or Server. With Server mode there are no further settings. With Client mode you can define a list of Servers that should be controlled. The settings of each of these Servers can be defined using the Option button or the servers can be ordered to execute immediate instructions.

The Options Dialog Box defines the settings of the remote control operations.

- Start/Stop simultaneously

When this option is active, the Server starts and stops each time the measurement starts and stops. Please note that Clients and Servers never start at exactly the same time because the transmission of the start command is dependent on the utilization and capacity of the network. Also network configuration, speed of network boards, etc., will affect the speed of the transfer.

- The Start, Stop and Load Options are executed immediately. Start measurement, stop measurement or loading a worksheet will be performed on the remote side “instantly.”

2.1. TCP/IP Network Protocol

The TCP/IP Protocol is the basis of DASyLab-Net’s functions. It is not included in the standard Windows or Windows for Workgroups installations. You will need to install the TCP/IP Stack to use the DASyLab-Net functions.

Availability

Several manufacturers provide TCP/IP Protocol Stacks as a supplement to Windows 3.1 and/or Windows for Workgroups 3.11. DASyLab-Net only works correctly with TCP/IP Stacks that include a WINSOCK DLL file. This file should meet the Windows Sockets Specification Version 1.1, Jan 20, 1993.

MS TCP/IP-32

The TCP/IP-32 Protocol Stack is provided free of charge by Microsoft. This stack (in contrast with others) cannot only be used with Windows 3.1 but also with Windows for Workgroups 3.11. It is very easy to install. New operating systems such as Windows 95 will contain the TCP/IP Protocol in the standard distribution.

The following section refers to the MS TCP/IP-32 Protocol stack.

Installation

MS TCP/IP-32 installation is started using the network setup from the Network Group. You can install it as an additional protocol using the driver options.

Typically you would first install the Microsoft Windows Network with an installed Ethernet board. Then install the TCP/IP-32 as an additional protocol.

Installation of additional Network protocols (such as Novell Net or others) is not required because each additional protocol running on the network diminishes the overall performance.

IP-Address

During the installation of TCP/IP, all mounted computers must have an IP Address (= Internet Address). The string is constructed of 4 numbers divided by decimal points (for example: 192.153.120.3) and has to agree with established declarations (for example, the first number defines the Address Type.)

If you want to connect your local network with the worldwide Internet, you must request the first three numbers from the network provider. The last number will define the local computer.

Also, while the network will work, local Internet conventions must be obeyed. For example, usable addresses are 192.153.120.x in which each local computer gets its station identification defined in the x component (range: 1 up to 255). The first three numbers of all local computers must be identical. Each local machine must be named unambiguously. This name is also used by DASyLab-Net.

2.2. Bibliography

Reviewing the literature, there are many books, articles, etc., which discuss TCP/IP, Internet and Windows Sockets.

References with subjects of Ethernet, FDDI, Using IP-Addresses, etc., are interesting if you want to install a TCP/IP Network.

Subjects of FTP, TELNET, NFS, EMAIL, WWW (Worldwide Web), GOPHER, and so on are descriptions of public domain services that are not necessary to run DASYLab-Net.

You won't need descriptions of Windows Sockets. You only need to know that DASYLab-Net needs Windows Sockets. The software manufacturer has to deliver them with the TCP/IP Stacks.

3. DDE: Communication with Other Applications

DDE (Dynamic Data Exchange) is defined as a dynamic data exchange between Windows applications using a defined protocol. Although this conversation is two-way, the role of each program is determined by the protocol. The program asking for data is called the Client. The called program is defined as the Server.

The Client always initiates a DDE conversation. It sends an initialization message (WM_DDE_INITIATE) to all running tasks. The parameters describe the general type of the required data. A program with that data type responds with an acknowledgment and declares itself to be the Server. A DDE conversation is restricted to two partners.

3.1. DASYLab as DDE Input

Using the Windows DDE Interface, external programs are able to initiate DASYLab functions (load file, start measurement...) in a running DASYLab program. Other Windows applications can control DASYLab. In this case DASYLab is the Server, a Visual Basic application, for example, is the Client.

The format of the DDE instructions has to conform to the following rules:

Service:	DASYLab
Topic:	Menu
Item:	Command e.g. Load

The name of the application (service) DASYLAB and the topic **Menu** starts the DDE conversation. Available items are **Command** (standard menu command) with start measurement, stop measurement, pause measurement and continue measurement functions and the item **Load** to load file.

There are 6 additional DDE items to manipulate Global Strings or Variables using DDE:

- SetString
- GetString

- SetVar
- GetVar
- GetData
- SetData

In both **GET** functions the number is chosen as item and the function as topic (DASYLab is the DDE server. Connection is a **Cold Link**). DASYLab will send back the result as an ASCII value. If there is no result (wrong number, etc.), DASYLab will send back the string '**Parameter Error**'. To set strings or variables (DASYLab is DDE server, connection is defined as DDE Poke) the number and the defined alphanumeric string or numerical value separated by a semicolon will be sent. DASYLab gives no feedback.

Protocol

Application: DASYLab

- **Start measurement, stop measurement, pause measurement, continue measurement:**

Topic:	Menu
Item:	Command
String:	START, PAUSE, CONT, STOP
Communication:	Poke
- **Load file:**

Topic:	Menu
Item:	Load
String:	FILENAME
Communication:	Poke
- **Set Global String:**

Topic:	Menu
Item:	SetString
String:	Number;String
Example:	3;test.ddf
Communication:	Poke
- **Get Global String:**

Topic:	Menu
Item:	GetString
String:	Number
Communication:	Cold link
- **Set Global Variable:**

Topic:	Menu
Item:	SetVar
String:	Number; (ASCII) Value
Example:	2;5.923
Communication:	Poke

- **Get Global Variable:**

Topic:	Menu
Item:	getVAR
String:	Number
Communication:	Cold link
- **Get DDE data**

Topic:	GetData
Item:	MODULEname
String:	Line with x channels, (ASCII)
Communication:	ColdLink or HotLink
- **Set DDE data**

Topic:	SetData
Item:	MODULEname
Communication:	Poke

Visual Basic - example

```
Private Sub cmdPoke_Click()
    txtData.LinkMode = vbLinkNone
    txtData.LinkTopic = "DASYLab" & "|" & "Menu"
    txtData.LinkItem = "Load"
    txtData.LinkMode = vbLinkManual
    txtData.Text = "c:\DASYLab\last.dsb"
    txtData.LinkPoke
End Sub

Private Sub cmdRequest_Click()
    txtData.LinkMode = vbLinkNone
    txtData.LinkTopic = "DASYLab" & "|" & "GetVariable"
    txtData.LinkItem = "1"
    txtData.LinkMode = vbLinkManual
    txtData.Text = ""
    txtData.LinkRequest
End Sub
```

In VisualBasic 5.0 the type of communication is declared as follows:

```
Poke:    Linkmode:txtdata.LinkMode = vbLinkManual
         Initialization:    txtdata.Poke

ColdLink:    LinkMode: txtdata.Linkmode = vbLinkManual
              Initialization:    txtdata.Request

HotLink: LinkMode: txtdata.LinkMode = vbAutomatic
```

When the connection is successful, an acknowledgment signal (“CONNECT”) will be sent.

