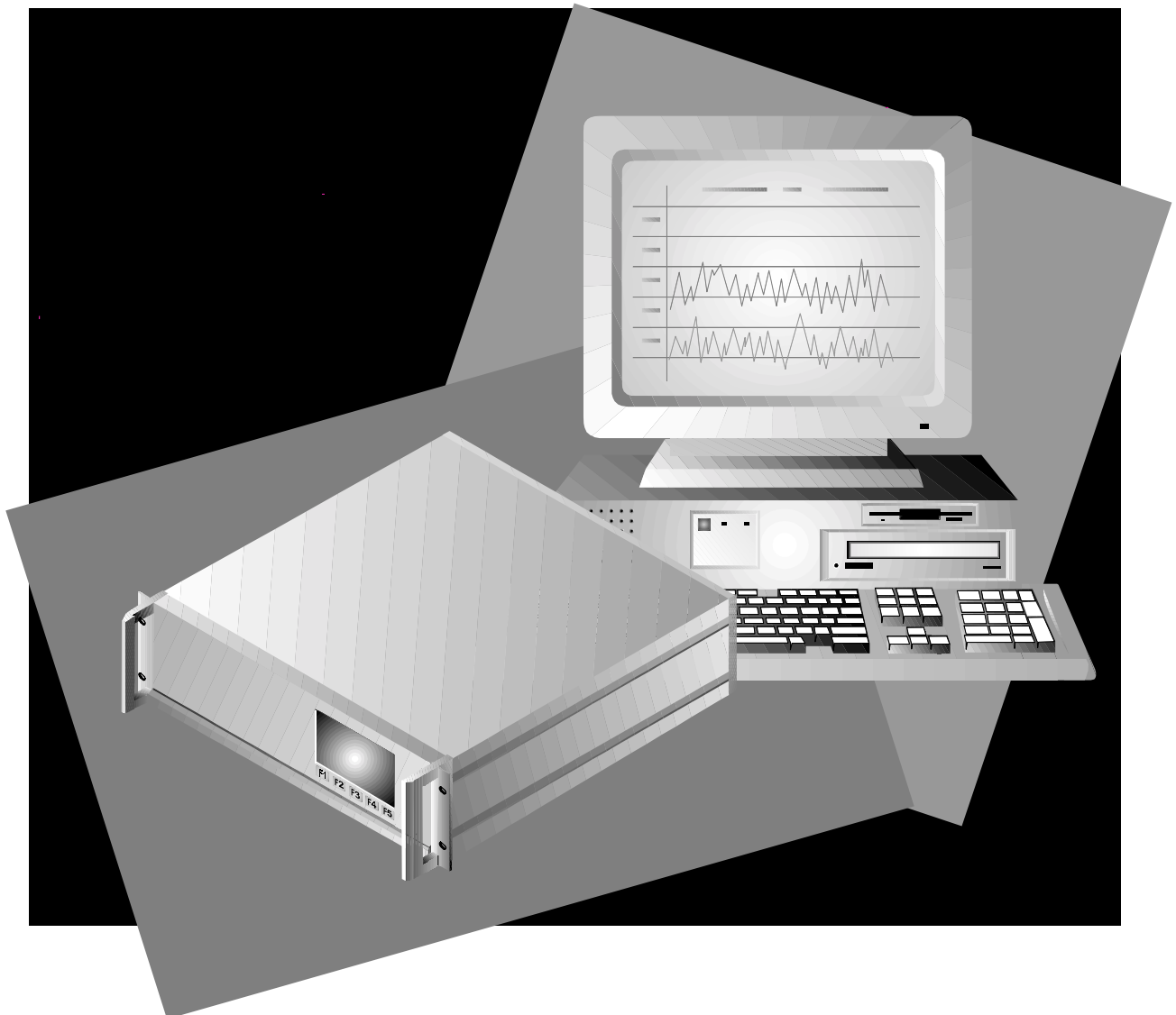


DDE SERVER

Rosemount Analytical



NOTICE

The information contained in this document is subject to change without notice.

Rosemount Analytical's system of NGA 2000 Modular Gas Analyzers and Controllers are patented, under U.S. Patent 5.787.015.

Excel™, Visual Basic™, Windows™ and Windows NT™ are trademarks of Microsoft Corporation.

MS-DOS® is a U.S. registered trademark of Microsoft Corporation .

Echelon® is a U.S. registered trademark of Echelon Corporation.

LONTALK™ is a trademark of Echelon Corporation.

IBM® is a U.S. registered trademark of International Business Machines.

National Instruments® and LabVIEW® are registered trademarks of National Instruments Corp.

Manual Part Number 748368-A
December 1997
Printed in U.S.A.

Rosemount Analytical Inc.
4125 East La Palma Avenue
Anaheim, California 92807-1802

CONTENTS

PREFACE

SUMMARY	P-1
CUSTOMER SERVICE, TECHNICAL ASSISTANCE AND FIELD SERVICE	P-2
RETURNING PARTS TO THE FACTORY	P-2
TRAINING	P-2
DOCUMENTATION	P-2

SECTION 1. GETTING STARTED

1.1 OVERVIEW	1-1
1.2 SYSTEM REQUIREMENTS	1-1
1.2.1 NGA DDE Server Computer Requirements	1-2
1.2.2 LONWORKS™ Interface Adapter Requirements	1-2
1.3 INSTALLING THE NGA DDE SERVER	1-2
1.3.1 Installed Components	1-3
1.4 STARTING THE NGA DDE SERVER	1-4

SECTION 2. USING THE MENUS

2.1 THE MAIN MENU	2-1
2.2 THE FILE MENU	2-1
2.2.1 Node List	2-1
2.2.2 Conversion List	2-3
2.2.3 Preferences	2-4
2.2.4 Exit	2-5
2.3 THE HELP MENU	2-6
2.3.1 Contents	2-6
2.3.2 About	2-6

SECTION 3. NGA VARIABLE SPECIFICATIONS

3.1	NGA LON DATA.....	3-1
3.2	NGA VARIABLE TYPES	3-1
3.3	NGA VARIABLE SYNTAX.....	3-2
3.4	NGA NODE SYNTAX.....	3-2

SECTION 4. DDE COMMUNICATIONS

4.1	DDE THEORY OF OPERATION.....	4-1
4.2	TOPIC SUPPORT	4-2
4.2.1	Error	4-2
4.2.2	Netvar	4-3
4.2.3	Nodelist	4-4

SECTION 5. INTERFACING TO MICROSOFT EXCEL

5.1	OVERVIEW.....	5-1
5.1.1	Microsoft Excel Examples.....	5-1
5.1.2	Microsoft Excel Example Descriptions.....	5-1
5.1.3	Miccrosoft Excel Example Files	5-1
5.2	SIMPLE EXCEL DDE COMMUNICATIONS	5-2
5.3	ADVANCED EXCEL DDE COMMUNICATIONS.....	5-3
5.3.1	VBA Variables and NGA Variables.....	5-3
5.3.2	Excel DDE Conversations	5-4
5.3.3	Reading a NGA Variable	5-4
5.3.4	Writing a NGA Variable	5-5
5.3.5	Reading the NGA Nodelist.....	5-6

