OMNIC® Software, Macro Programming and Dynamic Data Exchange

By Michael Fuller, Ph.D. Nicolet Spectroscopy Research Center, Madison, WI, USA

KEYWORDS

OMNIC, FT-IR software, macros programming, Macros\Basic, Macros\Pro, dynamic data exchange

INTRODUCTION

For many laboratories running routine experiments, such as the typical QC laboratory, it is imperative that the analysis steps be consistent and repeatable. In this environment, the ability to build, store and execute automated procedures is essential. Users of Nicolet's OMNIC software can create automated procedures using OMNIC Macros\Basic™ and Macros\Pro™.

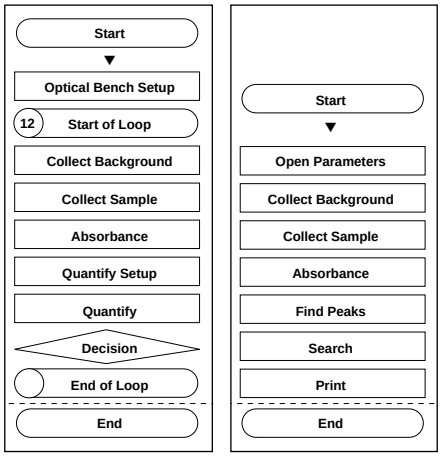
Nicolet's powerful OMNIC software family is a collection of complementary Windows®-based FT-IR software packages. The core OMNIC package has all of the capabilities you need to quickly and easily collect, process, analyze and manage your data. Its graphical user interface (GUI) with pull-down menus and customizable toolbar virtually eliminates the need for training because the path to successful data collection and analysis is intuitive. OMNIC includes all of the functions necessary to perform intricate infrared analysis experiments, from data collection through spectral processing and file management.

Using the functionality of this spectral analysis software, OMNIC Macros\Basic and Macros\Pro allow the user to create macros, from the simple to the complex, to automated procedures and provide customized interfaces.

OMNIC MACROS\BASIC

A macro is a series of tasks that are joined together to form a complete multi-step experiment. Using a macro to set system parameters and guide the analyst through an experiment provides considerable time savings and guarantees that the results are reproducible even when the experiment is performed by different operators.

OMNIC Macros\Basic is a simple macro programming tool. It provides a point-and-click graphical interface that allows even a novice to build and execute powerful macros. Most of the standard OMNIC commands can be inserted into the macro chain as well as mathematical functions to create automated methods that launch at the click of a button. This program even runs simultaneously with the core OMNIC software, so that newly created macros can be tested to assure proper operation.

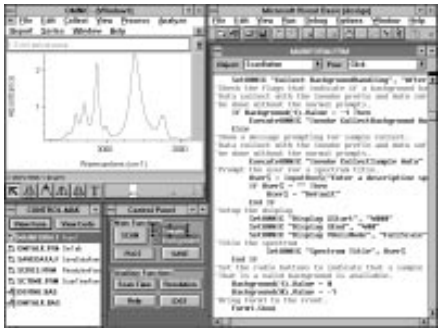


Two example macros written using Macros\Basic

The OMNIC Macros\Basic program provides an easy-to-use, graphical macro development environment that addresses the needs of most routine experiments. However, it is sometimes necessary to add macro capabilities beyond those which are accessible in the core OMNIC software package and the Macros\Basic program.

OMNIC MACROS\PRO

OMNIC Macros\Pro offers solutions to advanced programming needs such as complex numerical analysis of spectral information and the creation of unique graphical interfaces for special analytical experiments. Macros\Pro features many essential characteristics for a macro development environment to meet these complex demands. The environment must have complete access to OMNIC parameters and commands. It must also run in a multi-tasking mode, be capable of sophisticated numerical data analysis and provide intuitive means for developing graphical user interfaces without resorting to the complexities of a programming language such as C or Pascal. OMNIC Macros\Pro accomplishes this using the Visual Basic™ programming language and dynamic data exchange.



An example macro using Macros\Pro

DYNAMIC DATA EXCHANGE

One of the major advantages of the Windows environment is that of multi-tasking. This means that unlike the DOS operating system, more than one application can be running at the same time. In this environment it is even possible for programs to communicate with each other. One program can send data to the other and even execute commands in a remote manner. This type of interaction between Windows-based programs is called Dynamic Data Exchange (DDE).

DDE is the form of inter-process communications (IPC) used by Microsoft® Windows programs to support the exchange of commands and parameters between two applications. This communication consists of a conversation which is similar to a conversation between two people. A DDE conversation establishes a temporary or permanent link between two Windows applications and acts as a conduit for the exchange of information between the connected applications. The exchanged data can be information which is copied from one application to the other, or commands for the other application to process.

In a DDE conversation, the application initiating the conversation is known as the destination application. The application responding to the conversation is called

the source application. This terminology at first may seem backwards but keep in mind that the application that initiates the conversation is usually requesting some information to be sent to it (the destination of the information) by the responding application (the source of the information). An application may be involved in several conversations at the same time.

In order to initiate a DDE conversation, the destination application sends a message to the Windows operating system defining the source application that it wants to communicate with and a topic for the conversation. The topic defines the subject of the conversation and usually relates to some unit of source application data. For Microsoft Excel, this is a file with a .XLS or .XLC extension; For Word, a file with a .DOC or .DOT extension; and, for OMNIC, the topic is .SPA or .SPG.

Windows applications that support DDE "listen" for conversations that refer to them. When a source application receives a request concerning a topic that it recognizes, it responds by starting a conversation. Once the conversation starts, the topic cannot be changed unless the current conversation is ended and a new one is initiated.

During a DDE conversation, the source and destination applications can exchange information concerning items in a bi-directional manner. Items consist of data or commands that are meaningful to both the source and destination applications. The item can be changed by either the source or the destination during any given conversation.

An example of two commercial programs that use DDE are Microsoft Word and Microsoft Excel. You can use Excel to create a spreadsheet that calculates the yearly budget for your department and Word to construct a letter that describes the thought processes behind the budgeting figures. Within the Word document, you can initiate a DDE conversation via a Word Macro to automatically launch Excel, open the budget spreadsheet and transfer the data tables to the Word text document.

Not all Windows software programs have the ability to interact with other Windows programs through DDE. Special code in the program is required for this sharing of information. Some programs support simple data transfers vie DDE while others, such as Excel, offer extensive capabilities. OMNIC is an environment that is rich in DDE support, providing for a high level of interaction between it and other DDE supported applications.

VISUAL BASIC AND MACROS\PRO PROGRAMMING

There are many Windows compatible programming environments that can be used with OMNIC via DDE. High level Windows compatible languages such as Borland's Turbo Pascal for Windows and Microsoft's C can be used to create advanced macros that will interact with OMNIC. Nicolet has chosen Microsoft's Visual Basic as the programming environment to include in our Macros\Pro package. Visual Basic is a straightforward program that allows easy access to OMNIC through DDE.

The Macros\Pro package consists of three distinct parts. The first part is the information about DDE that is needed to set OMNIC parameters, issue commands and retrieve results. This information is presented in the manual section on OMNIC and DDE. It is very generic and provides all of the information needed to control OMNIC from Visual Basic or any Windows programming environment, supporting the full range of DDE capabilities. The second part is a copy of Microsoft's Visual Basic 2.0 programming software. This software allows the construction of sophisticated graphical user interfaces using point-and-click programming. Numerical analysis is easily coded using an easy to learn language whose syntax is based on the original BASIC computer language. The final part of the OMNIC Macros\Pro package consists of example Visual Basic programs that show you how to create powerful macros that interact with OMNIC using DDE. Each macro is thoroughly explained and provided on an accompanying floppy disk, allowing you to create new macros by modifying the examples provided.

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Nicolet Instrument Corporation

5225 Verona Road • Madison, WI 53711-4495 • U.S.A. • TEL: 800-232-1472, 608-276-6100 • FAX: 608-273-5046 • E-MAIL: nicinfo@nicolet.com • WEB: http://www.nicolet.com/