Net DDE

It is also possible to exchange data between programs running on different machines using an available **network**.

You need to ensure the following:

- On the server side there must be one or more DDE shares entries. This authorizes other applications (in the following example `Excel`) to connect via Net DDE. Shares are inserted in the SYSTEM.INI file section `[DDEShares]`.

Example:

```
[DDEShares]
CHAT$=winchat,chat,,31,,0,,0,0,0
SCHAT$=winchat,chat,,31,,0,,0,0,0
CLPBK$=clipsrv,system,,31,,0,,0,0,0
DL_MENU$=DASYLab,Menu,,15,,0,,0,0,0
DL_DATA$=DASYLab,DdeData,,15,,0,0,0
XL_TAB1$=Excel,Tab1,,15,,0,0,0
```

DASYLab requires the last three lines.

You need to restart Windows to initiate the connection.

- On the client side the following entries are necessary:
When DASYLab and the other application are installed on the same machine:

```
Application: Excel
Topic:      Tab1
Item:       R1C2
```

When DASYLab and the other application are connected via Net DDE:

```
Application: \\ComputerName\NDDE$
Topic:      XL_1TAB1
Item:       R1C2
```

Adjustments of the client must match the enabled DDE shares settings.

Chapter 6

Tips & Tricks

Chapter 6: Tips & Tricks

1. Demo Worksheets

When you set up DASYLab on your hard disk, several Sample Worksheets are copied to the DASYLab directory.



*You can open these files into the working area by choosing **Open** from the **File** menu or by clicking this **Function Bar** icon.*

These worksheet examples can give you some idea of the wide range of measuring tasks that can be solved by DASYLab.



*If you choose the **File Info** command from the **File** menu, or click the corresponding icon on the **Function Bar**, you will find information on that worksheet in the **Worksheet Information** box.*

2. DASYLab by Keyboard

Most Windows applications are designed with mouse operation in mind, but the keyboard may also be used. The following keyboard operations can be used in DASYLab:

Menu Commands

Menu commands can be chosen by pressing **ALT** to move to the Menu Bar, then typing the underlined letter in the menu name to open the menu, and then typing the underlined letter in the menu command.

Experiment Control

Keyboard shortcuts are provided for commonly used **Experiment** menu commands. Instead of opening the menu and choosing the command, press the key combination.

These keys are listed to the right of the menu entry. The online help pages also list them.

A list of the commands and their shortcut-key combinations is provided on page 6-2.

User Defined Hot Keys

The **Hot Keys** command in the **Option** menus allows the user to define and assign key combination to any available DASYLab function. See page 6-2.

Module Manipulation and Configuration

The module symbols in the worksheet can be dragged, connected by data channels, configured, or deleted. The latter two manipulations can also be done with the keyboard.

Only one module in the worksheet can be selected and manipulated. It is identified among the module symbols in the work area by the inverse coloring of its **Title Bar**, where the module name is displayed.

- To select a module, click it once with the **left** mouse button or press the **TAB** key on your keyboard until that module is selected.
- When you press the **ALT+ENTER** keys, the module configuration dialog box appears. Press the **TAB** or the **SHIFT+TAB** keys to move from one field or button to another; select items by pressing the arrow keys, the **SPACE** and the **ENTER** key.



Channel Selection can only be done using the mouse.

- To copy settings entered for the selected channel to the other activated channels, use the **F7/F8** Function Keys. This procedure can only be performed using keyboard operation.
- To delete the selected module from the worksheet, or to delete all the input and/or output channels of that module, press the **DEL** key. In the dialog box, select the desired option, or choose **Cancel**, and press **ENTER**.

3. DASyLab Hotkeys

In addition to the built-in Hotkeys, you can define your own. See Chapter 4: 1.6.4 on page 4-46 for details.

F1	Online Help
F2	Show Display Window
F3	Show Display Window
SHIFT-F3	Show Sequence Window
F4	Show Layout Window
F5	Start Measurement
CTRL+F5	Stop Measurement
CTRL+F6	Pause Measurement
CTRL+F6	Resume Measurement
F7	Copy selected channel properties
F8	Copy all channel properties
ESC or CTRL+F	Switch Layout from full screen to window mode
CTRL+F	Switch Layout into full screen mode
ALT+SHIFT+Number	Save window arrangement
Alt+Number	Choose window arrangement
ALT+CTRL+Number	Delete window arrangement

Hotkeys in junction with mouse button (Debug Window, only if measurement is running):

Left mouse click on data channel	Reduced Debug Window
---	----------------------

CTRL-Left mouse click on the data channel	Full Debug Window
SHIFT-Left mouse click on the data channel	Graphical Debug Window

4. How to Start and Stop an Experiment

This section contains

- Some basic information on the options provided by DASYLab to control an experiment or data acquisition process;
- An overview of the manual control options;
- And a review of the methods for automatically controlling an experiment.

4.1. Start/Stop/Pause/Resume an Experiment




DASYLab allows you to control your data acquisition procedures in various ways. Besides starting and completely stopping an experiment you can also interrupt it and later resume it at that point.

- When you pause an experiment, the acquisition of new data is stopped (for example, Generator, A/D or Digital Input, PID or Manual Control modules) but data already acquired will be processed completely.
- The acquisition of new data is resumed when the experiment is continued.

4.2. Controlling an Experiment Manually

There are three methods for controlling an experiment manually.

- ① Choose the commands from the **Experiment** menu: click the menu item, or press the **ALT, X** keys, then type the letter that is underlined in the item name.
- ② Click the icons on the **Function Bar**. Each icon symbolizes a menu commands.
- ③ Use keyboard shortcuts. When available, shortcut-key combinations are listed to the right of the menu item; to use, press the key combination.

Icon	Experiment Menu Command	Hotkey	Function
	Start	F5	Start experiment
	Stop	CTRL+F5	Stop experiment
	√Pause	CTRL+F6	Pause experiment / resume experiment

4.3. Automatic Program/Experiment Start

The experiment setup (the worksheet) and/or the computer can be configured so that the experiment will start and stop automatically.