APPENDIX A. LONTALK DEVICE CONFIGURATIONS

A.1	LONTALK ADAPTERS	A-1
A.2	LONTALK ADAPTER DRIVER INSTALLATION.....	A-1
A.2.1	Serial LONTALK Adapter Driver Parameters	A-1
A.2.2	PC LONTALK Adapter Driver Parameters	A-2
A.3	ECHELON ROUTER.....	A-3

APPENDIX B. REFERENCE INFORMATION

B.1	REFERENCE SOURCES FOR MICROSOFT'S DDE PROTOCOL	B-1
-----	--	-----

WARRANTY

FIELD SERVICE AND REPAIR FACILITIES

FIGURES

2-1	Node List	2-2
2-2	Change Node	2-2
2-3	Conversion List.....	2-3
2-4	DDE Server Preferences	2-4
2-5	Mode Tab	2-4
2-6	Options Tab	2-5

NOTES

PREFACE

SUMMARY

NGA 2000 PC Interface Suite consists of software and hardware elements that allow communication between NGA components and a personal computer (PC). These packages allow the user bi-directional or read-only communication with commercially available software or Rosemount operating software for the PC workstation package.

The *NGA DDE Server* software package includes several examples for interfacing to third part software packages, such as Microsoft Corporation's Excel, Microsoft Corporation's C Compiler and National Instruments LabVIEW.

The PC Interface addresses the network through the network port on the platform or directly to an Analyzer Module, and achieve data transfer through Echelon's LONWORKS™ communication protocol

The *NGA DDE Server* supports operation of the following NGA 2000 products:

- Platform
- Basic Analog, Autocal, and System Autocal I/O Modules
- Chemiluminescence (CLD) Analyzer Module
- Wet NOx (WNX) Auxiliary module
- Non-dispersive Infrared (NDIR) Analyzer Module
- Paramagnetic (PMD) Analyzer Module
- Flame Ionization Detector (FID) Analyzer Module
- Multi-Channel NDIR/O₂ Analyzer Module
- Heated FID (HFID) Analyzer Module

CUSTOMER SERVICE, TECHNICAL ASSISTANCE AND FIELD SERVICE

For order administration, replacement Parts, application assistance, on-site or factory repair, service or maintenance contract information, contact:

**Rosemount Analytical Inc.
Process Analytical Division
Customer Service Center
1-800-433-6076**

RETURNING PARTS TO THE FACTORY

Before returning parts, contact the Customer Service Center and request a Returned Materials Authorization (RMA) number. Please have the following information when you call: *Model Number, Serial Number, and Purchase Order Number or Sales Order Number.*

Prior authorization by the factory must be obtained before returned materials will be accepted. Unauthorized returns will be returned to the sender, freight collect.

When returning any product or component that has been exposed to a toxic, corrosive or other hazardous material or used in such a hazardous environment, the user must attach an appropriate Material Safety Data Sheet (M.S.D.S.) or a written certification that the material has been decontaminated, disinfected and/or detoxified.

Return to:

**Rosemount Analytical Inc.
4125 East La Palma Avenue
Anaheim, California 92807-1802**

TRAINING

A comprehensive Factory Training Program of operator and service classes is available. For a copy of the *Current Operator and Service Training Schedule* contact the Technical Services Department at:

**Rosemount Analytical Inc.
Phone: 1-714-986-7600
FAX: 1-714-577-8006**

DOCUMENTATION

The following NGA 2000 DDE Server instruction materials are available. Contact Customer Service or the local representative to order.

748368 Instruction Manual (this document)

1 GETTING STARTED

1.1 OVERVIEW

Carefully examine all shipping cartons and their contents for signs of damage. Immediately notify the shipping carrier if the cartons or contents are damaged. Retain the cartons and packing material until all components are operational.

The *NGA DDE Server Setup* program will decompress and copy all the necessary files to your hard drive. Before you can start using the *NGA DDE Server*, you must use the Setup program.

This chapter will instruct you on the necessary steps to install the *NGA DDE Server*.

It is assumed that the user has a basic working understanding of the DDE (Dynamic Data Exchange) concepts as specified by Microsoft. For more information pertaining to DDE services, please refer to Appendix B for additional books on this topic. The *NGA DDE Server* supports operation of the following NGA 2000 products:

- Platform
- Basic Analog, Autocal, and System Autocal I/O Modules
- Chemiluminescence (CLD) Analyzer Module
- Wet NO_x (WNX) Auxiliary module
- Non-dispersive Infrared (NDIR) Analyzer Module
- Paramagnetic (PMD) Analyzer Module
- Flame Ionization Detector (FID) Analyzer Module
- Multi-Channel NDIR/O₂ Analyzer Module
- Heated FID (HFID) Analyzer Module

1.2 SYSTEM REQUIREMENTS

The following section describes all the necessary components to using and operating the *NGA DDE Server*.

1.2.1 NGA DDE SERVER COMPUTER REQUIREMENTS

To use the *NGA DDE Server*, the user is required to supply the following computer hardware:

- IBM PC or compatible. 80486 33MHz CPU is the minimum recommended choice.
- MS-DOS 5.0 or later version.
- Windows 3.1 or Windows for Workgroups 3.11
- At least 8 megabytes (MB) of RAM.
- 10Mb of hard drive space.

1.2.2 LONWORKS™ INTERFACE ADAPTER REQUIREMENTS

In order for this product to work, you must have either the Echelon Model 73000 Serial LONTALK™ Adapter (SLTA) or the Echelon Model 73100 PC LONTALK™ Adapter (PCLTA) adapter. These components must be installed before attempting to operate the *NGA DDE Server*.

1.3 INSTALLING THE NGA DDE SERVER

The following instructions explain the steps to installing the *NGA DDE Server* onto your computer.

To install the *NGA DDE Server*.

Start Microsoft Windows

Insert the disk labeled "*NGA DDE Server Setup*" into drive A:

From the File menu in the Program Manager, choose Run...

Type a:\setup in the Command Line: entry box.

Press ENTER or click on the OK button.

Click on the Add/Remove button and follow the instructions.

After clicking on the Add/Remove button, you will have the opportunity to install the different options available for the *NGA DDE Server*. All options are selected.

Note

After installation of the NGA DDE Server, the computer will reboot, in order to install the required device drivers.