The following describes the menu commands needed and the details on how to automatically set up experiments using batch files and Windows resources.



The concept of Event Driven Actions enlarges the capabilities of DASyLab in the field of automatic measurement control. An ACTION module can react to detected events with certain activities, such as opening and starting a new worksheet, printing displays, resetting values, etc. See the Module Reference Guide for more information.

4.3.1 Start/Stop via DDE

Other Windows applications with DDE capabilities can be used to start and stop the DASyLab experiment. Refer to the DDE section in Chapter 6 for details on the DDE protocol.

4.3.2 Start/Stop at Time

Choose the Start/Stop at Time option from the Experiment menu to start, stop, and repeat an experiment at specified times. You can specify the time at which an experiment is to start, the duration of that experiment, and the interval after which the experiment is to be repeated. Refer to Chapter 6 for details.

4.3.3 Using the Auto Start Function

Use the Auto Start option from the Experiment menu to set an experiment to start automatically.

- Activate the Auto Start option from the Experiment menu (indicated by a check mark √).
- Choose Save or Save as... from the File menu, or click the Function Bar icon, to save your worksheet. When you exit DASyLab, the setting of the Auto Start option is saved with other window settings.

- To use Auto Start, append the file name of the worksheet to the program file name at the command line. DASYLab opens the worksheet and starts the experiment immediately.

4.3.4 Starting a Worksheet from the Windows Desktop

Drag and drop your worksheet files onto the Windows desktop. To automatically start DASYLab by double clicking on the worksheet, you first have to manually create a link from DASYLab to the file type. First, use the Drag & Drop method to place a worksheet file icon on the desktop. Because there is no defined link to any program, double clicking on this icon will open a dialog box. Windows will ask you what program should be used to open that file. Select the: **File always open with ...** radio button and select the **Others...** button. Windows will open an Explorer Window that allows you to select a program. Choose the DASYLab installation path and select the DASYLAB.EXE program. Use the **Open** button to confirm. Leave the dialog box using the **OK** button. In the future, DASYLab will automatically start when a worksheet icon is double clicked.

If you have installed several copies of DASYLab on your system, the created link connects only to one version of DASYLab from the Windows Program Manager or File Manager.

4.3.5 Starting Control Sequence Files from the Windows desktop

Using Windows 95/98 or 2000/NT you can place your Control Sequence files with Drag&Drop onto the Windows desktop. To automatically start DASYLab by double clicking on the Control Sequence file, you first have to manually create a link from DASYLab to the file type. First, use the Drag & Drop method to place a Control Sequence file icon on the desktop. Because there is no defined link to any program, double clicking on this icon will open a dialog box. Windows will ask you what program should be used to open that file. Select the: **File always open with...** radio button and select the **Others...** button. Windows will open an Explorer Window, which allows you to select a program. Choose the DASYLab installation path and select the DASYLab.EXE program. Use the **Open** button to confirm. Leave the dialog box using the **OK** button. In the future, DASYLab will automatically start when a worksheet icon is double clicked.

If you have installed several copies of DASYLab on your system, the created link connects only to one version of DASYLab.

4.3.6 Tips for starting worksheets/control sequences if you have more than one DASYLab version on the same computer

If there are several versions (e.g. German and English versions) installed on your system, you can create links to worksheets for each version. Because DASYLab doesn't use the extension to identify the worksheet file you can rename the work-

sheets of each version to a special extension (e.g. English worksheets with *.ews). Now you can create a new link in Windows as previously described, and each worksheet will start with the corresponding DASyLab version when you double click on the file. You have to pay attention to previously used extensions, so that you don't affect other installed software.

4.3.7 Various Application Icons or Batch Files

You can customize the start-up modes described above.

Batch Files

Create a batch file containing the command line described above, including the worksheet file name and save it with a descriptive file name. Set up several batch files, each with an experiment setup.

Any experiment can be then started by typing the corresponding batch file name.

Application Icons in Windows Program Manager

Add a new option to the DASyLab application icon displayed in the Windows Program Manager, or create a special icon for an experiment in your DASyLab program group in the Windows Program Manager.

- To keep the current program startup option without a worksheet, copy the DASyLab icon first. Select it, press the F8 function key, or choose Copy from the Program Manager File menu.
- Select the copied DASyLab icon with one mouse click, and press the ALT+ENTER keys, or, choose Properties from the File menu.
- Type the complete worksheet file name including its drive, directory, and extension after the DASyLab command in the Command Line box.

For example: C:\DLAB\DASYLAB.EXE D:\FLCS\FLC1.DSB
where FLCS is the directory on drive D: where your worksheet files are saved, and FLC1.DSB is the experiment setup file which is to be automatically started.

- In the Description box, type a description that identifies the worksheet.
- Press ENTER.

Any experiment can be started directly by clicking on the corresponding Program Manager icon.

4.3.8 Starting an Experiment at the same time as Windows

Copy one of the experiment icons to the Windows Program Manager AUTOSTART group to start the experiment when Windows is started.

4.3.9 Starting an Experiment when your Computer System Re-starts

Add the Windows command to the AUTOEXEC.BAT file and the experiment will start when you start your computer system.

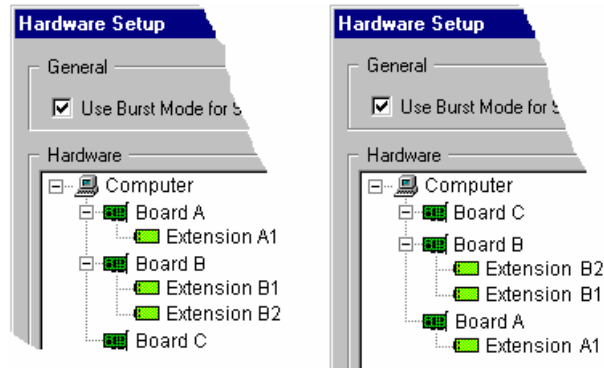
5. Exchanging Worksheets

Between Computers

If you have to exchange worksheets between several PCs (for example, when setting up runtime applications), you must guarantee that the selection and sequence of measurement hardware (Experiment: Hardware Setup) in the source DASYLab are exactly the same as in your target PC. If not, there may be problems with hardware specific modules. This is usually only a problem when using **more than one DAQ board** (multifunctional drivers) or **boards with extension boards**. The hardware configuration specified in the hardware setup is stored as a list of indices in the worksheet without a board-specific indication. The result of a different sequence is an incorrect setup of hardware modules.

Similarly, the hardware settings, including the base address and/or channel of the single components have to be identical.

The following picture shows parts of the hardware setup of different PCs with the same set of measurement hardware but with a different setup sequence, which causes incorrect hardware assignment.



Between Versions Of The Software

DASYLab worksheet files, *.DSB, are forward compatible with newer versions of the software. Generally, however, a worksheet created with a newer version, such as V8.0, cannot be read by an earlier version, V5.0. This may also be the case be-

tween minor revisions, such as V5.00 and V5.02, where the former, due to incompatible changes in the worksheet binary format, cannot read a worksheet created by the latter.

To read a worksheet file with an earlier version, save the file as the worksheet ASCII format (.DSA). You may have to reconfigure some modules, but the older DASyLab is more likely to be able to read the ASCII format worksheet.

From 16-bit version to 32-bit Version

Use the ASCII worksheet format (.DSA) to exchange files between the 16-bit V5.0 and 32-bit Version 5.0 and later.

6. Display Company Logo

The DASyLab logo appears in the Copyright Information dialog box (About DASyLab from the Help menu). You can display your company logo by creating the logo as a Windows Metafile (*.WMF). Copy that file to the DASyLab directory as LOGO.WMF. The next time you start DASyLab, your logo will be displayed in the Copyright Information window. It may be necessary to fine-tune the size and proportions of the picture.

Appendices

Appendices

A: What's included in Your DASYLab Package

The DASYLab package consists of the following parts:

- CD-ROM with the installation files for the DASYLab program files, the setup program files, and the driver files for data acquisition devices
- Optionally, a printed *User Guide*, the *Module Reference Guide* and the *Hands-On Guide*. If these books are not included, they can be printed from the CD-ROM (PDF format) or downloaded from www.dasylab.net
- Optionally, the *Hardware Installation Manual* that provides information about the drivers for the data acquisition devices. If you did not receive a *Hardware Installation Manual*, refer to the Online Help for your driver that was installed in the program group during installation.
- Optionally, the *DAP Power DLL Manual*, which describes features specific to the optional DAP Power DLL.
- Registration card, license, and miscellaneous enclosures



B: Internal Data Flow and Precision Information

Data values are represented in DASYLab as single precision floating point values. All calculations except the FFT are carried out in double precision (8 Byte floating point).

Single Precision Format

Data Format:	32 Bit
	1 Bit sign
	8 Bit exponent
	23 Bit mantissa
Range:	$3.4\text{E}-38$ to $3.4\text{E}+38$
Accuracy:	at least 7 decimals

Double Precision Format

Data Format:	64 Bit
	1 Bit sign
	11 Bit exponent
	52 Bit mantissa
Range:	$1.7\text{E}-308$ to $1.7\text{E}+308$
Accuracy:	at least 15 decimals

C: ASCII Table

Control Characters (not printable)

Decimal	Octal	Hex	Characters	Code	Notes
0	000	0x00	Ctrl-@	NUL	Null prompt
1	001	0x01	Ctrl-A	SOH	Start of heading
2	002	0x02	Ctrl-B	STX	Start of text
3	003	0x03	Ctrl-C	ETX	End of Text
4	004	0x04	Ctrl-D	EOT	End of transmission
5	005	0x05	Ctrl-E	ENQ	Enquiry
6	006	0x06	Ctrl-F	ACK	Acknowledge
7	007	0x07	Ctrl-G	BEL	Bell
8	010	0x08	Ctrl-H	BS	Backspace
9	011	0x09	Ctrl-I	HT	Horizontal tab
10	012	0x0A	Ctrl-J	LF	Line feed
11	013	0x0B	Ctrl-K	VT	Vertical tab
12	014	0x0C	Ctrl-L	FF	Form feed
				NP	New page
13	015	0x0D	Ctrl-M	CR	Carriage return
14	016	0x0E	Ctrl-N	SO	Shift out
15	017	0x0F	Ctrl-O	SI	Shift in
16	020	0x10	Ctrl-P	DLE	Data link escape
17	021	0x11	Ctrl-Q	DC1	X-ON
18	022	0x12	Ctrl-R	DC2	
19	023	0x13	Ctrl-S	DC3	X-Off
20	024	0x14	Ctrl-T	DC4	
21	025	0x15	Ctrl-U	NAK	Not acknowledged
22	026	0x16	Ctrl-V	SYN	Synchronous idle
23	027	0x17	Ctrl-W	ETB	End transmission blocks
24	030	0x18	Ctrl-X	CAN	Cancel
25	031	0x19	Ctrl-Y	EM	End of medium
26	032	0x1A	Ctrl-Z	SUB	Substitute
27	033	0x1B	Ctrl-[ESC	Escape
28	034	0x1C	Ctrl-\	FS	File separator
29	035	0x1D	Ctrl-]	GS	Group separator
30	036	0x1E	Ctrl-^	RS	Record separator
31	027	0x1F	Ctrl-_ Ctrl-^	US	Unit separator
127	0177	0x7F		DEL	Delete or rubout

Printable Characters:

Decimal	Character	Decimal	Character	Decimal	Character	Decimal	Character
32:		33:	!	34:	"	35:	#
36:	\$	37:	%	38:	&	39:	'
40:	(41:)	42:	*	43:	+
44:	,	45:	-	46:	.	47:	/
48:	0	49:	1	50:	2	51:	3
52:	4	53:	5	54:	6	55:	7
56:	8	57:	9	58:	:	59:	;
60:	<	61:	=	62:	>	63:	?
64:	@	65:	A	66:	B	67:	C
68:	D	69:	E	70:	F	71:	G
72:	H	73:	I	74:	J	75:	K
76:	L	77:	M	78:	N	79:	O
80:	P	81:	Q	82:	R	83:	S
84:	T	85:	U	86:	V	87:	W
88:	X	89:	Y	90:	Z	91:	[
92:	\	93:]	94:	^	95:	_
96:	`	97:	a	98:	b	99:	c
100:	d	101:	e	102:	f	103:	g
104:	h	105:	i	106:	j	107:	k
108:	l	109:	m	110:	n	111:	o
112:	p	113:	q	114:	r	115:	s
116:	t	117:	u	118:	v	119:	w
120:	x	121:	y	122:	z	123:	{
124:		125:	}	126:	~	127:	□
128:	€	129:	□	130:	,	131:	<i>f</i>
132:	„	133:	...	134:	†	135:	‡
136:	^	137:	‰	138:	Š	139:	<
140:	Œ	141:	□	142:	Ž	143:	□
144:	□	145:	‘	146:	’	147:	“
148:	”	149:	•	150:	–	151:	—
152:	~	153:	™	154:	š	155:	›
156:	œ	157:	□	158:	ž	159:	ÿ
160:		161:	ı	162:	€	163:	ℓ
164:	¤	165:	¥	166:	ı	167:	§
168:	¨	169:	©	170:	ª	171:	«
172:		173:	-	174:	®	175:	–
176:	°	177:	±	178:	²	179:	³
180:	´	181:	µ	182:	°	183:	·
184:	¸	185:	¹	186:	º	187:	»
188:	¼	189:	½	190:	¾	191:	¿
192:	Å	193:	Ă	194:	Â	195:	Ã
196:	Ä	197:	Ä	198:	Æ	199:	Ç
200:	È	201:	É	202:	Ê	203:	Ë
204:	Ì	205:	Í	206:	Î	207:	Ï