1.3.1 INSTALLED COMPONENTS

FILE	DESCRIPTION
INGASUITE	
NGDDESRV.EXE	NGA DDE Server executable.
NGACOM16.EXE	NGA Network Communicator executable
BC453RTL.DLL	
BIDS47.DLL	
OWL253.DLL	
NGACTL16.DLL	
NGANET16.DLL	
PHRASES.BIN	NGA Phrases
NGDDESRV.HLP	NGA DDE Server help file.
LDVSLTA.SYS	Network driver for the SLTA
LDVPCLTA.SYS	Network driver for the PCLTA
NGDDESRV.CFG	Setup configuration file.
INGASUITE\DOCS	
404AVAR.DOC	
NGDDESRV.HLP	This document in the Windows Help File format.
IMPVARS.TXT	
\NGA...\EXAMPLES\EXCEL	
NGACHECK.XLS	NGA Analyzer Module diagnostic worksheet that depicts detailed analyzer module diagnostics.
NGALOG.XLS	NGA data-logging worksheet that allows variable data collection and averaging for a user-selectable time duration.
NGAPARM.XLS	NGA Analyzer module parameter set control worksheet that allows loading different sets of configuration parameters into analyzers.
NGATREND.XLS	NGA internal datalog extraction spreadsheet that extracts 24 hours of 15 minute averaged data from an analyzer.
TUTORIAL.XLS	Microsoft Excel Tutorial spreadsheet which has the examples from section 5.3 <i>Advanced Excel DDE Communications</i> .
\NGA...\EXAMPLES\C	
NGCLIENT.EXE	Sample application which views the PVA and current range of a selected analyzer.
NGCLIENT.MAK	Microsoft C project file.
NGCLIENT.H	
NGCLIENT.RH	
NGCLIENT.RC	
NGCLIENT.DEF	
NGCLIENT.C	

1.4 STARTING THE NGA DDE SERVER

After installing the *NGA DDE Server*, you can start the application. In Program Manager, the NGA 2000 PC Interface Suite group is already open. Double-click on the icon that contains the *NGA DDE Server*.

At this point, the *NGA DDE Server* will start to query the LON.

2 USING THE MENUS

2.1 THE MAIN MENU

Since the concept of the *NGA DDE Server* was to be a simple communication package to the NGA Analyzer family, the *NGA DDE Server* employs only two menu entries. These are listed as:

- File
- Help

Note

Make sure that the NGA DDE Server is opened as a window. If it is displayed as an icon on the bottom of the screen, double-click the icon, or single click the icon and select Restore.

2.2 THE FILE MENU

The File entry contains four choices which control the various components of the *NGA DDE Server*.

- Node list
- Conversation List
- Preferences
- Exit

2.2.1 NODE LIST

The Node List command will display a simple dialog box, containing a list box. The list box displays all the modules currently active on the LON.

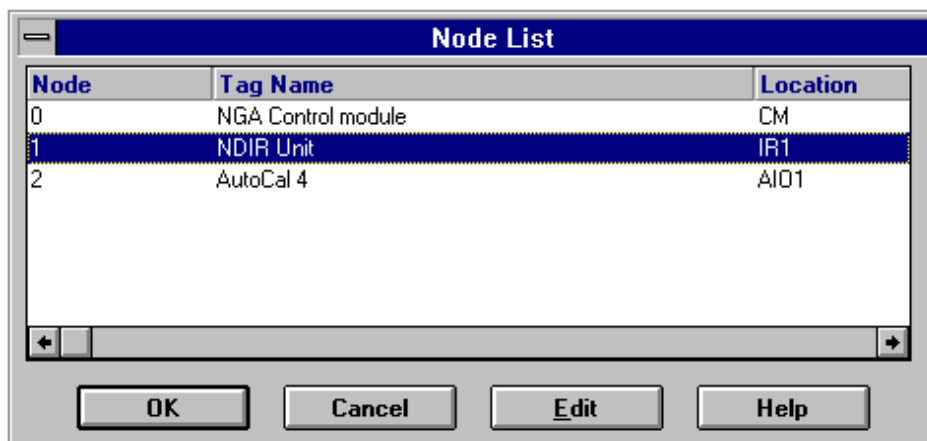


FIGURE 2-1. NODE LIST

To access the Node List

Select File from the menu.

Select Node list

Each entry has a node number, tag name, location and module type associated with it.

Note

Before you start to use the NGA DDE Server, it is suggested that you identify all the nodes on the LON using the File/Node list. Without these identifications, such as node number or tag name, you will not be able to communicate with the NGA DDE Server.

Edit Node Dialog Box

The Change Node dialog box is used to change the tag name and location field of the selected module.

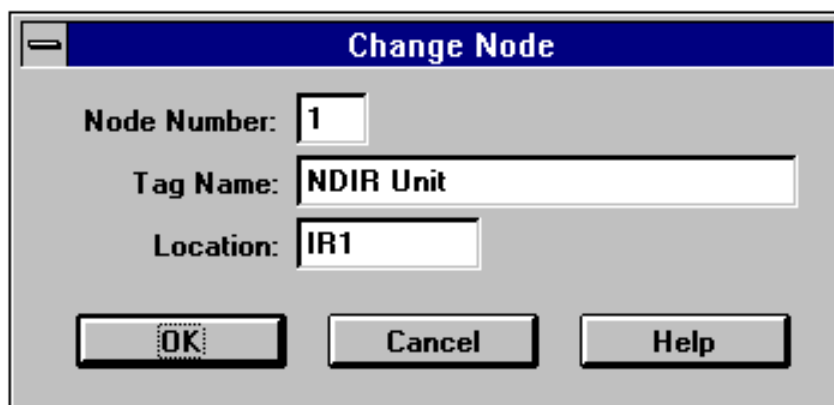


FIGURE 2-2. CHANGE NODE

To access the Change Node Dialog box

Select File from the menu.

Select Node list.

Select the desired module.

Click on the Edit button.

Make necessary changes to the tag name and/or the location name.

Press ENTER or click the OK button.

Note

If a Control Module is attached to the LON, you can not change the location of any module attached to the LON. In order to change any node's location, power must first be removed from the Control Module.

2.2.2 CONVERSATION LIST

The Conversation List command will display a dialog box, containing a list of the currently open conversation.

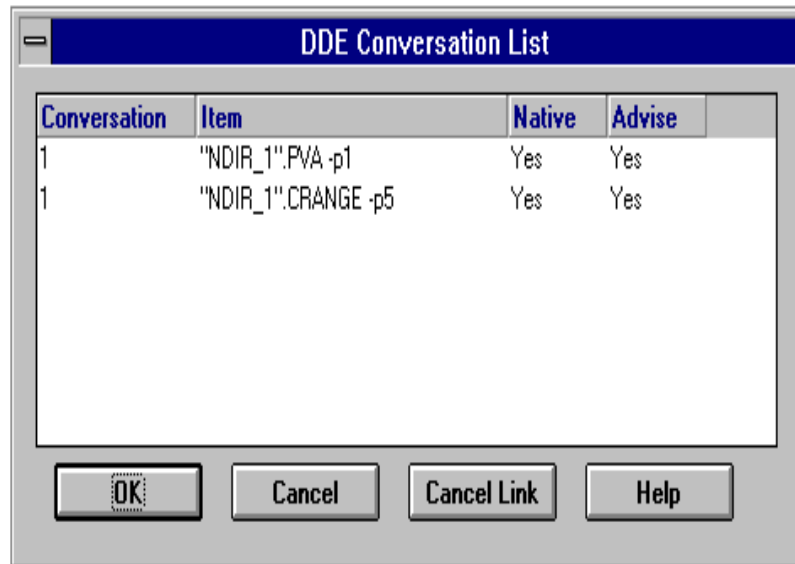


FIGURE 2-3. CONVERSATION LIST

To access the Conversation List

1. Select File from the menu.
2. Select Conversation List

The DDE Conversation List dialog box displays the conversation index number, DDE item as requested by the client application and whether the items are native mode variables and advisable.