Decimal	Character	Decimal	Character	Decimal	Character	Decimal	Character
208:	Ð	209:	Ñ	210:	Ò	211:	Ó
212:	Ô	213:	Õ	214:	Ö	215:	×
216:	Ø	217:	Ù	218:	Ú	219:	Û
220:	Û	221:	Ý	222:	Þ	223:	ß
224:	à	225:	á	226:	â	227:	ã
228:	ä	229:	å	230:	æ	231:	ç
232:	è	233:	é	234:	ê	235:	ë
236:	ì	237:	í	238:	î	239:	ï
240:	ð	241:	ñ	242:	ò	243:	ó
244:	ô	245:	õ	246:	ö	247:	÷
248:	ø	249:	ù	250:	ú	251:	û
252:	ü	253:	ý	254:	þ	255:	ÿ



D: Error Messages and Troubleshooting

The following error messages may be encountered while using DASYLab.

Analog output had to be interrupted

- | | |
|------------|---|
| Cause | the D/A buffer is empty, DASYLab could not generate data to be sent by the D/A module fast enough |
| Correction | reduce the output rate, or increase the output buffer size |

Cannot create DDE Link

- | | |
|------------|---|
| Cause | the specified server application is not active or the specified Topic or Theme is not available |
| Correction | start application and make sure that Topic and Theme are defined |

Cannot execute the worksheet at this module - aborted

- | | |
|------------|--|
| Cause | the worksheet contains a loop that means the output of a module is (indirectly) needed for its input |
| Correction | insert a time delay module or remove the loop completely |

Cannot open COMx

- | | |
|------------|--|
| Cause | the serial port is used by another application under Windows and is not available for DASYLab |
| Correction | make sure that the specified COM-port is not used by the mouse or by any other Windows application |

DDE Link was interrupted

- | | |
|------------|--|
| Cause | the DDE Link was interrupted by the Server program |
| Correction | make sure that the Server program is still running |

Digital output had to be interrupted

- | | |
|------------|--|
| Cause | the digital output buffer is empty, DASYLab could not generate data to be sent by the Digital Out module fast enough |
| Correction | reduce the output rate, or increase the output buffer size |

Error No 15

This message may occur with some drivers that have not replaced the default message text.

- | | |
|-------|---|
| Cause | (and meaning) data acquisition could not be started because a hardware conflict (like interrupts) has been detected. This is a driver error code and you should report this message to technical support for more information. Please be prepared to describe the exact situation in which it occurs. |
|-------|---|

File read error

- | | |
|------------|--|
| Cause | the data file you want to read is corrupt or has the wrong file format |
| Correction | check for the correct settings in the dialog box and make sure that the file format is correct |

Illegal block size STOP

- | | |
|------------|---|
| Cause | the FFT related module can only handle block sizes that are a power of 2 |
| Correction | use the Data Windows module to change the block size at the FFT input to a power of 2 |

Output rate does not match the channel rate for one channel. STOP

Output rate does not match the input rate at an input. STOP

- | | |
|------------|--|
| Cause | these messages indicate that the global acquisition rate is not an integer multiple of the defined output rate. Synchronized output can only be realized in a way that one sample is sent to the D/A Card after a certain number of input samples has been acquired. Therefore the input rate divided by the output rate has to be an integer value. In both cases DASyLab does not use the channel rates, but the summed rates. |
| Correction | adjust the analog or digital output rate |

The sample frequency is too high for this module

- | | |
|------------|---|
| Cause | up to version 1.54 of DASyLab the Chart Recorder was limited to 100Hz per channel. From 1.55 it does not check the rate of input signals. |
| Correction | slow down the input rate by separate or average modules |

The sampling rate is too fast. The measurement has been stopped

- | | |
|-------|--|
| Cause | the speed DASyLab can acquire data from an analog input card is limited. The limits depend on the hardware structure and the computer you use as well as on the worksheet you run. There may be different circumstances causing this message. The most common reason is that the driver buffer in DASyLab had an overrun and that the driver did not know where to store the next samples. In this case the measurement is stopped. Usually the bar in the status line indicates how much of the driver buffer is used, there are some situations where there may be no time to update the indicator. Another possible reason is that the interrupt frequency that is needed to acquire data at the desired rate was too high and that DASyLab no- |
|-------|--|

ticed that interrupts have been lost. This may be caused by extreme bus activities of the graphics or hard disk controllers. When this happens, the message also appears without having the buffer status indicator filled.

Correction slow down the sampling rate or increase the driver buffer

You cannot display signals from these input channels together in one scope

Cause the Y/t Chart module can only display signals of the same type in one display. The same type means that they are all time dependent, all frequency dependent or all histograms. When the signals are time dependent they have to have the same gap structure, that means that they may have gaps, but all at the same time and of the same length.

Correction use the Signal Adaptation module before the Y/t Chart or use different Y/t Charts for the different types

You cannot display signals from these input channels together in one X/Y chart

Cause the X/Y Chart module can only display signals of the same type in one display. The same type means that they are all time dependent, all frequency dependent or all histograms. When the signals are time dependent they have to have the same gap structure, that means that they may have gaps, but all at the same time and of the same length

Correction use the Signal Adaptation module before the X/Y Chart or use different X/Y Charts for the different types




E: Product Support

DASYLab™ is an innovative Windows application that has been developed over a period of several years by a team of committed engineers. To ensure that our software product will meet the changing needs of its users, we will continue to develop DASYLab™. If you fill in the registration form included in this package and send it back to us, you will automatically receive the latest information on any updates of the software.

Information about changes or features that were included after this user guide was printed is covered in the README file on your setup disk. Use Windows “Write” (or a similar word processor) to read this file. Read this file to find out about improvements and about conversions that may be necessary before you can use the latest DASYLab™ version.

If you have any questions, suggestions, or requests regarding the DASYLab™ software and documentation, please contact us – we will be glad to help.

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Index

*.ASC	5-4	Black Box Levels	4-11
*.DDB	5-5	Block Size	2-5
*.DDF	5-5	Maximum	4-25
*.DPF	5-3	New Feature	4-25
*.DSB	4-2, 4-43, 5-1	Block Size	4-25
*.DSQ	3-12, 3-13, 4-71	Blocked	
*.I32	5-4	Data Stream	4-46
*.IIS	4-33	Branches	3-3
*.INI	5-3	Create	3-5
*.IOU	4-33	Delete	3-6
*.SIM	4-33	Rearrange	3-6
*.SIS	4-33	BSI DISC PD-2000-1	ii
*.SOU	4-33	Buffer	
16-bit Program Worksheets	1-13	Driver	4-25
32-bit version	1-13	button	3-25
Acquisition		Calculate Expression	4-52
Mode	4-26	Channel Activation	1-16
Rate	4-24	Channel Status	3-4
Action Junction	3-13	Channels	
Actions		Differing Sampling Rates	4-24
Key Events	4-48	Channels Names	
List	4-49	Copy	4-68
Screen Locking	4-48	Client	4-22, 5-11
Activate Channel	1-16	Clipboard, Copy to ~	
Active/Passive Partner	5-11	File Info	4-5
Additions And Changes	1-15	Layout	4-12
Alphabetic Index (Help Index)	4-85	Worksheet	4-9
Analog Output Setup	4-27	Clocking	2-5
Analysis Toolkit	1-13	CLP	4-9
Animation	4-35	Colors	
ASC	5-4	Background	4-45
ASCII Data Format	5-4	Black Box	4-12
Auto Start		Data Channels	4-45
Experiment Menu	4-22	Edit Custom ~	4-45
Automatic Experiment/Program Start	6-4	Grid	4-45
Automation		Options Menu	4-45
Key Events	4-48	Screen Customization	3-9
Autorouter	3-5	Worksheet	2-2
Options Menu	4-46	Command Line	4-22
Back to Main Chart (Black Box)	4-11	Comment Flowchart	2-2, 3-13
Background Color	4-45	Company Logo	6-8
Basic	1-13	Configuration	
Bitmap Snapshots	1-17	Function Bar	3-24
Black Box		Module Bar	3-22
Colors	4-12	Module Bar Menu	4-13
Edit Menu	4-10	Configure	
Info	4-11	Module	4-18
Leave ~	4-11	Context Menu	2-6
Save	4-10	Continuous	

Acquisition Mode	4-26	ASCII	5-4
Control Sequencer	3-12, 4-69	DASYLab	5-5
Control Sequencer View	3-13	I32	5-4
Control Sequencer Window	3-12	Universal 0	4-28
Conventions	2-4	Data Stream Blocked	4-46
Convert 16-Bit Program Worksheets	1-13	DBB	4-10
Copy		DDB	5-5
Channel Names	4-68	DDE	5-13
File Info to Clipboard	4-5	DDF	5-5
Layout to Clipboard	4-75	Deactivate Channel	1-16
Layout Window	2-3	Debugging Aids	3-4
Module	2-2	Default	
VITool	2-3	Module Bar	4-15
Worksheet to Clipboard	4-9	Default Directories	4-43
Copy Layout as Bitmap into Clipboard	1-17	Data	4-43
Copy/Paste		Devices	4-43
Layout Window	4-75	Other files	4-43
List Actions	4-49	Streaming	4-43
VITool	4-75	Worksheet	4-43
Copyright Information	4-41	Default Options	2-2
Create		Define	
Data Channels/Branches	3-5	Global Strings	4-50
Create Directory	4-42	Global Variables	4-55
Cut		Delete	
Layout Window	2-3	Data Channels/Branches	3-6
Module	2-2	Layout Window	2-3
VITool	2-3	Module	2-1, 4-18, 4-19
Cut/Paste		Modules	4-16
Copy Layout	4-12	Output Channels	2-2
Modules	4-15	VITool	2-3
Worksheet parts	4-15	Window Arrangement	4-39
DASYLab		Delete Input Channels	2-1
Data Format	5-5	Digital Output Setup	4-27
DASYLab Versions	1-12	Directories	
DASYLab.DML	4-15	Default	4-43
DASYLab.INI	5-3	Data	4-43
DASYLab-Net		Devices	4-43
Client	4-22, 5-11	Other files	4-43
Master/Slave	5-11	Streaming	4-43
Remote Control	4-22, 5-11	Worksheet	4-43
Server	4-22, 5-11	Global Strings/Variables	4-61
TCP/IP	5-12	Disk Streaming	2-5, 4-27
Data Channels		Data Format	4-28
Autorouter	4-46	Read Data	4-28
Colors	4-45	Display	
Create	3-5	Function Bar	4-35
Delete	3-6	Module Bar	4-36
Rearrange	3-6	Display Window	
Data format		Dialog Box	3-11
Disk Streaming	4-28	Display Tree	3-11
Data Format		Display Window	3-11

Display Window Icon	3-11	Setup	4-23
Fixed Arrangements	3-28	Acquisition Mode	4-26
Function Bar	3-11	Block Size	4-25
Hide ~	4-36, 4-37	Driver Buffer	4-25
Make Visible ~	4-36	Sampling Rate	4-24
Menu Bar	3-11	Start	4-20
Restore ~	4-36	Start/Stop	6-3
Scroll Bar	3-11	Stop	4-20
Status Bar	3-11	Expressions	4-52
Title Bar	3-11	Extended	4-52
Display Windows		Extended Tooltip	1-16
Saved Arrangements	3-28	Extension (File-)	
DLL drivers	4-31	VEC	5-9
DML	4-14, 5-2	Extensions	
DMX (File Extension)	5-1	ASC	5-4
Documentation	2-2, 3-9	Black Boxes	4-10
List Actions	4-49	DBB	4-10
DOS Prompt	4-22	DDB	5-5
Dots (Grid)	4-41	DDF	5-5
Double Format	1-17	DML	4-14, 5-2
DPF	5-3	DPF	5-3
Drawing Elements	4-76	DSB	4-2, 5-1
Layout Windows	3-18	I32	5-4
VITool	3-18	IIS	4-33
Driver	1-10, 4-31	INI	5-3
Driver Buffer	4-25	IOU	4-33
Driver Selection	4-22	List Module Bar Files	4-14
DSA (File Extension)	5-1	Save Module Bar	4-15
Dynamic Data Exchange	see DDE	SIM	4-33
Edit		SIS	4-33
~ Menu Commands	4-9	SOU	4-33
Custom Colors	4-45	Extensions (File-)	
Edit Action	3-13	DSA	5-1
Embedding (Black Boxes)	4-11	TXT	5-2
Error Handling	4-46	Extensions (File-)	
Ethernet	5-12	DMX	5-1
Event-Driven Action		External Programs	4-89
Screen Locking	4-48	FIFO Status	3-4
Events		File	
Key	4-48	~ Menu Commands	4-1
Examples		Default Directories	4-43
Global Strings	4-61	Formats	
Global Variables	4-61	Initialization	5-3
Exit		Interpolation	5-3
Black Box	4-11	Module Bar	5-2
Program	4-8	Open Module Bars	4-14
Experiment		Open Worksheets	4-2
~ Menu Commands	4-20	Reference Points	5-3
Auto Start	4-22	Worksheets	5-1
Automatic ~ Start	6-4	Info	4-5
Pause	4-21	Open	