To cancel a conversation, simply select the desired conversation and click on the Cancel Link button.

Note

When you cancel a conversation, all items which are listed under the specified conversation number also terminated.

2.2.3 PREFERENCES

The Preferences dialog box will display a tabbed dialog box with two option tabs, Modes and Options. This dialog box controls how the *NGA DDE Server* interfaces to the client and LON.

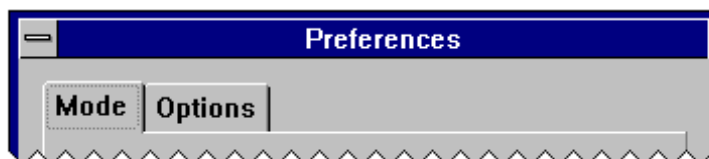


FIGURE 2-4. DDE SERVER PREFERENCES

MODE TAB

The Mode tab allows for the user to select the way the *NGA DDE Server* operates.

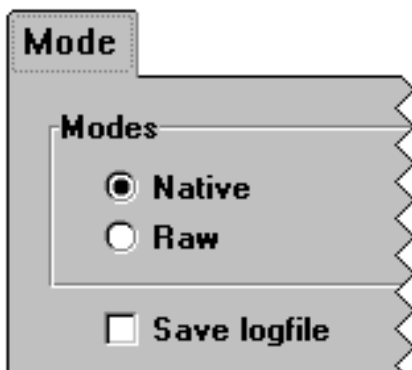


FIGURE 2-5. MODE TAB

Native	NGA Module variables have certain predefined specifications as to how they are displayed. Using the Native Mode format, you will see the variable as the platform module displays it.
Raw	The Raw Mode will format variables as the Echelon DDE server would show them. e.g. Floating point values have 6 decimal places, ENUM's are displayed as integer values.
Logfile	This option will log all transactions to a file called: LOGFILE.TXT. This is a troubleshooting tool only.

OPTIONS TAB

The Options tab allows the user to make changes to the *NGA DDE Server* that are effected only at the start time of the *NGA DDE Server*.

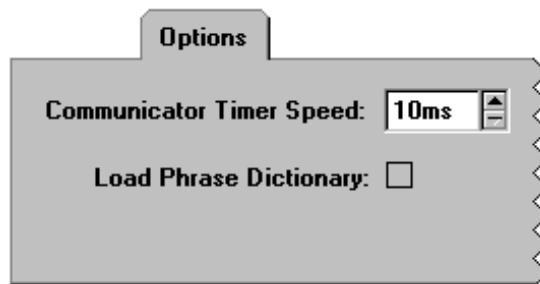


FIGURE 2-6. OPTIONS TAB

Speed	This is the update interval for which the <i>NGA DDE Server</i> uses to retrieve one NGA Module variable from the LON. The fastest that the <i>NGA DDE Server</i> can retrieve a variable is 10ms. The system defaults to 10ms. The user has the option of changing it only at boot time.
Dictionary	The Phrase Dictionary is contained in a file known as PHRASES.BIN. These phrases are the driving force behind ENUM variables. The Phrase Dictionary takes less than 64Kb of memory. If the Phrase Dictionary is not loaded at start time, the NGA DDE Server will always operate in Raw Mode.

Note

It is highly recommended that the user run the NGA DDE Server in Native Mode. This will make interpretation of data coming from the NGA DDE Server easier.

2.2.4 EXIT

The Exit command will terminate the *NGA DDE Server* and remove it from memory.

To exit the *NGA DDE Server*

1. Select File from the menu
2. Select Exit, or press Alt - F4

2.3 THE HELP MENU

2.3.1 CONTENTS

To get additional help for the *NGA DDE Server*.

Select Help from the menu.

Select Contents.

2.3.2 ABOUT

To get additional information about the *NGA DDE Server*.

Select Help from the menu.

Select About.

The *NGA DDE Server* About dialog box has information on the version of the *NGA DDE Server*, copyright notices, and other information which is pertinent to have when calling in for technical support on this product.

3

NGA VARIABLE SPECIFICATIONS

3.1 NGA LON DATA

NGA analyzers operate over a digital network called the LON . All of the internal data is available over this network.

Data is sent over the LON as discrete packets called “Variables”. These correspond with normal programming variables, except that they are available to anything on the LON capable of reading them.

There are also other packets of information used by the NGA system, but these are not accessible to non-NGA devices.

The complete NGA analyzer module library that identifies all variable tag names by description, units and variable type is provided in the document, ***NGA Reference Manual***.

3.2 NGA VARIABLE TYPES

LON variables may be of four basic types, floating point, integer, enumerated or string. In addition, all but string variables may be packaged into arrays, with a maximum of seven floating point numbers per array, or fifteen integer or enumerated types per array.

The complete listing of variables types is listed as follows:

TYPE	DEFINITION
Floating Point	Accurate number value with decimal point and significant figures. All primary and secondary variables are this type
Floating Point Array	Up to 7 accurate numbers with decimal point and significant figures packaged in an array and separated by commas
Integer	Integer value (-32,767 to 32,767)
Integer Array	Up to 10 integers packaged in an array and separated by commas
Enumerated	Integer value which equates to a pre-determined phrase within the NGA phraseology. Enable/disable messages and certain status variables are this type
Enumerated Array	Up to 10 enumerated variables packaged in an array and separated by commas
String	Alphanumeric value that contains up to 31 characters. Manufacturing dates, serial numbers and service information are this type.

3.3 NGA VARIABLE SYNTAX

In order to communicate to a variable on the network, there are several pieces of information which are required on the item parameter line.

NODE.<SUBNODE:>VAR<[ARRAY INDEX]>

TYPE	DEFINITION
Node	The node can be referenced either by node number, location name, or tag name. See the section below: <i>NGA Node Parameter</i> .
Subnode	Integer value. (0-15). This is only valid on analyzer which have multiple sub nodes. MLT.2:PVA
Variable	Any variable name
Array Index	Integer value. (1-15) This is only valid on variables which are arrays. FID1.AFT90_[2]

Note

Variables which are arrays will return the first element if you do not specify an element index.

3.4 NGA NODE SYNTAX

Node parameter of the NGA variable syntax has three methods of identification.

TYPE	DEFINITION
Location Name	This is a simple 4 character name, which can be set using the Nodelist item from the menu. IR1.PVA
Node Number	You can also reference a node by its number. In order to do this, you must enclose the number within quotes ("), followed by a period (.): "1".PVA When adding a node to a NGA network, the number may change, so this is not the most flexible method.
Tag Name	The last method is via the Tag name. This is a 31 character name, which can be set using the Nodelist item from the menu. A Tag name must be enclosed within quotes ("), followed by a period (.): "My FID - 1/1/95".PVA

DDE COMMUNICATIONS

4.1 DDE THEORY OF OPERATION

Microsoft Windows and Windows based applications, support three mechanisms of inter-application communication, Dynamic Data Exchange (DDE), the Clipboard, and Object Link Embedding (OLE).

The DDE services are a client/server based communication protocol, which uses the built-in messaging system of Microsoft Windows. Two applications carry on a “conversation” by sending messages to each other.

In order to carry on a conversation with a server, the client must know the name of the server, topic and item which is being requested. These three items are a hierarchical method of transferring data.

The server name is the actual DDE server application name. In the case of the *NGA DDE Server*, the service name is NGDDESRV.

The topic name is a category of items that a server can provide. For instance, the *NGA DDE Server* has data available regarding error messages, general network information and specific analyzer information. These topics are listed in the next section, along with their respective items which they support.

The item is the actual unit of information that the user wants provided. The *NGA DDE Server* can retrieve information about any of the variables on the NGA Analyzer Network. Each variable is an item.

Data can be retrieved in two ways. One is to request a single piece of data, once. This is sometimes called a “cold link”. This means that, every time you would like to get newer information, you must request it.

The second method of communication is to request data as advised. This method will keep an open link between the client and server. When the server finds that the data has changed, it will automatically notify the client. This is sometimes called a “hot link”.

One of the easiest applications to use as a client to the *NGA DDE Server* is Microsoft Excel. Each cell can contain a conversation with a single DDE server on a single topic and item. Every cell that has a conversation with a server becomes automatically a “hot link”.

See Section 5, Using the NGA DDE Server with Microsoft Excel for more information.

4.2 TOPIC SUPPORT

The *NGA DDE Server* supports several topics which allow for communication to and from an NGA Analyzer Network. These are as follows:

- Error
- Netvar
- Nodelist

4.2.1 ERROR

The *NGA DDE Server* has the built in capability of reporting different errors which can occur while interacting with an NGA Analyzer Module.

GENERAL

This item will always report the last error that occurred on the *NGA DDE Server*.

NGA VARIABLE

This allows for any NGA variable interaction status.

The values which the *NGA DDE Server* will return to the client application are shown in Table 4-1.

ERROR VALUE	DESCRIPTION
NO_ERROR	The variable existed and communication was processed.
NOT_ADVICE	The item which you are attempting to make advisable is not an advisable item.
NOT_A_VAR	The requested variable either was not spelled correctly, or doesn't exist.
NOT_A_TOPIC	The topic is not a supported topic name.
NOT_A_ITEM	The topic which you are requesting does not support the requested item.
NO_CHANGE	The variable which you are requesting has not changed since last time that it was requested.
NEW_VAL	The variable which you are requesting has changed since last time that it was requested.
MEMORY_ERROR	The process which was requested could not be completed due to lack of memory.

4.2.2 NETVAR

The NGA DDE Server is designed to communicate with NGA Analyzer Modules. Interaction with the an analyzer is accomplished with the item, *netvar*. It is possible to retrieve all available variables from the analyzer. Writable variables can be poked.

NGA VARIABLE

This allows for any NGA variable interaction status.

The parameter switches for the netvar item is shown in Table 4-2.

PARAMETER SWITCH	DESCRIPTION
-n	Display in Native format. This is a manual override for when the NGA DDE Server is set in the Raw Mode.
-d[format]	Display in decimal format, using the format string. The format string can contain numbers and decimal points, i.e. -d2.2 or -d1. This is a manual override for when the NGA DDE Server is set in the Native Mode.
-x	When the <i>NGA DDE Server</i> deals with arrays, it can either pull a specific element or return the entire variable array in a comma delimited format. The -x command will return the number of elements in the specified array.
-a Boolean	This is a parameter intended only for compatibility to the Echelon DDE Server. The Boolean value may be set to True or False.
-p nnnnn	This parameter allows for the user to select the priority level of a variable. The values may be set from 1 - 5. The default value is 5.
-p Boolean	The Boolean value may be set to True or False. This is a parameter intended for compatibility to the Echelon DDE Server. It is the equivalent of setting -p 1
-l nnnnn	This is a parameter intended only for compatibility to the Echelon DDE Server. The parameter value is a number between 0 and 32767.
-r nn	This is a parameter intended only for compatibility to the Echelon DDE Server. The parameter value is a number between 0 and 15.

Note

The parameter switches can be entered in any order. The NGA DDE Server will parse them upon request.

Variables can be retrieved and formatted in two fashions; Native Mode and Raw Mode. Native Mode will display the variable as the Control Module displays it. This includes any additional information displayed with the values such as, temperature format ('F' or 'C'), ppm, what ever. Raw Mode will display the variable in its raw numerical or string format.

4.2.3 NODELIST

The nodelist topic will retrieve information regarding the NGA Analyzer Network. This information is limited to the number of nodes and some basic information regarding each node.

This topic can only be requested, and not advised.

ITEM	DESCRIPTION
number	This command will retrieve the number of nodes on the NGA Analyzer Network. The return string is in the format of "A<number>".
get	This command will retrieve the full node list. The data is structured as an array of text elements, separated by commas.

The *get* item will return a data array in the following format:

node number, analyzer module type, tagname,

Note

Note the comma at the end of the data array.

5 INTERFACING TO MICROSOFT EXCEL

5.1 OVERVIEW

The *NGA DDE Server* can easily be integrated with Microsoft Corporation's Excel spreadsheet software. Using Microsoft Excel, the user can carry out many standard I/O Module functions like setting alarms and triggering calibration functions. In addition, the user can create custom screens that display data in groupings specific to the user's application.

For more information regarding DDE communications and *Microsoft Excel*, please see the *Microsoft Excel User's Guide*.

5.1.1 MICROSOFT EXCEL EXAMPLES

The Excel-based examples provided in this package give the user has bi-directional communication capabilities (i.e., data can be written as well as read on the network).

The Excel-based example files are located in the installed directory under \EXAMPLES\EXCEL.

5.1.2 MICROSOFT EXCEL EXAMPLE DESCRIPTION

The Microsoft Excel spreadsheet examples support NGA 2000 analyzers in the following ways:

- Allows access to all NGA 2000 network variables
- Updates variable displays
- Provides basic trending graphics
- Archives variable data
- Prints reports
- Extracts internally logged data within each analyzer module
- Provides alternative configurations for analyzers

5.1.3 MICROSOFT EXCEL EXAMPLE FILES

This package includes four example files that the user can copy to create customized worksheets. The four example files include:

- **NGALOG.XLS** - NGA data-logging worksheet that allows variable data collection and averaging for a user-selectable time duration.
- **NGACHECK.XLS** - NGA Analyzer Module diagnostic worksheet that depicts detailed analyzer module diagnostics.
- **NGAPARM.XLS** - NGA Analyzer module parameter set control worksheet that allows loading different sets of configuration parameters into analyzers.
- **NGATREND.XLS** - NGA internal datalog extraction spreadsheet that extracts 24 hours of 15 minute averaged data from an analyzer.
- **TUTORIAL.XLS** - This spreadsheet has the examples from section 5.3 *Advanced Excel DDE Communications*.

5.2 SIMPLE EXCEL DDE COMMUNICATIONS

Microsoft Excel supports direct reference links to any third party DDE server from within a cell. The cell must contain a formulae which links to the required DDE server. This is done by using the following format:

```
=SUM(Service|Topic!Item)
or
=Service|Topic!Item
```

This will automatically establish a link between the Excel spreadsheet cell and the specified DDE server. When the value of the data changes, Microsoft Excel will show the most current value as passed back from the DDE server.

The user can also change the manner which the link functions by choosing from the Excel menu, Edit|Links...

Note

For more information regarding data links, please see the Excel User's Guide, Chapter 41, "Sharing Data and Graphics with Other Applications"

To illustrate the idea more clearly, here are a few examples:

To get a reading on the PVA variable for an analyzer, you would enter the following:

```
=NGDDESRV|netvar!my_fid.PVA
```

To get the latest error code, you code use the following:

```
=NGDDESRV|error!general
```

In order to use any of the formatting codes, you must place the item within single quotes ('):

```
=NGDDESRV|netvar!'my_fid.PVA -d1.4'
```

5.3 ADVANCED EXCEL DDE COMMUNICATIONS

With the release of Microsoft Excel 5.0, Microsoft created a new macro language, called Visual Basic for Applications (VBA). This is a subset of the standard Visual Basic language package.

The Microsoft Excel spreadsheet examples that are included in this software package are written in VBA. For more information regarding Visual Basic for Applications or for definitions of the terms used in the following sections please see the help file, *Visual Basic Reference*.

The following sections are code examples for VBA. These examples are entered as macros. To create a macro in Excel, select from the menu Insert|Macro|Module. A blank sheet without columns or rows will appear, labeled usually as *Module1*. This is the macro worksheet.

5.3.1 VBA VARIABLES AND NGA VARIABLES

VBA variables are named symbolic definitions of pieces of data. These symbolic definitions are references to place holders in memory where the actual data values are stored. These variables are declared within modules or procedures that are contained in a macro. Each variable is declared with a name and a data type, *Boolean*, *integer*, *currency*, *single* (floating point), *string*, or *variant*. This is done by the following Excel macro statement:

```
Dim a_number_variable As Integer
```

When requesting a variable from the *NGA DDE Server*, the result is returned as an array of characters, regardless of the NGA variable type, i.e. integer, float, string or enumerated. Therefore, you must declare the VBA variable which will receive the *NGA DDE Server* variable, as type *variant*, or as an array of strings. An example of this in an Excel macro statement would be:

```
Dim myPVA As Variant  
myPVA = DDERequest( ... )
```

If you want the *NGA DDE Server* variable to be stored as a number in a VBA variable, you will have to convert it. The easiest way is to write it into a worksheet cell, and then read it back. Otherwise you can use a function to do it, an example of which is "LON_into_string()" in the Excel spreadsheet examples.

Note

VBA variables that are stored into a cell in a worksheet, are automatically converted into a the appropriate cell format, i.e. number or string, with the exception of dates. Dates are stored in Excel cells in the Julian date format. You can convert the Julian date format by formatting the cell as a date after storing the variable to that cell.

5.3.2 EXCEL DDE CONVERSATIONS

In order for an Excel macro to communicate with the *NGA DDE Server*, a conversation must be established. Initiation of a conversation can be illustrated as follows:

```
Dim NGA_Conversation As Integer
```

```
NGA_Conversation = DDEInitiate( NGDDESRVR, netvar )
```

The function *DDEInitiate* returns an integer value, which if successful, is necessary for any other DDE transactions during that conversation's duration.

When the conversation is complete, and all the required *NGA DDE Server* variables have been successfully transmitted, it is necessary to close down the open conversation. This is done by the follow macro statement:

```
DDETerminate( NGA_Conversation )
```

If you fail to terminate the conversation when the macro is done running, the conversation will still be open. Also, if you stop the macro in mid-operation, you will also leave the conversation open. You must then terminate the conversation via the *NGA DDE Server's* menu command, File|Conversation List.

See Section 2.2.2. *Conversation List* in this manual.

5.3.3 READING A NGA VARIABLE

Reading a variable from the *NGA DDE Server* is one of the easiest operations to do. As seen in section 5.2. *Simple Excel DDE Communications*, you can link a cell to the *NGA DDE Server*, and continuously request data.

Excel allows for a higher level of sophistication when reading a NGA variable. You simply create a macro which will poll the variable that is desired.

The macro *DDERead* is an example of requesting a single variable from an NGA analyzer. Please substitute the analyzer location ("IR1") with the appropriate analyzer at your location.

To outline the steps of the *DDERead* function, we can break them down as:

- Macro declaration.

- Variable declarations.

- Initialization of the DDE conversation.

- Retrieval and display of the DDE server's data.

- Termination of the DDE conversation.

```

Sub DDERead()
Dim dde_conv As Integer
Dim dde_ret_var As Variant
dde_conv = DDEInitiate("NGDDESRV", "netvar")
dde_ret_var = DDERequest(dde_conv, "IR1.TAG")
Worksheets("Sheet1").Cells(2, 1).Value = dde_ret_var
DDETerminate( dde_conv )
End Sub

```

5.3.4 WRITING A NGA VARIABLE

Writing to an NGA variable on the *NGA DDE Server* isn't as simple as reading. With reading a variable, you can store the data directly into a VBA variable. When writing, you must use data from a spreadsheet cell.

The cell must be formatted as text. Numbers must be placed into the cell as character types, rather than literal number values. If there is an error in the format of the cell, the poke function will fail, and Excel will not give any error messages to explain why.

The macro *DDEWrite* is an example of poking a single cell into an NGA analyzer. Please substitute the analyzer location ("IR1") with the appropriate analyzer at your location.

To outline the steps of the *DDEWrite* function, we can break them down as:

1. Macro declaration.
2. Variable declarations.
3. Initialization of the DDE conversation.
4. Retrieval of the worksheet's cell data and writing it into the NGA DDE Server.
5. Termination of the DDE conversation.

```

Sub DDEWrite()
Dim dde_conv As Integer
dde_conv = DDEInitiate("NGDDESRV", "netvar")
DDEPoke dde_conv, "IR1.TAG",
Worksheets("Sheet1").Cells(2, 2)
DDETerminate( dde_conv )
End Sub

```

5.3.5 READING THE NGA NODELIST

The *NGA DDE Server* provides a list of the analyzers and their types which are

present on the LON. This can be obtained by using the topic *nodelist*.

Using the topic *number*, the *NGA DDE Server* will return to you the number of analyzers on the LON. Using the topic *get*, the *NGA DDE Server* will return an array of the nodes.

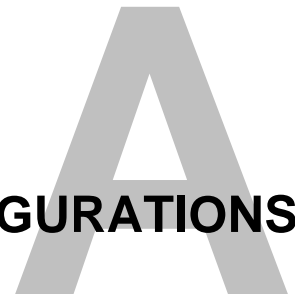
```
Sub DDE_Node_List()  
Dim dde_conv As Integer  
Dim nodenums As String  
Dim nodelist As Variant  
dde_conv = DDEInitiate("NGDDESRV", "nodelist")  
nodenum = DDERequest(dde_conv, "number")  
Worksheets("Sheet1").Cells(1, 1).Value = nodenum  
nodelist = DDERequest(dde_conv, "get")  
Worksheets("Sheet1").Cells(2, 1).Value = nodelist  
DDETerminate (dde_conv)  
End Sub
```

It is also important to know that the item *number* returns a string "An", where *n* is the number of nodes. The following macro statement will strip off the A and also convert *n* into a integer value.

```
Dim nodenum As Integer  
nodenum = Right(nodenums, Len(nodenums) - 1)
```

The *get* item will return a data array containing the node number, analyzer module type and tagname. Each item is separated by commas. To learn how to extract each element of the array, please see the macro call *Analyze_network()* in spreadsheet NGACHECK.XLS.

LONTALK DEVICE CONFIGURATIONS



A.1 LONTALK™ ADAPTERS

To communicate between the NGA digital network to the PC, you must use LonWorks gateway hardware, which consists of the following items:

DESCRIPTION	ROSEMOUNT PART NO.	ECHOLON PART NO.
Echelon Serial LONTALK™ Adapter. (SLTA)	903659	730000
Echelon PC LONTALK™ Adapter, single channel. (PCLTA)	904631	73100-11
Echelon Router	903660	71000

The Serial LONTALK™ Adapter allows for the PC to connect through a serial port to the NGA digital network.

The PC LONTALK™ Adapter allows for the PC to connect via a bus slot to the NGA digital network.

The Echelon Router is required when more than one NGA platform is interfaced to a single PC (one router for each Platform). This will eliminate conflicts with node assignments between analyzer modules and their respective platforms.

A.2 LONTALK™ ADAPTER DRIVER INSTALLATION

Depending on which LONTALK™ Adapter is installed, the *NGA DDE Server* setup program will install and configure the appropriate driver in the CONFIG.SYS file.

This section briefly explains what these drivers are and how they are configured.

A.2.1 SERIAL LONTALK™ ADAPTER DRIVER PARAMETERS

The Serial LONTALK™ Adapter provides communication to the NGA digital network through the PC's communication port (COM1: or COM2:). This device driver must be loaded by a *DEVICE* command in your CONFIG.SYS file. The syntax for this driver is as follows:

DEVICE=C:\NGASUITE\LDVSLTA.SYS /Pn /Dn /In /On /a

PARAMETER	DESCRIPTION
/Pn	Sets the serial communication port for which the Echelon SLTA is attached to. Valid settings are 1-4.
/Dn	Defines the device unit number, where n is a number between 1-9. For the device driver to work with the <i>NGA DDE Server</i> , the setting must be 1.
/In	This sets the size of the input buffer. Valid buffer sizes are from 2-258. The default is 2. Each buffer is 255 bytes in size.
/On	This sets the size of the output buffer. Valid buffer sizes are from 2-258. The default is 2. Each buffer is 255 bytes in size.
/a	

A.2.2 PC LONTALK™ ADAPTER DRIVER PARAMETERS

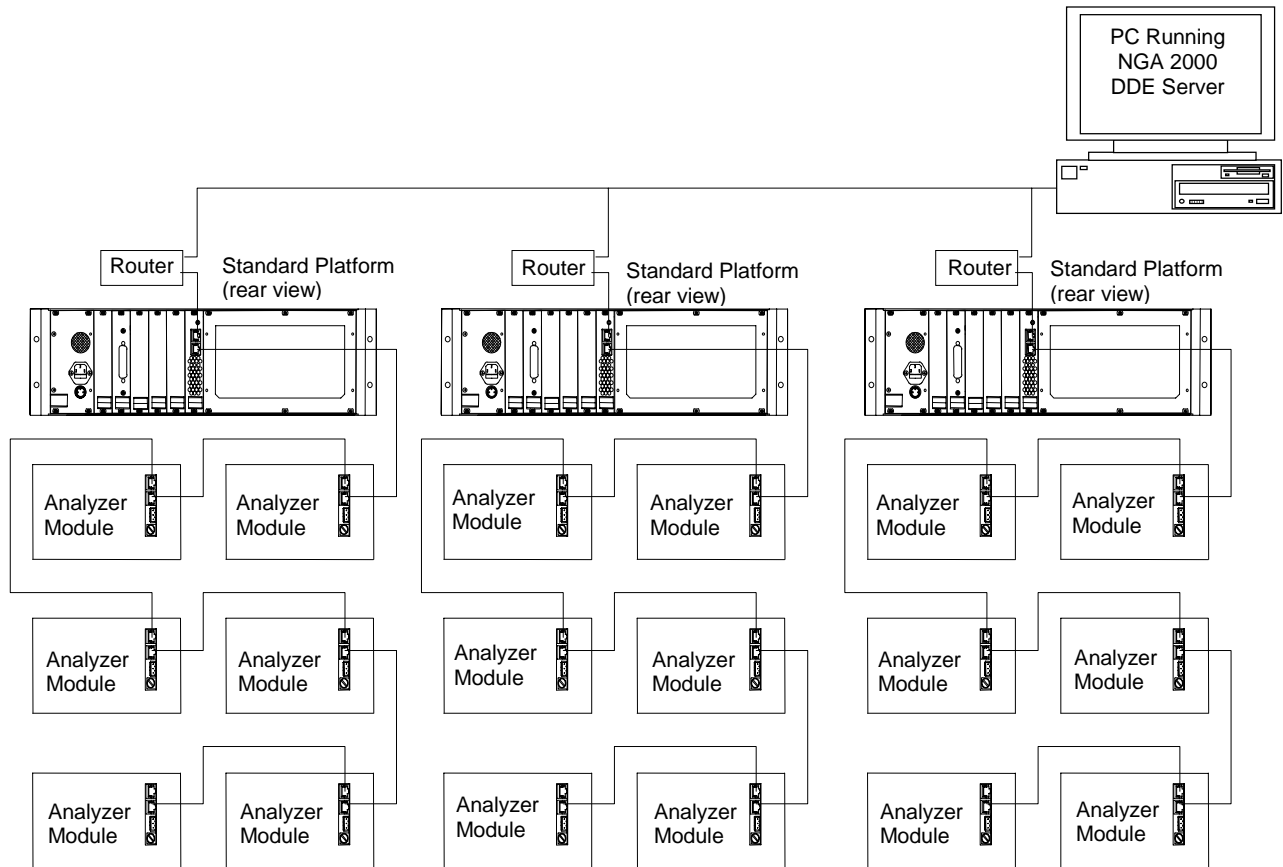
The PC LONTALK™ Adapter provides communication to the NGA digital network through the PC's internal bus slot. This device driver must be loaded by a *DEVICE* command in your CONFIG.SYS file. The syntax for this driver is as follows:

DEVICE=C:\NGASUITE\LDVPCLTA.SYS /Pn /Dn /Un /In /On

PARAMETER	DESCRIPTION
/Pn	Sets the device address for which the Echelon PCLTA is attached to. Valid address settings are from 200-3FC(hex). This address must match the PCLTA I/O address set in the DIP switches at S1. Please see the NGA Network Communicator document under PCLTA for more information.
/Un	Sets the PCLTA interrupt request number to n. The valid interrupts are 5, 9, 10, 11, 12 or 15. The default IRQ setting is 15.
/Dn	Defines the device unit number, where n is a number between 1-9. For the device driver to work with the <i>NGA DDE Server</i> , the setting must be 1.
/In	This sets the size of the input buffer. Valid buffer sizes are from 2-258. The default is 2. Each buffer is 255 bytes in size.
/On	This sets the size of the output buffer. Valid buffer sizes are from 2-258. The default is 2. Each buffer is 255 bytes in size.

A.3 ECHELON ROUTER

See the figure below for an illustration of how a multiple-Platform system might be configured in conjunction with the *NGA DDE Server* package.



Note the daisy-chaining function of the Echelon Model 71000 Router, which interconnects with the Platform on one side and both routers and SLTAs on the other.

The router must be configured correctly. To configure the router, please see the document ***NGA Network Communicator***.

NOTES

REFERENCE INFORMATION



B.1 REFERENCE SOURCES FOR MICROSOFT'S DDE PROTOCOL.

The information listed here is a index of books and magazines which have information pertaining to the use and application of *Microsoft Windows Dynamic Data Exchange* (DDE) services.

- 📖 "Microsoft Windows Software Development Kit Reference Volume 2," Chapter 15, "Windows DDE Protocol Definition."
- 📖 "Microsoft Windows Software Development Kit Guide to Programming," Chapter 22.
- 📖 "Programming Windows," Second Edition (Charles Petzold, Microsoft Press), Chapter 17.
- 📖 "Developing Windows 3.1 Applications with Microsoft C/C++," Second Edition (Brent E. Rector, Sams Publishing).
- 📖 Microsoft Systems Journal Articles - Vol. 5 No. 1 (January 1990), "Simplifying Complex Windows Development Through the Use of a Client-Server Interface."

NOTES

WARRANTY

Goods and part(s) (excluding consumables) manufactured by Seller are warranted to be free from defects in workmanship and material under normal use and service for a period of twelve (12) months from the date of shipment by Seller. Consumables, glass electrodes, membranes, liquid junctions, electrolyte, o-rings, etc., are warranted to be free from defects in workmanship and material under normal use and service for a period of ninety (90) days from date of shipment by Seller. Goods, part(s) and consumables proven by Seller to be defective in workmanship and/or material shall be replaced or repaired, free of charge, F.O.B. Seller's factory provided that the goods, part(s) or consumables are returned to Seller's designated factory, transportation charges prepaid, within the twelve (12) month period of warranty in the case of goods and part(s), and in the case of consumables, within the ninety (90) day period of warranty. This warranty shall be in effect for replacement or repaired goods, part(s) and the remaining portion of the ninety (90) day warranty in the case of consumables. A defect in goods, part(s) and consumables of the commercial unit shall not operate to condemn such commercial unit when such goods, part(s) and consumables are capable of being renewed, repaired or replaced.

The Seller shall not be liable to the Buyer, or to any other person, for the loss or damage directly or indirectly, arising from the use of the equipment or goods, from breach of any warranty, or from any other cause. All other warranties, expressed or implied are hereby excluded.

IN CONSIDERATION OF THE HEREIN STATED PURCHASE PRICE OF THE GOODS, SELLER GRANTS ONLY THE ABOVE STATED EXPRESS WARRANTY. NO OTHER WARRANTIES ARE GRANTED INCLUDING, BUT NOT LIMITED TO, EXPRESS AND IMPLIED WARRANTIES OR MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE.

Limitations of Remedy. SELLER SHALL NOT BE LIABLE FOR DAMAGES CAUSED BY DELAY IN PERFORMANCE. THE SOLE AND EXCLUSIVE REMEDY FOR BREACH OF WARRANTY SHALL BE LIMITED TO REPAIR OR REPLACEMENT UNDER THE STANDARD WARRANTY CLAUSE. IN NO CASE, REGARDLESS OF THE FORM OF THE CAUSE OF ACTION, SHALL SELLER'S LIABILITY EXCEED THE PRICE TO BUYER OF THE SPECIFIC GOODS MANUFACTURED BY SELLER GIVING RISE TO THE CAUSE OF ACTION. BUYER AGREES THAT IN NO EVENT SHALL SELLER'S LIABILITY EXTEND TO INCLUDE INCIDENTAL OR CONSEQUENTIAL DAMAGES. CONSEQUENTIAL DAMAGES SHALL INCLUDE, BUT ARE NOT LIMITED TO, LOSS OF ANTICIPATED PROFITS, LOSS OF USE, LOSS OF REVENUE, COST OF CAPITAL AND DAMAGE OR LOSS OF OTHER PROPERTY OR EQUIPMENT. IN NO EVENT SHALL SELLER BE OBLIGATED TO INDEMNIFY BUYER IN ANY MANNER NOR SHALL SELLER BE LIABLE FOR PROPERTY DAMAGE AND/OR THIRD PARTY CLAIMS COVERED BY UMBRELLA INSURANCE AND/OR INDEMNITY COVERAGE PROVIDED TO BUYER, ITS ASSIGNS, AND EACH SUCCESSOR INTEREST TO THE GOODS PROVIDED HEREUNDER.

Force Majeure. Seller shall not be liable for failure to perform due to labor strikes or acts beyond Seller's direct control.

Rosemount Analytical

Rosemount Analytical Inc.

4125 EAST LA PALMA AVENUE • ANAHEIM, CALIFORNIA 92807-1802 • 714-986-7600 • FAX 714-577-8006
FEBRUARY 1997 • 7485189-C • PRINTED IN USA

(blank)

FIELD SERVICE AND REPAIR FACILITIES

Field service and repair facilities are located worldwide.

U.S.A.

To obtain field service on-site or assistance with a service problem, contact (24 hours, 7 days a week):

**National Response Center
1-800-654-7768**

INTERNATIONAL

Contact your local Rosemount Sales and Service office for service support.

FACTORY

For order administration, replacement Parts, application assistance, on-site or factory repair, service or maintenance contract information, contact:

**Rosemount Analytical Inc.
Process Analytical Division
Customer Service Center
1-800-433-6076**

RETURNING PARTS TO THE FACTORY

Before returning parts, contact the Customer Service Center and request a Returned Materials Authorization (RMA) number. Please have the following information when you call: *Model Number, Serial Number, and Purchase Order Number or Sales Order Number.*

Prior authorization by the factory must be obtained before returned materials will be accepted. Unauthorized returns will be returned to the sender, freight collect.

When returning any product or component that has been exposed to a toxic, corrosive or other hazardous material or used in such a hazardous environment, the user must attach an appropriate Material Safety Data Sheet (M.S.D.S.) or a written certification that the material has been decontaminated, disinfected and/or detoxified.

Return to:

**Rosemount Analytical Inc.
4125 East La Palma Avenue
Anaheim, California 92807-1802**

(blank)