Index

Module Bar	4-14	Color	4-45
Worksheet	4-2	Hands-On Guide to DASyLab	2-2
file header	4-59	Hardware	
Files		Requirements	1-9
Default Directories	4-43	Hardware Setup	4-23
Find Modules	4-16	Hide	
Float Format	1-17	- Display Window	4-37
Flow Chart	see Worksheet	- Display Windows	4-36
Flowchart Junction	3-13	Hotkey	4-44
Font Sizes		Hot-Keys	1-15
Global Setting	4-44	I32	5-4
Format	see File -s	ICom/IEEE Modules	1-17
Page -	4-6	IIS	4-33
Worksheet	5-1	Index	
Worksheet Files	5-1, 5-2	Help Menu	4-85
Free H(ot)Keys	4-45	Information	
Free Variables/Strings	4-64	Black Box	4-11
Full version	1-13	File -	4-5
Function Bar		INI	5-3
Configuration	3-24	Input Channels	
Display/Remove	4-35	Delete	2-1
Screen Element	3-23	Install	
Window Arrangements	3-28	Module	4-18
Function Buttons	1-15, 3-25	Installation	
Getting Started	1-15	Setup	1-10
Getting Started Guide	1-15, 2-7, 4-87	System Requirements	1-9
Global Block Size	2-5	Instruction	2-2, 1-15, 2-7, 4-87
Global Clocking	2-5	First Worksheet	2-7
Global Sampling Rate	2-5, 4-24	Help Index Option	4-85
Global Setting		Interpolation	
Font Sizes	4-44	File Format	5-3
Global String		IOU	4-33
Overview	4-54	Isolated Series	
Global Strings	4-50	Acquisition Mode	4-26
Directory Example	4-61	Junction Points	3-3
Examples	4-61	Pop Up Menu	3-12
Module Use	4-54	Rearrange	3-6
System	4-54	key combinations	1-15
Global Variable		Key Events	4-48
Overview	4-54	Keyboard	3-2
Global Variables	4-55	Screen Locking	4-47
Directory Example	4-61	Keyboard Operations	6-1
Examples	4-61	Layout Object	
System Information	4-57	Properties	2-3
Use in Modules	4-57	Layout page	4-83
global Variables and Strings	1-15	Layout Window	3-17
Graph Object		Bitmap Objects	3-16
Properties	4-78	Copy	2-3
Graphic Card	1-12	Cut	2-3
Grid		Delete	2-3
- Type	4-41	Display Objects	3-16

Drawing Object	3-16	Margins	4-7
Function Bar	3-16	Master	5-11
Menu Bar	3-16	Maximum	
Text Objects	3-16	Block Size	4-25
Title Bar	3-16	Memory Requirements	1-9
ToolBox	3-16	Menu	
View	4-82	Display Window	4-68
Visualization Objects	3-16	Layout	4-68
Zoom	4-82	New Layout	4-68
Layout Windows		Window	4-68
Active Elements	3-19	Worksheet	4-68
Bitmapped Graphics properties	4-77	Menu Bar	
Copy	4-75	Screen Element	3-20
Copy Layout to Clipboard	4-12	Message Module	1-17
Copy/Paste	4-75	Mode	
Delete	4-75	Acquisition	4-26
Drawing Elements	3-18, 4-76	Module	
Linked Graph Properties	4-78	~ Menu Commands	4-16
Linked Text Properties	4-78	Copy	2-2
Load	4-75	Cut	2-2
Load from file	4-13	Default Options	2-2
New Layout	3-17	Documentation	2-2
Page Properties	4-83	Install and Configure.	4-18
Passive Elements	3-18	Polar Plot	1-16
Properties	3-17	Properties	2-2
Save	4-75	Replace	2-2
Save to file	4-12	Search	2-2
Text Block	4-79	Module Bar	2-4
Text Elements	3-18	~ Menu	
Text Grid	4-79	New	4-14
Text Line	4-79	Open	4-14
Toolbox	3-20	Save As ...	4-15
Visualization	4-77	Set to Default	4-15
Visualization Elements	3-18	~ Menu	4-13
LE	1-13	Configuration	3-22
leap year	ii	Display/Remove	4-36
Leave Black Box	4-11	File Format	5-2
Levels (Black Boxes)	4-11	Icons	3-2
Limited	1-13	Removing	3-23
Lines		Saving	3-22
Grid option	4-41	Screen Element	3-22
List Actions	4-49	module default	1-15
Lite	1-13	Module Groups	
Load	see Open	~ Overview	3-29
Network Open	5-11	Modules	
Program	4-58	Delete from Worksheet	4-16
Logo	6-8	Global Strings	4-54
Main Chart (Black Box)	4-11	Global Variables	4-57
Main Menu		Search	4-16
Customizing	4-89	Motorola	
External Programs	4-89	Double Format	1-17

Index

Float Format	1-17	PC Hardware Configuration	1-11
Mouse Button, Right -	2-1	Polar Plot	1-16
Move		Power Management	1-11
Module	4-18	Preceding Level (Black Box)	4-11
MS TCP/IP-32	5-12	Precision	B-1
Net option	1-13	Print	
Network	5-12	List Actions	4-49
TCP/IP	5-12	Page Format	4-6
New		Viewport	4-6
Module Bar	4-14	Worksheet	4-5
Worksheet	4-1	Printer Setup	4-6
New in Version 8.0	1-15	Processing Cycle	4-25
new Layout	4-69	Program Automation	
New Line (text boxes)	4-5	Key Events	4-48
NI-DAQ	2-5, 4-31	Program Item Properties	4-22
Off-line phase	4-64	Program Load	4-58
One Series		Program Operation Fundamentals	2-1
Acquisition Mode	4-26	Properties	
Open		Bitmapped Graphics	4-77
Module Bar	4-14	Layout Object	2-3
Worksheet	4-2	Layout Objects	4-77
Operations		Layout Window	4-81
Keyboard	6-1	Module	2-2
Options		VITool Objects	4-77
Program Start	4-41	Worksheet	2-2
Options Menu	4-82	Protocol	
Options Menu Commands	4-40	TCP/IP	5-12
Output Channels		QuickStart	1-15
Delete	2-2	Quit	4-8, see Exit
overview	1-15	Read	see Open
Overview	4-35, 4-54	Read Data	
Overview window	4-64	Disk Streaming	4-28
Page		Read or Write Access	4-64
- Format	4-6	README file	2-2
- Frame	4-7	README File	1-15
Page Properties	4-83	Rearrange Data Channels	3-6
Paper	4-7	Reference Points	
Parameter		File Format	5-3
Module	4-18	References (Help Index option)	4-85
Passive Partner	5-11	Regression Module	1-17
Password		Remote Control	4-22, 5-11
- Protection	4-47	Remove	
Password Protection		Display Window	4-37
Black Boxes	4-47	Display Windows	4-36
Paste		Function Bar	4-35
Modules	4-15	Module Bar	4-36
Worksheet	2-2	Replace	2-2
Worksheet Parts	4-15	Requirements	
Pause		Memory	1-9
Experiment	4-21	Resource Conflicts	1-12
PC Clock	4-31	Response Time	4-30

Restart after Time	4-21	Copyright Information	4-41
Restore Display Windows	4-36	Show Display Windows	4-36
Right Mouse	2-6	Show File Information	4-41
Right Mouse Button	2-1	SIM	4-33
Risky Applications	iii	Slave	5-11
Running Series		Sockets	5-12
Acquisition Mode	4-26	Spacing	4-41
S/B ratio	4-30	Start	
Sampling Rate	2-5, 4-28	Automatic Experiment/Program Start	
Differing \sim s	4-24		6-4
Sampling Rate	4-24	Experiment	4-20, 6-3
Sampling Rate/Block Size Ratio	4-30	at Time	4-21
Save		Auto Start	4-22
Black Box	4-10	Restart after Time	4-21
Module Bar	4-15	Start Options	4-41
Window Arrangement	4-38	Start/Stop	5-11
Worksheet	4-3	StartUp	
Save As		From Windows	2-4
Module Bar	4-15	Status Bar	2-3, 3-4, 3-27
Worksheet	4-4	Status line	4-65
Save Data		Step-By-Step Guide	2-2
Disk Streaming	4-27	Stop	
Screen		Experiment	4-20, 4-23, 6-3
Customization	3-9	after Time	4-21
Screen Locking	4-47	Streaming	2-5
Search	2-2	Strings	
Search for Modules	4-16	Examples	4-61
Security		Switch to Runtime	4-68
Black Box Passwords	4-47	System Information	
Editing Passwords	4-47	Global Strings	4-54
Screen Locking	4-47	Global Variables	4-57
Worksheet Passwords	4-47	System Requirements	1-9
Select		TCP/IP	5-12
Window Arrangement	4-38	Text	
Self-Paced Tutorial	2-2	Block	4-79
Sequencer	3-12	Elements	4-79
Sequencer Comment	3-15	Grid	4-79
Serial Devices	4-32	Text Block	
Serial number	1-10	Layout Object	4-79
Server	4-22, 5-11	Text Boxes	3-10
Setup		Text Elements	
Analog Output	4-27	Layout Windows	3-18
Digital Output	4-27	VITool	3-18
Disk Streaming	4-27	Text Line	
Experiment \sim	4-23	Layout Object	4-79
Hardware \sim	4-23	Text Object	
Output Buffer	4-27	Properties	4-78
Output Rate	4-27	Text Objects	
Output Start	4-27	Strings and Variables	4-81
Printer \sim	4-6	Time	
Show		Restart after \sim	4-21

Start at ~	4-21	Save Layout Window to File	4-75
Stop after ~	4-21	Text Block	4-79
Time Base Setup	2-5	Text Elements	3-18
Time Bases	2-5, 4-31, 4-32	Text Grid	4-79
Time Zone	1-12	Text Line	4-79
Title Bar	3-20	Toolbox	3-20
Tooltip	1-16	Undo	4-75
Tutorial See Instruction, See Instruction, See Instruction, see Instruction, see Instruction		Visualization	4-77
TXT (File Extension)	5-2	Visualization Elements	3-18
Undo	4-15, 4-75	Window Arrangement	3-28
Universal 0		Delete	4-39
Data Format	4-28	Save	4-38
Used Variables/Strings	4-64	Select	4-38
User Defined Function Buttons	1-15, 3-25	Window Menu	4-68
User defined Hot-Keys	1-15	Window Setup	4-40
user-defined Hotkeys	4-45	WINSOCK	5-12
Variables		WMF/CLP	4-9
Examples	4-61	Work Area	
VEC (File-Extension)	5-9	Layout Window	3-17
Vector-File		Worksheet Window	3-8
Data format	5-9	Worksheet	
View Menu	4-82	Open	4-2
View Menu Commands	4-34	Worksheet	
Viewport	4-6	Colors	2-2
Virtual device driver	1-11	Element	3-1
Visualization		Modules	3-1
Layout Window	4-77	Properties	2-2
Visualization Elements		Symbols	3-2
Layout Windows	3-18	Worksheet	
VITool	3-18	Save	4-3
VITool		Worksheet	
Active Elements	3-19	Save As	4-4
Bitmapped Graphics properties	4-77	Worksheet	
Copy	2-3	Print	4-5
Copy Layout to Clipboard	4-12	Worksheet	
Copy to Clipboard	4-75	File Format	5-1
Copy/Paste	4-75	Worksheet Documentation	3-9
Delete	2-3, 4-75	Worksheet Settings	2-2
Drawing Elements	3-18, 4-76	Worksheet to Clipboard	4-9
Layout Window	3-16, 3-17	Worksheet Window	
Layout Window Properties	3-17	Dialog Box	3-8
Linked Graph Properties	4-78	Display Window Icon	3-8
Linked Text Properties	4-78	Function Bar	3-8
Load Layout Window from File	4-75	Menu Bar	3-8
Load Layout Windows	4-13	Module Bar	3-8
Menus	4-74	Scroll Bar	3-8
New Layout	3-17	Status Bar	3-8
Page Properties	4-83	Title Bar	3-8
Passive Elements	3-18	Work Area	3-8
Save Layout Window	4-12	Worksheet Window	3-8
		Year 2000 Compliance	ii

Notes:

