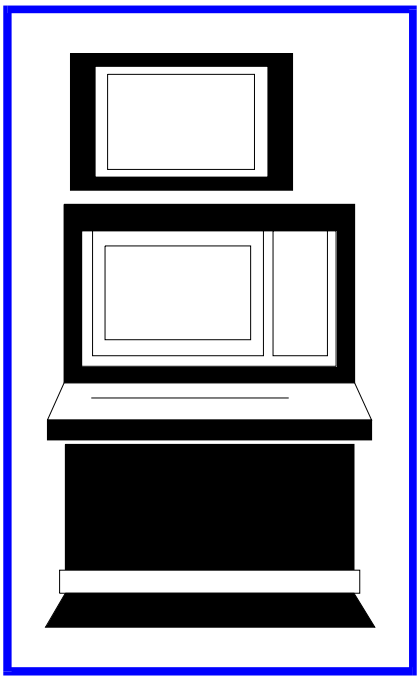
Bailey® infi 90®

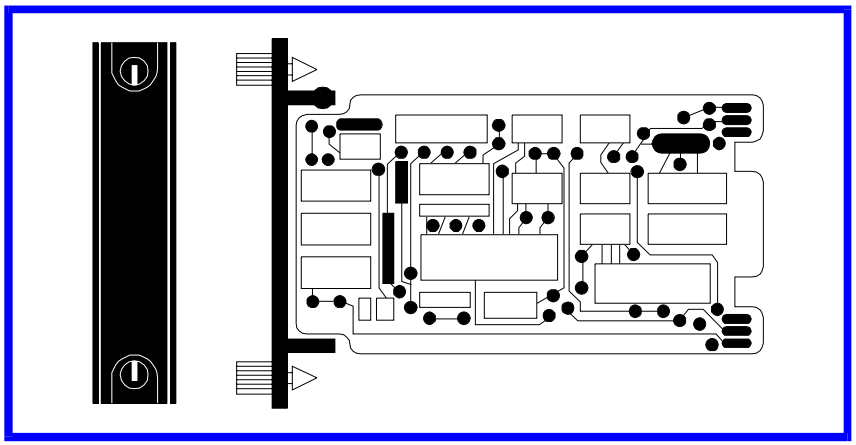
E97-811-18

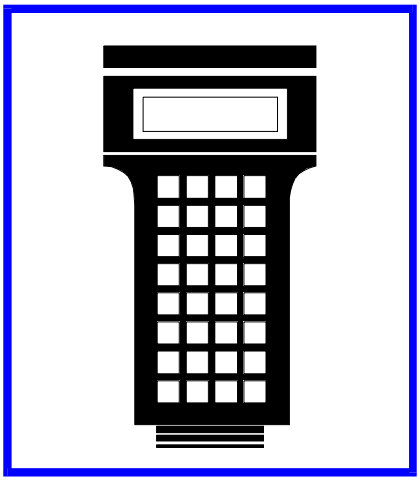
Instruction

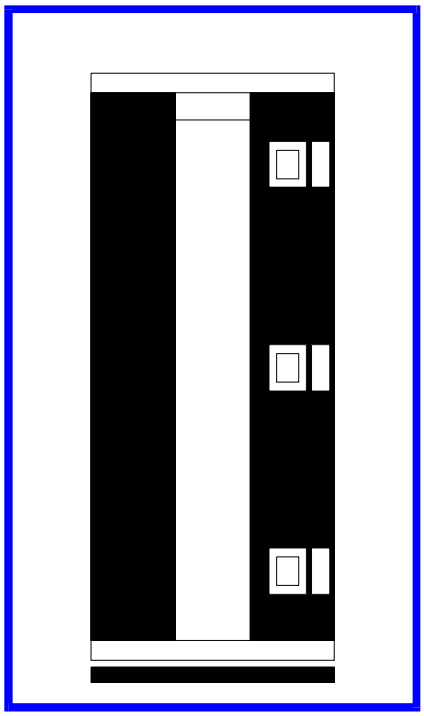
LAN-90® Process Control View (PCV®)

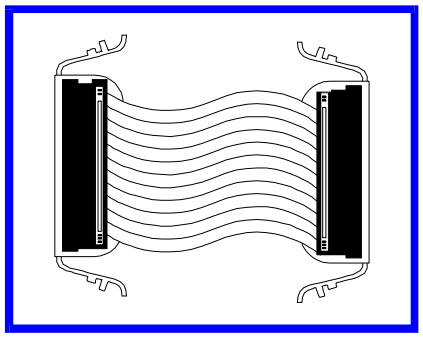
classCONNECT/DDE and TCP-Link Software User's Guide (Software Release 5.2)

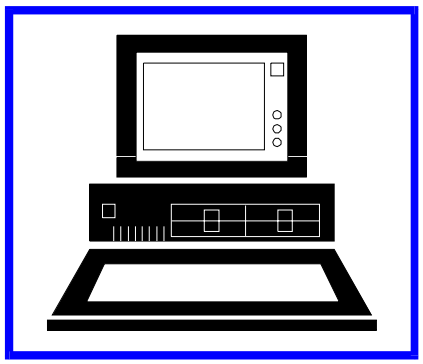












Bailey Process Control and Automation Solutions from Elsag Bailey Group

WARNING notices as used in this instruction apply to hazards or unsafe practices that could result in personal injury or death.

CAUTION notices apply to hazards or unsafe practices that could result in property damage.

NOTES highlight procedures and contain information that assists the operator in understanding the information contained in this instruction.

WARNING

INSTRUCTION MANUALS

DO NOT INSTALL, MAINTAIN, OR OPERATE THIS EQUIPMENT WITHOUT READING, UNDERSTANDING, AND FOLLOWING THE PROPER **Elsag Bailey** INSTRUCTIONS AND MANUALS; OTHERWISE, INJURY OR DAMAGE MAY RESULT.

RADIO FREQUENCY INTERFERENCE

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POSSIBLE PROCESS UPSETS

MAINTENANCE MUST BE PERFORMED ONLY BY QUALIFIED PERSONNEL AND ONLY AFTER SECURING EQUIPMENT CONTROLLED BY THIS PRODUCT. ADJUSTING OR REMOVING THIS PRODUCT WHILE IT IS IN THE SYSTEM MAY UPSET THE PROCESS BEING CONTROLLED. SOME PROCESS UPSETS MAY CAUSE INJURY OR DAMAGE.

Preface

This manual applies to LAN-90® PCV® Software Release 5.2 classCONNECT/DDE™ and TCP-Link™ options. It provides general information and specific instructions on Configuring classCONNECT/DDE and TCP-Link software.

This manual should be used as:

- A reference guide for system engineers and technicians responsible for installing and configuring classCONNECT/DDE and TCP-LINK software.

- An operation guide for process control operators and other users on using classCONNECT/DDE.

This manual assumes the reader has a sound knowledge of LAN-90 PCV.

List of Effective Pages

Total number of pages in this instruction is 59, consisting of the following:

Page No.	Change Date
Preface	Original
List of Effective Pages	Original
iii through vii	Original
1-1 through 1-5	Original
2-1 through 2-3	Original
3-1 through 3-6	Original
4-1 through 4-21	Original
5-1	Original
A-1 through A-7	Original
B-1 through B-6	Original
Index-1 through Index-3	Original

When an update is received, insert the latest changed pages and dispose of the superseded pages.

NOTE: On an update page, the changed text or table is indicated by a vertical bar in the outer margin of the page adjacent to the changed area. A changed figure is indicated by a vertical bar in the outer margin next to the figure caption. The date the update was prepared will appear beside the page number.

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® Elsag Bailey	Registered trademark of Elsag Bailey Process Automation.
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SECTION 1 - INTRODUCTION

OVERVIEW

The classCONNECT/DDE product is a collection of software that allows useful data to be exchanged between process monitoring consoles in the LAN-90 PCV environment, and desktop computers running one of the Microsoft Windows® family of operating systems. Using this product, you can incorporate live data into reports and spreadsheets, set up using your favorite third party package, and actually watch the values change in real-time. Alternatively, historical information collected by LAN-90 PCV can be viewed. This information can be incorporated into any of the many Microsoft Windows applications that support the DDE data communication standard, such as Microsoft Excel®, Microsoft Word® for Windows, and WordPerfect®, with no more effort than a few clicks of the mouse.

If desired, systems can be configured that actually allow data to be sent back to the LAN-90 PCV system from the Microsoft Windows computer system. This can be used to change internal PCV values, or even perform some control functions. Of course, if you want to perform these types of functions you will have to be pre-qualified through the standard LAN-90 PCV password protection mechanism, which classCONNECT/DDE interfaces with.

As shown in Figure 1-1, classCONNECT/DDE works in conjunction with the LAN-90 PCV TCP-Link software option. TCP-Link provides the services necessary on the LAN-90 PCV console to communicate with the classCONNECT/DDE software modules. Communications between these two packages is done via a standard TCP/IP Local Area Network interface over Ethernet™.

classCONNECT/DDE conforms to the DDE standards as set out by Microsoft. This allows you to work with a large number of applications from numerous vendors. The classCONNECT/DDE server has been tested with both Microsoft Excel and Microsoft Word using the examples included in the package. Some applications that claim to support DDE do not support it fully, however, and therefore may not function as well as they should. While we cannot guarantee that any other application will function as flawlessly, through our Professional Services program we offer whatever level of support you require to integrate your applications with classCONNECT/DDE. Please contact your local Elsag Bailey sales office for information about our Professional Services program. This manual is intended to be used by classCONNECT/DDE users. It describes the installation, configuration, and use of the different software programs that make up classCONNECT/DDE.

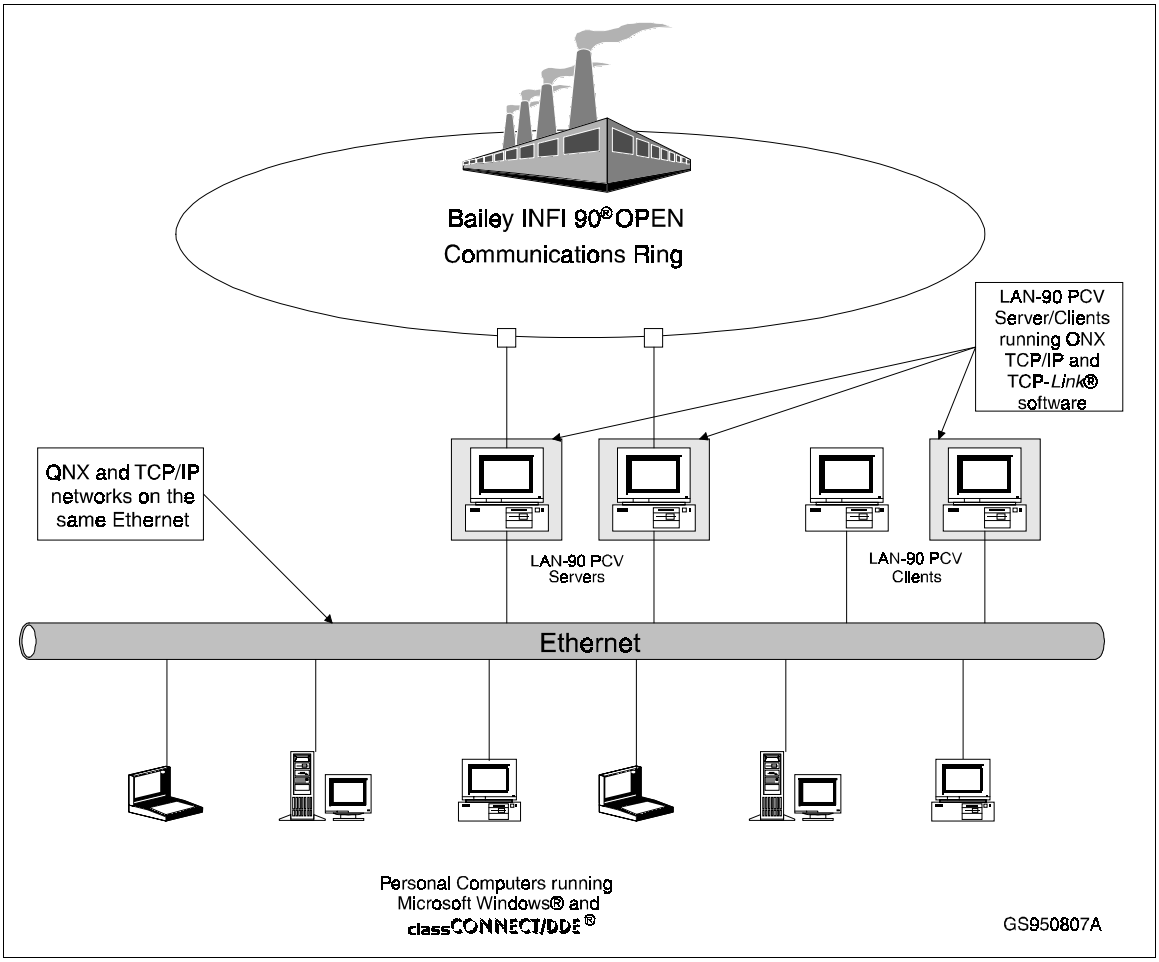

Figure 1-1. Overview of a Network Using TCP-Link and classCONNECT/DDE

REQUIREMENTS

Hardware Requirements

Standard Ethernet hardware is required in both the MS Windows and the LAN-90 PCV machines. The Ethernet card used in the LAN-90 PCV system must be approved for use with LAN-90 PCV. For a list of approved Ethernet cards, contact your local Elsag Bailey sales office.

If your LAN-90 PCV system already uses Ethernet to communicate between QNX® nodes, you do not need any additional hardware for your LAN-90 PCV systems. You can use a single Ethernet card to run both QNX networking and TCP/IP at the same time.

On a LAN-90 PCV computer, installing the TCP-Link software requires that an additional four MBytes of memory be available, over and above the required amount.

Computers running MS Windows or MS Windows For Workgroups require a minimum of eight MBytes of memory in order to install classCONNECT/DDE. Computers running Windows-NT require a minimum of 16 MBytes of memory.

Software Requirements

TCP-Link is an option available for LAN-90 PCV, and must be installed on systems running LAN-90 PCV. The QNX TCP/IP support package, version 4.2.2 or higher, is also required for each LAN-90 PCV node on which the TCP-Link software is installed.

classCONNECT/DDE can be installed on any computer running:

- Microsoft Windows 3.1.
- Microsoft Windows for Workgroups 3.1.1.
- Windows 95.
- Microsoft Windows NT 3.51 or 4.0.

A 100% Windows Sockets (WinSock) compatible TCP/IP interface is required for classCONNECT/DDE operation on Windows 3.1 and Windows for Workgroups 3.1.1. Windows NT comes equipped standard with TCP/IP Support, so no additional third party TCP/IP software is required to run classCONNECT/DDE on Windows NT computers.

CONTENT OF THIS MANUAL

This manual explains the installation, configuration and operation of the classCONNECT/DDE software package.

Introduction Provides a summary of the main features of classCONNECT/DDE, and a list of the hardware and software requirements.

Installation Describes how to install classCONNECT/DDE.

Configuration Describes how to configure classCONNECT/DDE, and the associated LAN-90 PCV Option, TCP-Link.

Operation Describes how to use the different programs supplied as part of classCONNECT/DDE.

CONVENTIONS USED IN THIS MANUAL

You will find the following conventions used throughout this manual:

NOTE: Used to highlight important or additional information.

CAUTION	Used to highlight information that, if ignored, could result in property or information damage.

WARNING	Used to highlight information that, if ignored, could result in personal injury.

bold Used for anything you must type exactly as shown. For example, you could be told to press **Y** or type **ls /dev/hd0t77** (QNX4 example).

italic Used for information you must provide. For example, if you are told to enter a *filename*, you type the actual name of the file instead of the italicized word. Also used to show information displayed by the computer.

Initial Capitals Used for menu and screen titles.

`small text` Used to show the contents of text files.

<Key> Used for the names of special keys (non-alphabetic, non-numeric, non-punctuational) that can be found on the regular QWERTY keyboard or can be found on both the Elsag Bailey operator and regular keyboards. Some of the key names used are:

<Enter>	the enter key
<Num+>	the plus key on the numeric keypad
<Space>	the space bar
<PgUp>	the page up key
<Left>	the left cursor key

{Key} Used for the names of keys found only on the Elsag Bailey operator keyboards. Some of the Elsag Bailey operator keyboard key names are {Silence} and {DoubleUp}.

<Key Key> When two or more keys are to be pressed together, the key names appear together within the brackets or braces. For example, to reboot the computer, you can press <Ctrl Alt Shift Del>; that is, press the Ctrl, Alt, Shift, and Del keys in that order without releasing any one until you have pressed them all.

“name” Used for filenames, directory names, and device names.

RELATED DOCUMENTS

This document describes how to install and use the classCONNECT/DDE package and the LAN-90 PCV TCP-Link option. This software relies on several other software packages having already been properly installed and configured.

For information on these other packages, please refer to one of the following manuals:

- LAN-90 PCV 5.2 Installation Manual, ***I-E97-811-1*** (describes how to install LAN-90 PCV).

- LAN-90 PCV 5.2 Configuration and Operation Manuals, ***I-E97-811-2.1*** and ***I-E97-811-2.2*** (describes how to use LAN-90 PCV to monitor and control a process).

- or -

If LAN-90 PCV 5.1 is to be installed, please refer to:

- LAN-90 PCV Software Release 5.1 Installation Manual, ***I-E97-808-1*** (describes how to install LAN-90 PCV Software Release 5.1).

- LAN-90 PCV Software Release 5.1 Configuration and Operation Manuals, ***I-E97-808-2.1*** and ***I-E97-808-2.2*** (describes how to use LAN-90 PCV Software Release 5.1 to monitor and control a process).

SECTION 2 - INSTALLATION

BEFORE INSTALLING

classCONNECT/DDE version 5.2 will operate correctly with either LAN-90 PCV 5.1A or LAN-90 PCV 5.2. However, the revision of the LAN-90 PCV TCP-LINK option should match the version of LAN-90 PCV installed on the host system.

Before you install QNX TCP/IP or the LAN-90 PCV TCP-Link option disk, verify that your LAN-90 PCV system has been configured as a networked server/client node or a stand-alone server with an Ethernet network card. If you are not sure, open a QNX shell window and type:

sin -PNet.ether

If a process is found, you are properly configured.

If no process is found, refer to the ***Changing a Stand-Alone Console to a Networked Console*** topic in the ***Installation*** section of your ***LAN-90 PCV Installation Manual.***

If you do not have a network card for your LAN-90 PCV system, you must purchase the ***LAN-90 PCV Network Upgrade Package***. Contact your local Elsag Bailey Sales office for details.

INSTALLING QNX TCP/IP

The QNX TCP/IP package is required to be installed on all LAN-90 PCV nodes that will be designated as QNX TCP/IP Hosts. At least one LAN-90 PCV system must be designated as a QNX TCP/IP Host. QNX TCP/IP Host computers are able to communicate on both the QNX network and the TCP/IP network, and, once the LAN-90 PCV TCP-Link software gets installed, will serve data to MS Windows computers running classCONNECT/DDE.

The QNX TCP/IP software may be installed at any time after the QNX operating system has been installed, either before or after LAN-90 PCV has been installed. To install, simply follow the instructions supplied with the software package:

Log in to QNX as the root user. This could be done from a QNX-Windows shell, or after exiting PCV and QNX Windows.

Insert “install disk 1” in your floppy drive and type:

/etc/install [*drive***]**

where *drive* is the name of the floppy you are using. The default is **/dev/fd0**.

INSTALLING THE LAN-90 PCV TCP-LINK OPTION

The LAN-90 PCV TCP-Link option can be installed at the same time that LAN-90 PCV is installed, or afterwards. For a full description of how to install LAN-90 PCV and its option disks, refer to the ***LAN-90 PCV Installation Manual***.

To install the LAN-90 PCV TCP-Link option at the same time that LAN-90 PCV is installed, simply insert the TCP-Link disk when prompted by the installation program for "Optional Packages".

If LAN-90 PCV has already been installed, you may install TCP-Link from the LAN-90 PCV Main menu through the **Configuration/Setup/Install Options** menu item.

INSTALLING classCONNECT/DDE

Before installing the classCONNECT/DDE software on your MS Windows computer, you should make sure that your TCP/IP software is set up and working properly. Make sure that you can "Ping" from your MS Windows computer to the QNX TCP/IP Host ("PCVHostN"). For information on the "Ping" program, refer to your MS Windows TCP/IP package documentation.

To install the classCONNECT/DDE product, you should be running in MS Windows. Insert "Setup Disk 1" into the floppy drive. From the File Manager, run (or click on)

a:\setup

This command copies all of the necessary files from the installation floppy disks to your hard disk in the location you specify. A classCONNECT/DDE program group is created, into which the following program items are placed:

- Net Agent.
- Server Monitor.
- PCV DDE Server.
- Tag Wizard.
- classCONNECT/DDE Setup.
- Samples Help.

In addition to copying these programs, Setup does a number of other configuration functions:

- Adds the ODBC Administrator to your system, if you do not already have it. Adds an ODBC® data source. These are used by the Tag Wizard and PCV DDE Server to make tag data field requests.

- Modifies the “autoexec.bat” file to add to the search path and store the correct time zone. The old “autoexec.bat” file is renamed.

Section 3 contains descriptions of the options you will be asked to set as you install classCONNECT/DDE.

SECTION 3 - CONFIGURATION

OVERVIEW

This section contains descriptions of the steps necessary to correctly configure the classCONNECT/DDE package. It includes configuration options that are available in LAN-90 PCV, the Setup program, and the Net Agent program.

ENABLING COMMUNICATIONS IN LAN-90 PCV

In order to access data from MS Windows computers through the classCONNECT/DDE package, communications must be enabled on the LAN-90 PCV host computer. To enable communications, go to the **Configuration-System Options-Console Configuration** menu (Figure 3-1) and find the **Software Options** (Figure 3-2). Select **Enable** for the TCP/IP Remote Data Access option.

If you wish to allow users to log in to the LAN-90 PCV system from remote MS Windows locations, to perform control and/or database update operations, also enable **Remote Login**. Note that anyone trying to log in to the LAN-90 PCV system through classCONNECT/DDE will have to have a valid LAN-90 PCV login name and password. For security, you can only administer these users through the LAN-90 PCV system.

When a user logs into the LAN-90 PCV system remotely, he or she is granted all of the same permissions that would be granted when logging in on a PCV console directly. For a further description of the LAN-90 PCV permissions and security system, refer to the ***LAN-90 PCV Configuration*** and ***Operation*** manuals.

CAUTION

By enabling Remote Login, you are granting users on the TCP/IP network (who have a valid LAN-90 PCV user name, password, and privileges) access to operations that may change the operating conditions in your LAN-90 PCV system. This includes remote (from client) access to control functions such as *motor start/stop and controller set point and output changes*. Therefore, make sure that when you enable this option, you are careful in assigning LAN-90 PCV accounts and permissions.

Setting The Host TCP/IP Address

When the LAN-90 PCV TCP-Link option was installed, it set up a TCP/IP "Host Name" for the QNX computer, and assigned a default IP address to that computer. This default IP address

MUST BE CHANGED to a unique address in order for TCP/IP communications to function properly.

If the QNX computer is going to be attached to a network with more than just PCV and classCONNECT/DDE computers connected to it (e.g., a corporate network), get your network administrator to assign an IP address to the QNX TCP/IP Host computer.

If the network is isolated (i.e., only PCV and classCONNECT/DDE computers), then you can choose your own IP address in a valid range (e.g., 129.47.1.1). Make sure it is unique. This IP address will be used by classCONNECT/DDE to access this PCV node.

The IP address may be set on the Console Options screen in the Software Options section (Figure 3-2).

By default, the LAN-90 PCV TCP-Link software assigns a TCP/IP Host name of "PCVHostN" to the QNX node, where "N" is the QNX node number. For example, on a single node QNX system, the QNX node's TCP/IP name will be "PCVHost1".

You will have to exit PCV and reboot before your changes take effect.

CAUTION	**Care must be used when assigning an IP address to a node on a TCP/IP network. Avoid duplicating IP addresses. Note that some IP addresses are "reserved", and that addresses in different ranges will sometimes have different behaviors. Consult the documentation that came with your TCP/IP software for more details.**

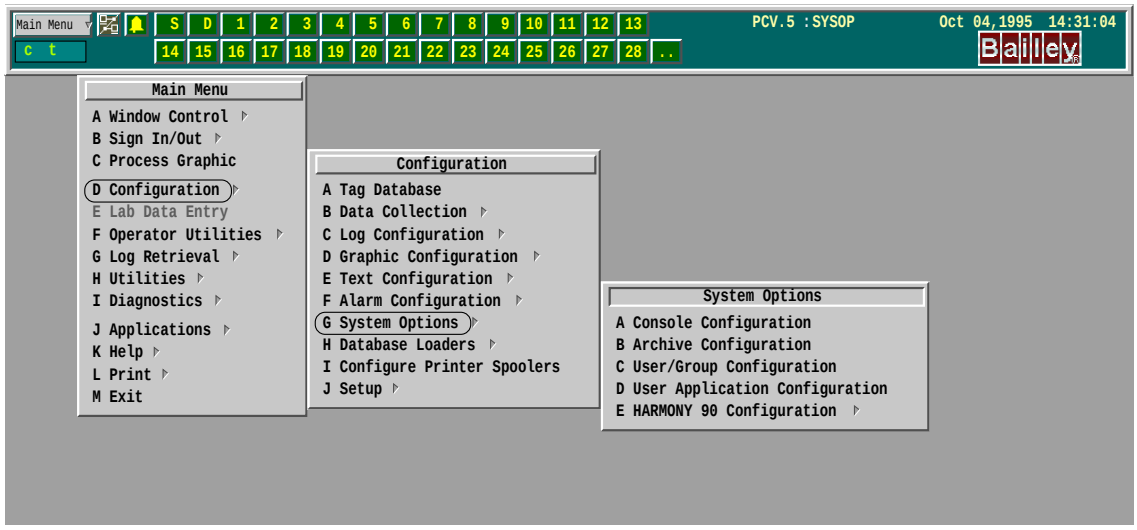

Figure 3-1. Console Configuration Menu

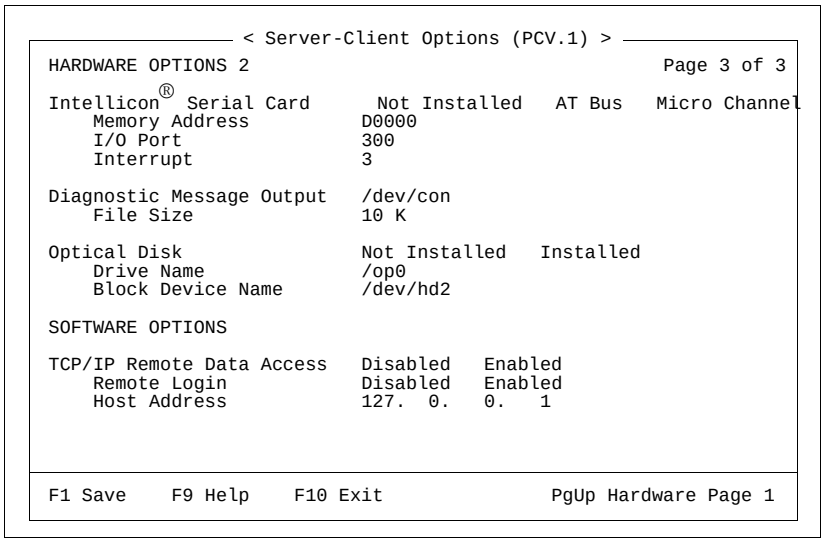

Figure 3-2. Software Options

classCONNECT/DDE SETUP OPTIONS

When running the classCONNECT/DDE setup program, either for the first time or later on, you have the capability of setting several options. The first time setup is run, you are automatically prompted for values for the time zone variable, the date format, and the DDE Server Name. These options are explained below.

You can make changes to any of these variables later, after you have installed your system by running setup again, and choosing **Options**.

Selecting a Time Zone

All times and dates that LAN-90 PCV systems use are kept internally in Universal Coordinated Time (UCT - also called Greenwich time). This is done to maintain a fixed time reference, regardless of time zone, daylight savings etc. Historical data collected by LAN-90 PCV is stored using UCT time stamps.

Whenever classCONNECT/DDE needs to pass a time or date stamp to LAN-90 PCV (for example when doing a historical data request), it must convert the request time that you enter to UCT format. In order that the software can perform this conversion, it must be configured for the correct time zone, so that the appropriate number of hours and minutes are added or subtracted from any given local time to get UCT time.

The setup program provides a facility to set the time zone for your MS Windows computer. A dialog is provided to allow you

to enter a time zone string. (The time zone information is then added to the “autoexec.bat” file).

The time zone string is defined as follows:

tzn[+ | -]hh[:mm[:ss]][dzn]

The *tzn* must be a three-letter time zone name, such as PST (i.e., Pacific Standard Time), followed by an optionally signed number, *hh*, giving the difference in hours between UCT and local time. To specify the exact local time, the hours *(hh)* can be followed by minutes *(mm)*, seconds *(ss)*, and a three-letter daylight-saving-time zone *(dzn*), such as PDT (i.e., Pacific Daylight Savings Time). Separate hours, minutes, and seconds with colons (:).

If daylight saving time is never in effect, as is the case in certain states and localities, set the time zone without a value for dzn. If the time zone value is not currently set, the default is PST8PDT, which corresponds to the Pacific time zone. The time zone can be reset to its default value by using the **Default** button.

Time Zone Examples

The following are time zone definitions used to set the time zone for several different areas. These will give you an idea of how a time zone that is not listed here may be specified.

Table 3-1. Time Zone Examples

Time Zone Definition	Time Zone Description
est05edt	Eastern
cst06cdt	Central
mst07md	Mountain
pst08pdt	Pacific
akt09ldt	Alaska
hat10	Hawaii
utc00	Greenwich Mean Time
nzt-12	New Zealand
eat-10	Eastern Australia
cat-09:30	Central Australia
jst-09	Japan
wat-08	Western Australia
cst-08	China
hkt-08	Hong Kong
kst-09	Korea
ist-05:30	India

Table 3-1. Time Zone Examples (continued)

Time Zone Definition	Time Zone Description
mst-02mdt	Moscow
eet-02eed	Eastern Europe
cet-01ced	Central Europe
met-01med	Middle Europe
wet-01	Western Europe
wet-01	United Kingdom
bst03	Eastern Brazil
nst03:30ndt	Newfoundland
bwt04	Western Brazil
sst11	Samoa

Changing the DDE Server Name

Part of the syntax of all DDE messages is a DDE Server name (See ***DDE SYNTAX*** in Section 4 for more information). This name is used by your software to refer to the local DDE Server task. It is not seen by anyone else on the network. The default DDE Server name for the PCV DDE server is "PCVDD". It is extremely unlikely that this name would conflict with the DDE server name of some other DDE server you may have installed on your computer or network, but if it does, Setup provides a dialog where you can change the PCV DDE server name to something else. The name should be short (ten characters or less), and not contain any spaces or punctuation characters.

Note that if you change your PCV DDE server name, you will have to change any spreadsheet files or reports that you have already set up with the old name.

CONFIGURING THE NET AGENT

The Net Agent has a setup menu, from which several configuration options are available.

Port

Port allows you to change the socket port, through which LAN-90 PCV and the Net Agent communicate. Changing the port number that the Net Agent uses, requires the same change to be made on the LAN-90 PCV side of the link. By default, this value is **2999**. It should only have to be changed if other third party TCP/IP-based software being used also happens to use this port (which is very unlikely).

To change the port number, simply type in the new port number and click on **OK**.

Host List

The Net Agent needs to be explicitly told where to find LAN-90 PCV TCP/IP host systems on the network. The names and IP addresses of these host systems are entered in the TCP/IP host file for the MS Windows system on which the Net Agent is running. The names should be (by default) "PCVHostN", where "N" is the QNX node number of the host (e.g., "PCVHost1"). The IP addresses for these nodes were entered on the PCV System Options screen (see ***Setting The Host TCP/IP Address***).

The way to enter the LAN-90 PCV TCP/IP host names and addresses on the MS Windows system will vary, depending on the TCP/IP software that you have. For example, if you are using Microsoft TCP/IP, you will have to edit the "hosts" file directly. In Chameleon, from NetManag, you can enter host names using the **Custom** icon. (Refer to the documentation that came with your TCP/IP software for more details on adding host names to the host file.)

Once the host names and addresses are added to the TCP/IP hosts file, at least one must be added to the Net Agent's Host List. This list is used by the Net Agent to connect to LAN-90 PCV systems, and specifies the connect order. When the Net Agent starts running, it goes through its host list, trying consecutive hosts until it finds one that responds. If that host later fails, the Net Agent tries the other hosts in the host list to find one that is still active.

Options

Login on Start-up

If this option is enabled, the login dialog will automatically appear when the Net Agent starts. It is enabled by default.

Synchronize Time to Host

If this option is enabled, the local system clock will be synchronized to the PCV host. The clock will be set when the difference in the times between the two systems is five seconds or more (the "*" indicator appears in the Status Window), and this difference has been present for at least four updates from the PCV host (at 30 second intervals). This option is disabled by default.

SETTING UP PROGRAM GROUPS

The Setup program automatically creates a classCONNECT/DDE program group for you when you install the classCONNECT/DDE package. In order for you to use the DDE linking capabilities of classCONNECT/DDE in your reports and spreadsheets, you must make sure that the PCV DDE Server is running. For this reason, you may want to create a program item for the PCV DDE Server in your start-up program group. This will ensure that the PCV DDE Server (and any programs it depends on) will be automatically launched on start-up of MS Windows.

SECTION 4 - OPERATION

OVERVIEW

This section will describe the operation of the different software components that make up the classCONNECT/DDE package.

GENERAL INFORMATION

There are four main programs that make up the classCONNECT/DDE package, the Net Agent, the Server Monitor, the PCV DDE Server, and the Tag Wizard. In order for the Tag Wizard or the PCV DDE Server to run, the Net Agent and the Server Monitor must both be running. The Net Agent and the Server Monitor are automatically launched whenever the Tag Wizard or the PCV DDE Server is launched.

Of the four main programs, only the Tag Wizard (and to a lesser extent, the Net Agent) will actually be used interactively. The other programs provide status and diagnostic information.

THE NET AGENT (bciagent.exe)

Overview

The Net Agent is responsible for all network communication between the MS Windows system and the LAN-90 PCV system. Using TCP/IP and the WinSock interface library, the Net Agent routes all messages destined for a LAN-90 PCV system to the correct LAN-90 PCV TCP/IP host, and makes sure all messages received from LAN-90 PCV go to the correct requesting window.

The Net Agent must be running before any communication between MS Windows applications and LAN-90 PCV can take place.

Net Agent Status Window

The Net Agents status window (Figure 4-1) displays an assortment of status information, useful in diagnosing the current state of the MS Windows to PCV link.

Among the items shown are:

Link Status Indicates whether or not a communication link has been established between this computer and the LAN-90 PCV host.

If a valid connection exists, the Link Status is on-line. If no connection exists, the Link Status is “off-line”.

Current Connections

Shows how many connections are currently established between client applications and the Net Agent. Most connections are for tag or historical data. Net Agent connections are also used by the Server Monitor and DDE Server task for monitoring the link status.

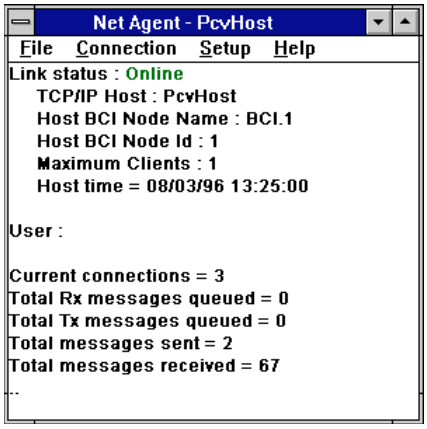

Figure 4-1. Net Agent Status Window

Total Rx (Received) Messages Queued

Indicates how backed up the TCP/IP link currently is. This number indicates how many messages have been received from LAN-90 PCV, but have not yet been received by the client task they are destined for. If this number stays above zero for a long period of time, chances are that something has gone wrong with one or more client applications (DDE Server, Tag Wizard, etc.,).

Total Tx (Transmit) Messages Queued

Similar to Total Rx messages queued, this number shows how many messages are currently waiting to be sent to the LAN-90 PCV system. It will fluctuate rapidly as clients interact with the LAN-90 PCV system. If this number stays above zero for a long period of time, chances are something has gone wrong with the TCP/IP link.

Total Messages Sent

This number represents the total number of TCP/IP messages sent to the LAN-90 PCV system from the Net Agent since the Net Agent software began running.

Total Messages Received

This number represents the total number of TCP/IP messages received by the Net Agent from LAN-90 PCV since the Net Agent began running.

If the Link Status is on-line, the following data will also be shown:

TCP/IP Host Indicates the TCP/IP Host name of the LAN-90 PCV computer with which the Net Agent is communicating. Host names are assigned in the TCP/IP Host file. Consult the documentation that came with your MS-Windows TCP/IP software for details on setting host names.

Only TCP/IP hosts that are listed in the Net Agent Host list are candidates for communication with the Net Agent. See ***CONFIGURING THE NET AGENT*** in Section 3 for more details.

Host BCI Node Name Indicates the PCV "Node name" of the LAN-90 PCV TCP/IP Host which is currently in communication with the Net Agent.

Host BCI Node Id Indicates the PCV "Node Number" of the LAN-90 PCV TCP/IP Host which is currently in communication with the Net Agent.

Maximum Clients Indicates the maximum number of client applications which can communicate with the DDE server on your node. This limit is controlled on the LAN-90 PCV side of the link.

Host Time Shows the current time of the LAN-90 PCV TCP/IP Host. When the TCP/IP connection is first established, the indicator *Unknown* will be shown until the first update is received from the PCV host. The time is updated every 30 seconds; a "*" indicator means that there is a difference of more than 5 seconds between the local system clock and the LAN-90 PCV host time. To automatically synchronize the local time to the LAN-90 PCV host time, see ***CONFIGURING THE NET AGENT*** in Section 3.

User Indicates the login name and login group of the currently logged-in user. If nobody is currently logged-in, this field is blank.

Logging In to LAN-90 PCV

In order to perform any control or database modification operations, you must first login to the LAN-90 PCV system. This is done through the login function, in the Net Agent Connection menu. The name and password entered into the login dialog must have already been set up in the LAN-90 PCV system. Note that if you are already logged in, or using a system where remote login has been disabled, the **Login** option is dimmed.

The ability to send data to the LAN-90 PCV server is controlled by LAN-90 PCV. The standard LAN-90 PCV security system is extended to MS-Windows by the Net Agent. This allows permissions to be controlled by a user log-in process, where only privileged users are allowed to affect the database or perform control actions. Log in requests are sent to a LAN-90 PCV server for validation.

Once you are logged in, you can log out using the ***Logout function***, also found in the Connection menu. If no user is currently logged in, the **Logout** option is dimmed.

Connecting to LAN-90 PCV Hosts

The Net Agent Connection menu allows you to choose how the link between the Net Agent and LAN-90 PCV system is controlled.

Connect

If the state of the link is off-line, you can reconnect the link by choosing **Connect**. This will present a pick list dialog (Figure 4-2) from which you can choose the LAN-90 PCV Host to connect to. This list is constructed from the Net Agent Host list that you have already set up. If the link is already on-line, **Connect** is dimmed.

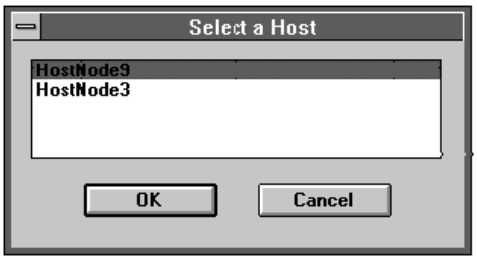

Figure 4-2. Selecting a Host for Connection

Disconnect

If the state of the link is on-line, you can disconnect the link by choosing **Disconnect.** The link will stay disconnected (off-line) until **Connect** is chosen. If the link is already off-line, **Disconnect** is dimmed.

THE SERVER MONITOR (servmon.exe)

The Server Monitor is responsible for monitoring the status of all of the LAN-90 PCV nodes on the QNX PCV network, as well as maintaining important addressing information. This information enables MS Windows applications to communicate directly with LAN-90 PCV. All of the PCV nodes being monitored do not have to be on the TCP/IP network; as long as the LAN-90 PCV TCP/IP host is on both the QNX network and the TCP/IP network, the Server Monitor can see all of the PCV nodes.

The Server Monitor view window displays server status information. Two views of this data are provided. One view is sorted by server, showing all the information relevant for each server. The other view lists all of the registered names in the LAN-90 PCV system.

The information shown in these views is for diagnostic purposes only and displays the same information that is shown in the “PCV Service Monitor” display in PCV, for each server node.

> **NOTE:** The Server Monitor must be running while any of the other classCONNECT/DDE software is running.

THE PCV DDE SERVER (pcvdde.exe)

The DDE Server allows DDE compliant applications to acquire LAN-90 PCV tag data and optionally send tag information back to PCV. Tag data that can be acquired includes tag configuration information, live tag data and historical tag data. Tag data that can be sent back to PCV includes:

- Tag value (for internal, report and RMSC type tags).
- Tag state (for RCM, DD, MSDD and RMCB tags).
- Auto/manual mode (where appropriate).
- Setpoint, control output and ratio index (for station tags).
- Cascade/ratio mode (for station tags).

The DDE server can acquire data from one or more LAN-90 PCV servers on the network.

Error Indication

In the event the requested value is not available, an appropriate error indicator will be returned. Table 4-1 lists possible errors given by the PCV DDE Server.

Table 4-1. PCV DDE Error Indicators

Error Indicator	Meaning
******	Historical tag data not available.
??????	Initial value; no value received yet.
++++++	Historical tag data is available but in an off-line archive. Mount appropriate archive volume and retry request.
* Cannot retrieve tag value	Internal problem.
* Error in returned data	PCV returned incorrect (or incorrectly formatted) data.
* Failure in PCV server link	Server link has failed, check Net Agent status.
* Failure in tag connect	Error in connecting tag at LAN-90 PCV server.
* Invalid field for tag type	Field is not valid for the tag type.
* Invalid syntax	Link is not specified correctly; a field is missing.
* No more room in string	The 32K buffer supported by DDE was about to be exceeded.
* Failure accessing server	Internal problem.
* Tag data not available	Tag data could not be retrieved.
* Unable to find tag	Tag does not exist on the LAN-90 PCV server, or is improperly specified.
* Unable to read data	Tag data could not be retrieved.
* Unknown error	Internal error.

Table 4-1. PCV DDE Error Indicators (continued)

Error Indicator	Meaning
* Unknown field	Field specified is not valid for this tag type.
* Unknown tag type	The supplied tag type name is not valid.
* Unsupported cold request	An advise loop (warm link) must be established.

DDE SYNTAX

Microsoft has defined DDE requests to have a three level address scheme. The top level describes the application, or "Server" of interest. The next level defines a "Topic" within the selected server. The final level specifies an "Item" within the topic. Each level is separated from the others by a unique separator character to form a general syntax.

ServerName|TopicName!'ItemName'

Server Name

The DDE server will by default define its server name as "PCVDDE". The DDE server name may be changed from the default name. This may be required in the unlikely event that the default name conflicts with another DDE server application name. To change the name, re-run the setup program, select **Options**, and enter the new *Server Name* in the appropriate dialog.

Topic Name

There are currently six different topics supported by classCONNECT/DDE. The SYSTEM topic is used to query the DDE server for miscellaneous information about services supported. The TIMEREF topic is used to define symbolic time references (which can be used in other requests). The SERVERLIST topic retrieves the names of the LAN-90 PCV servers accessible by classCONNECT. The TAGLIST topic retrieves information about the tags that are available on a particular server, while the FIELDLIST topic is used to retrieve a set of valid fields that can be used with a tag type or a specific tag. The TAGDATA topic is used to request real-time data for a tag or group of tags, or to request historical data relating to specific tags.

Explicit Time Specifications

A time reference is used to specify a place in history from where data is to be retrieved. A reference can be either a fixed time and/or a fixed date, or a symbolic time reference. Symbolic time references are described below, where the *TIMEREF* topic is explained. The remainder of this section describes the format of an explicit (or fixed) time specification.

A time reference has the general form of a date followed by a time. If no date is supplied, the current date is assumed; if no time is supplied, the start of the specified date is assumed. Times and dates may also be partially specified. The date format used is the same as that used by the MS Windows environment installed on the client machine. If the format is *dd-mm-yy*, then trailing components may be omitted; the DDE server will use the current year if the year is omitted, and will assume the current month if the month is omitted. (If the format is *mm-dd-yy,* then only the year component may be omitted.)

Times are specified using a 24 hour clock, with the format *hh:mm:ss*, where *hh* is hours, *mm* is minutes, and *ss* is seconds. All time specifications must include at least an hours value. If not supplied, the minutes or seconds are assumed to be zero.

SERVERLIST TOPIC

The SERVERLIST topic will provide a list of all the LAN-90 PCV servers which the DDE Server can access. If an item is specified by the client, it is ignored. The format for this topic is as follows:

PCVDDE|SERVERLIST!ALL

A single row array (up to 32 Kbytes) of the available LAN-90 PCV server names is returned. This topic is supported by a cold link.

TAGLIST TOPIC

The TAGLIST topic provides a list of tags available for examination on a particular LAN-90 PCV server. This topic is available as a cold link only and has the following format:

PCVDDE|TAGLIST! *'server; index; range'*

The *server* field of the item is the name of a LAN-90 PCV server where the list is to be obtained. The tag *index* specifies the first tag to include (i.e., the tag ID number configured on the LAN-90 PCV system), and *range* provides the maximum number of tags to be returned (up to a maximum of 32 kilobytes of returned data). Index and range are optional fields: range defaults to all remaining tags after index, and index defaults to one if it is omitted (range must be omitted if index is omitted). The appropriate separator (";") must be omitted if the field is not specified.

The list of tags is returned in a four column array with the following format:

Tag Name	Tag Description	Tag Type	Tag Index

FIELDLIST TOPIC

The FIELDLIST topic retrieves a list of field names for a particular tag name, which is returned as a single row array through a cold link. There are two formats, the first of which follows:

PCVDDE|FIELDLIST! *'server: tagname; index; range; qualifier'*

The *server* field of the item specifies the LAN-90 PCV server where the tag with name *tagname* may be found. The server field is optional, unless tag names are not unique across the LAN-90 PCV network. (In the case of non-unique tag names, prefixing the server name ensures the correct tag is referenced.) The *index* and *range* fields are numeric, and are similar to those used under the TAGLIST topic, except they refer to the index of the fields associated with the tag and the count of fields. The *qualifier* may be one of the strings in the following table, and will filter the list of fields according to a category of data request. If no qualifier is present, both Spec and Value field categories are returned.

Qualifier String	Field Category
VALUE	Value
SPEC	Spec
CONTROL	Control
EVENTS	Historical Request - Events method
MIN, MAX, AVG, SUM, SUMSQR or MULTI	Historical Request - Non-events methods

The second format for this topic uses a type name instead of a tag name. The *index, range* and *qualifier* fields have the same meaning as the first format:

PCVDDE|FIELDLIST!*'(type;index;range;qualifier)'*

This request will return a list of fields for a tag of that type. For instance, specifying ANALOG as the type will return a list of all fields associated with an ANALOG tag.

As mentioned above, the appropriate separators must be omitted if a field of the item is omitted. For either format, there is a limit of 32 Kbytes for returned data.

TAGDATA TOPIC

The DDE server provides the TAGDATA topic to allow access to all tag-related data available on an attached LAN-90 PCV server. All data is returned in CF_TEXT format (up to 32 Kbytes); hot, warm and cold links are usually supported.

This topic has a basic form, where a value for a particular field of a tag can be requested. The base syntax is also extended in two different ways, to allow requests for multiple tags and fields simultaneously, and also to request historical information about a tag and field.

The base syntax returns the current value of a single field of a tag. This syntax has the following form:

PCVDDE|TAGDATA!*' server: tagname. fieldname'*

As with other DDE topics, *server* is an optional field in the item, specifying the LAN-90 PCV server where *tagname* is found. If server is not present, the colon (":") separator must be omitted as well. A single value is returned by this link. Note that *fieldname* is **not** an optional part of the item, and that the period "." separator must be present as well.

By itself, the base syntax is supported by hot and cold DDE links.

Retrieving Multiple Fields Through the Same Link

Multiple tag-field pairs may be specified simultaneously for a hot or warm link through this topic, using a comma to delimit the pairs, and surrounding the pair-set with parentheses. The syntax is as follows:

PCVDDE|TAGDATA!*'(server:tagname.fieldname,server:tagname.fieldname, …)'*

After the first tag-field specified, the "server:tagname" portion may be omitted for subsequent tag-field pairs as a short form: The previous server:tagname will be assumed. Note that the period "." preceding the field name is mandatory in a short form specification. In the following example of the use of this short form, the field "tagtype" refers to "PCV.1:Tag1", and "status" refers to "PCV.1:Tag2":

PCVDDE|TAGDATA!'(PCV.1:Tag1.*value,.tagtype,***PCV.1:Tag2***.value,.status)'*

The following request will return an "* Invalid syntax" error string, because a server:tagname is not specified:

PCVDDE|TAGDATA!*'(.value,.tagtype,.status)'*

When multiple tags and fields are specified, the value returned is a table, with a tag-field pair and its associated value presented in each row. The table is limited to 32 Kbytes in size; its columns are as follows:

Tag Name.FieldName	Value

There is no order or degree of completeness implied for the returned data table. As this syntax is only used for hot or warm links, the table only contains values that have changed. The order of values in the table will initially be the order of changes received from the LAN-90 PCV system; the ordering of tags may vary, and should not be relied upon. Also, the table may not be complete: only the changed tag-field pairs will be included in the returned data table. Since the returned table is limited to 32 Kbytes, too large a list may cause returned data to be truncated.

For the warm link, an advise will be sent to the client when the data changes; the client will then make a cold request, which will return a table of all changes which have occurred since the last request. After a cold request is made, new data changes will replace the buffer that was just returned; if no changes have occurred since that request was made, the same buffer will be returned. Mixing cold requests with hot links is not advised; it will probably result in a loss of data if the client cannot handle hot advises while processing a cold request. An error message will be returned if a cold link has been made when an advise loop (either hot or warm) has not been initiated.

This syntax is intended for programmatic use only. Because the returned data is hot link only, and the order is not predictable, use in a spreadsheet package would not be feasible: The cells being updated by this topic's syntax would continuously be overwritten with the names of different tag-field pairs, and the values for other tag-fields. The returned table will instead need to be parsed by a custom DDE-aware program.

Retrieving Historical Data

The history of changes associated with a tag can be accessed using an extension to the base TAGDATA syntax, where five parameters are added onto the *TAGDATA* item. Note that multiple tag/field pairs may not be specified, and there are several additional components in the item. The general syntax is as follows:

PCVDDE|TAGDATA!*'server:tagname.fieldname;*
METHOD;TIME;SAMPLES;PERIOD;OPTIONS'

The returned data is in table format. The table varies depending on the METHOD and the supplied OPTIONS, and is described below.

The METHOD defines the retrieval method to be used. Six methods are supported. These calculated values are the components of more complex calculations such as standard deviation, average and variance. See Table 4-2 for a description of the historical data retrieval methods.

The TIME component is a time reference used to define where in history the data is to be retrieved from. The TIME can be a time, or a symbolic time reference.

The absolute value of the SAMPLES component defines the number of samples that should be returned. If this number is positive then the samples will be in the future, relative to TIME. If it is a negative number then the samples will be in the past, relative to TIME. The ability to define both positive and negative samples allows the user to use the TIME component as either a start time or end time.

The PERIOD component defines the sample period to be used. It is defined as a non-zero, non-negative numeric value followed by a unit of time. The units of time available will be Seconds, Minutes, Hours, Days, Weeks, Months, and Years

The only component which may be omitted is the OPTIONS component. The OPTIONS specify which data columns will be returned with the historical data request, and is comprised of a series of letters, each one representing one of the possible data columns to be returned. If the letter is present, the column is returned, and if no letters are present (or the component is omitted), ***all*** columns are returned. The OPTIONS may consist of the following letters:

T Timestamp.
V Value (all values for MULTI method).
B % Bad.
O Number of Samples.

Data is returned in a table (of up to 32 Kbytes in size) with one sample per row, and with values and related information specified in different columns. The OPTIONS field is used to determine what combination of the four basic columns will be present. The basic table format may have up to four columns:

Timestamp	Value	% Bad	Number of Samples

The first column contains the time the value occurred, the second column contains the value of the *fieldname* specified, the third contains a number between zero and 100 indicating the quality (correctness) of the value, and the last column contains

the number of one second samples used by LAN-90 PCV during the process of assembling the value.

For the MULTI method, seven value columns are returned instead of one. When using the MULTI method, up to ten columns may be present in the returned table, depending on the OPTIONS component:

Time-stamp	MIN	MAX	SUM	SUM SQR	AVG	TMIN	TMAX	% Bad	# Samples

See the MULTI method in Table 4-2 for details on these seven-value columns.

If there is an error in the syntax of an historical request, one of the error messages in Table 4-3 will be returned instead of tabular data.

If the number of samples specified cannot be retrieved, the contents of remaining rows will be filled with a *data not available* indicator ("******"). Rows of data will always be returned in chronological order with the oldest value at the top of the table. All of the simple retrieval methods use the same four column output format shown above, while the MULTI method uses the ten column output format. All data is generated by the LAN-90 PCV Enhanced Data Collection System (EDCS).

Table 4-2. Historical Data Retrieval Methods

Method	Description
SUM	This method returns the summation of all good quality values over the selected period, in the "value" column. The "time stamp" column contains the start time of the period. The "% bad" column provides an indicator of the quality of the summation. The "number of samples" column provides the number of samples that were summed.
SUMSQR	This method returns the summation of the squared good quality values over the selected period, in the "value" column. The "time stamp" column contains the start time of the period. The "% bad" column provides an indicator of the quality of the summation. The "number of samples" column provides the number of samples that were summed.
MIN	This method returns the minimum good quality value over the selected period, in the "value" column. The "time stamp" column contains the start time of the period. The "% bad" column provides an indicator of the quality of the value. The "number of samples" column provides the number of samples that were evaluated.
MAX	This method returns the maximum good quality value over the selected period, in the "value" column. The "time stamp" column contains the start time of the period. The "% bad" column provides an indicator of the quality of the value. The "number of samples" column provides the number of samples that were evaluated.
AVG	This method returns the average of all of the good quality values sampled over the selected period, in the "value" column. The "time stamp" column contains the start time of the period. The "% bad" column provides an indicator of the quality of the average. The "number of samples' column provides the number of samples that were averaged.

Table 4-2. Historical Data Retrieval Methods (continued)

Method	Description
EVENTS	This method provides the actual events recorded by the server. It is treated slightly differently than the other methods. The “value” column contains the actual value. The “time stamp” column contains the actual time of the event. The “% bad” column contains either 0 or 100 and represents the actual quality at the time of the event. The 'number of samples' column is filled with the number of events being returned, i.e., 1 for a good value, 0 for a bad. In this case, the number of samples to be returned is not deterministic. This method uses the SAMPLES parameter as a ***maximum*** number to return. It also uses the PERIOD parameter as an ***overall period*** for all returned samples. If the PERIOD parameter is blank, the request will be assumed to have no fixed period and will cause the server to attempt to return the number of samples specified. If SAMPLES is negative, then the TIMEREF is treated as an end time. In this case, the start time is calculated by subtracting the PERIOD from the TIMEREF, and the absolute value of SAMPLES, as well as the PERIOD, is used to limit the samples returned. Note that a PERIOD must be specified if the SAMPLES value is negative.
MULTI	This method provides a means for producing a complex output table, which is essentially a normal output table with multiple value columns. There are seven value columns, one for each of the five simple methods AVG, MIN, MAX, SUM and SUMSQR, and also two additional columns, TMIN and TMAX. These two columns provide the times the MIN and MAX values occurred. The “time stamp”, “% bad” and “number of samples” columns are included using the OPTIONS T, B, and O. The V option specifies all seven value columns together. As with the simple methods, if the OPTIONS parameter is not present, all option letters are assumed.

Below are some examples of historical data retrieval requests:

Example 1 — Get 60 samples of myTag's value summed over 1 minute periods starting at 8:00 today (Timestamp and Value only)

PCVDDE|TAGDATA!'myTag.value;SUM;8:00; 60; 1 Min;TV'

Example 2 — Get a single Maximum value of myTag's set point during the day of May 18 of the current year (All Columns)

PCVDDE|TAGDATA!'myTag.sp;MAX;18-05;1; 1 Day'

Example 3 — Get up to 100 actual events of myTag's process value that occurred yesterday (All Columns)

PCVDDE|TAGDATA!'myTag.pv;EVENTS;0:00; -100; 24 Hours;TVBO'

Example 4 — Get hourly average values of myTag from yesterday (Time and Value only)

PCVDDE|TAGDATA!'myTag.pv;AVG;0;-24;1 Hour;TV'

Table 4-3. Error Messages for Historical Data Retrieval Requests

Message	
* Bad number of samples	* Time unit not found
* Method type not found	* Time reference not found
* Error in date syntax	* Error in time syntax
* No day of month specified	* MONTH: Out of range (1..12)

Table 4-3. Error Messages for Historical Data Retrieval Requests

Message	
* YEAR: Out of range (1970..2037)	* DAY: Out of range (1..31)
* HOUR: Out of range (0..23)	* MINUTE: Out of range (0..59)
* SECOND: Out of range (0..59)	* No calculation period specified
* No value defined for the time reference	* PERIOD: out of range (1..32768)

TIMEREF TOPIC - SYMBOLIC TIME REFERENCES

Symbolic Time References are maintained by the DDE server and defined by a DDE application. Time References are symbolic representations of a fixed time in history. In addition to application-defined Symbolic Time References, the server provides predefined Symbolic Time References that are available to all applications. Predefined Symbolic Time References provide dynamic references to the current time of day. All other Symbolic Time References are defined by applications and are used to simplify the retrieval of historical information. By using Symbolic Time References in data requests, the same set of DDE connections can be used to access different periods of time by simply adjusting a single Symbolic Time Reference. This ability is essential for reporting applications which generate predefined reports that are repeated periodically.

To use a Symbolic Time Reference, simply put the name of the Symbolic Time Reference into the DDE request statement in the TIMEREF field, instead of a hard-coded time.

For example, say you wanted to get the 1 minute averages for myTag.pv over the last 60 minutes. Your DDE syntax would be:

PCVDDE|TAGDATA!'myTag.pv;AVG;THISMINUTE;-60;1 Minute'

This example uses the “THISMINUTE” predefined time reference. In the above example, “THISMINUTE” will get replaced by the current time. “-60” means “go back 60 periods from THISMINUTE” and “1 Minute” means “minutely” averages. If the above DDE link was pasted into a spreadsheet, it would automatically update every time THISMINUTE changed (every minute).

Say, instead of only looking at the previous 60 minutes of data, you want to be able to specify any end time, and look at the 60 minutes immediately preceding it. You can define your own time reference, and then write macro code to poke values to it. Anytime a new value is poked into a time reference, all DDE links using that time reference are automatically updated.

An application can set the value of the Symbolic Time Reference by issuing a DDE poke request on it. The Item of this Topic consists of a symbolic name for the Time Reference and a

valid time description (See Section 3). The time description can include a full time and date, can refer only to a time (in which case the current date is assumed), or can refer only to a date, in which case the start of the day is assumed. Twenty-four hour time is assumed for time descriptions. Date descriptions include at least the day of the month, and can optionally include month and year (the current system month and year are assumed if not included).

The following is a sample of Excel macro code for poking a Symbolic Time Reference Value. (Note that lines starting with a single quote (') are comment lines and may be ignored) It is recommended that you refer to the Microsoft Excel Visual Basic User's Guide for a complete description of how to write Excel macro code.

```
Function PokeTimeRef
channelNumber  = Application.DDEInitiate("PCVDDE","TIMEREF")

'Time Value is in cell E4
Set rangeToPoke = Cells(4,5)

Application. DDEPoke channelNumber, "myTimeRef", rangeToPoke

'An alternative syntax is
'Application.DDEPoke channelNumber, "myTimeRef=8-30-1994 16:00",
'rangeToPoke

'Note that in the alternative syntax, the value of range ToPoke is
'ignored, in favour of the hard coded time and date

Application.DDETerminate channelNumber
End Function
```

You could then use the "myTimeRef" time reference in a data retrieval:

PCVDDE|TAGDATA!'myTag.pv;AVG;myTimeRef;-60;1 Min'

Symbolic Time Reference changes will affect all current and future TAGDATA connections that include the affected reference. This implies that any connections in effect at the time of the change will be sent the change. The application doesn't have to reconnect its requests.

The symbolic name of a time reference can be composed of any alpha-numeric characters but cannot begin with a numeric character. No special characters are allowed in these names.

The DDE Server also provides a set of predefined symbolic time references that may be used by any DDE application. Predefined Symbolic Time References include *THISMINUTE, THISHOUR, THISDAY, THISMONTH* and *THISYEAR.*

You may create a link to a Symbolic Time Reference, to view its current value.

To create a link to a Symbolic Time Reference named “myTimeRef”, the syntax would be

PCVDDEITIMEREF!'myTimeRef'

As long as a valid link exists to the defined Symbolic Time Reference, or to a historical data request using the Symbolic Time Reference, the DDE Server will maintain it as an active data source.

The DDE server maintains Symbolic Time References as global information available to all applications. Each application that defines Symbolic Time References will need to adopt a naming convention to avoid conflicts with other applications. Global Time Reference can be used by an application to provide references to other applications, in effect extending the predefined Symbolic Time References.

UPDATING TAG DATA AND PERFORMING CONTROL

When you have appropriate privileges, you can change LAN-90 PCV database tags from a DDE compliant application. This is performed using the DDE POKE command. It uses the same basic DDE syntax as described in ***TIMEREF TOPIC - SYMBOLIC TIME REFERENCES***. Some restrictions apply to data fields of non internal tag types. If the tag type is not internal then its value field cannot be updated.

The following example is a sample of Excel macro code that will set the Station setpoint of station “station-1”. This example sets the sp according to the value contained in spreadsheet Cell E4.

```
Function PokeSetpoint
channelNumber =Application.DDEInitiate(“PCVDDE”,“TAGDATA”)
' Value is in cell E4
Set rangeToPoke =Cells(4,5)
Application. DDEPoke channelNumber,“station-1.sp”, rangeToPoke
Application.DDETerminate channelNumber
End Function
```

Please refer to the on line help facilities for an up to date list of fields available to be controlled for each tag type.

CAUTION	**Extreme caution should be used when embedding control-type functionality into spreadsheet macros. Make sure that any macros you set up are protected from improper use, and well documented as to their functionality. It is not a good idea to have control-type macros execute automatically when a spreadsheet is opened, because someone browsing through spreadsheet files may accidentally invoke a control operation.**

SYSTEM TOPIC

The System Topic is provided in order to be compliant with other DDE applications currently available. The System Topic is intended to provide an application with information that will help it determine the capabilities of the server. The general syntax is as follows.

PCVDDE|SYSTEM!sysItem

The following items are available for the System topic:

Topics Returns a list of names of the set of topics supported.

SysItems Returns a list of items supported under the System topic. This list contains all items noted here.

Formats Returns a list of names of all the formats supported by the server. The text (CF_TEXT) format is the only one supported at this time.

Status Returns an indication of the readiness of the server. The server will return either the “Busy” string or the “Ready” string.

EXAMPLES

Below are some examples of specifying data retrieval using DDE.

Example 1 Get a list of the first 100 fields of myTag.

PCVDDE|FIELDLIST!'myTag;1;100' .

Example 2 Get a list of the names of all DIGITAL fields.

PCVDDE|FIELDLIST!'(DIGITAL)' .

Example 3 Get the current value of myTag's pv field.

PCVDDE|TAGDATA!'myTag.pv' .

Example 4 Get the current values of myTag's pv, sp and value fields (returned in a table).

PCVDDE|TAGDATA!'(myTag.pv, myTag.sp, myTag.value) '

Example 5 Get 60 samples of myTag's value summed over 1 minute periods starting at 8:00 today (four columns, one sample per row).

PCVDDE|TAGDATA!'myTag.value;SUM;8:00; 60; 1 Min'.

Example 6 Get the time (i.e., timestamp only) of the single maximum value of myTag's set point during the day of May 18 of the current year.

PCVDDE|TAGDATA!'myTag.sp;MAX;18-05;1; 1 Day;T'

Example 7 Get up to 100 actual events of myTag's process value that occurred yesterday (four columns)

PCVDDE|TAGDATA!'myTag.pv;EVENTS;0:00; -100; 24 Hours'

Example 8 Retrieve 60 one minute sums of myTag's process value from the previous hour of the current day (using a predefined symbolic time reference).

PCVDDE|TAGDATA!'myTag.pv;SUM;THISHOUR;-60;1 Min'

Example 9 Get data on all the PCV collection methods applied to 25 1 minute intervals of myTag's value field beginning on April 23, 1972 at 4:00 am. (The results are returned in a table of 10 columns by 25 rows).

PCVDDE|TAGDATA!'myTag.value;MULTI;23-04-72 4:00; 25; 1 Min

THE TAG WIZARD (browser.exe)

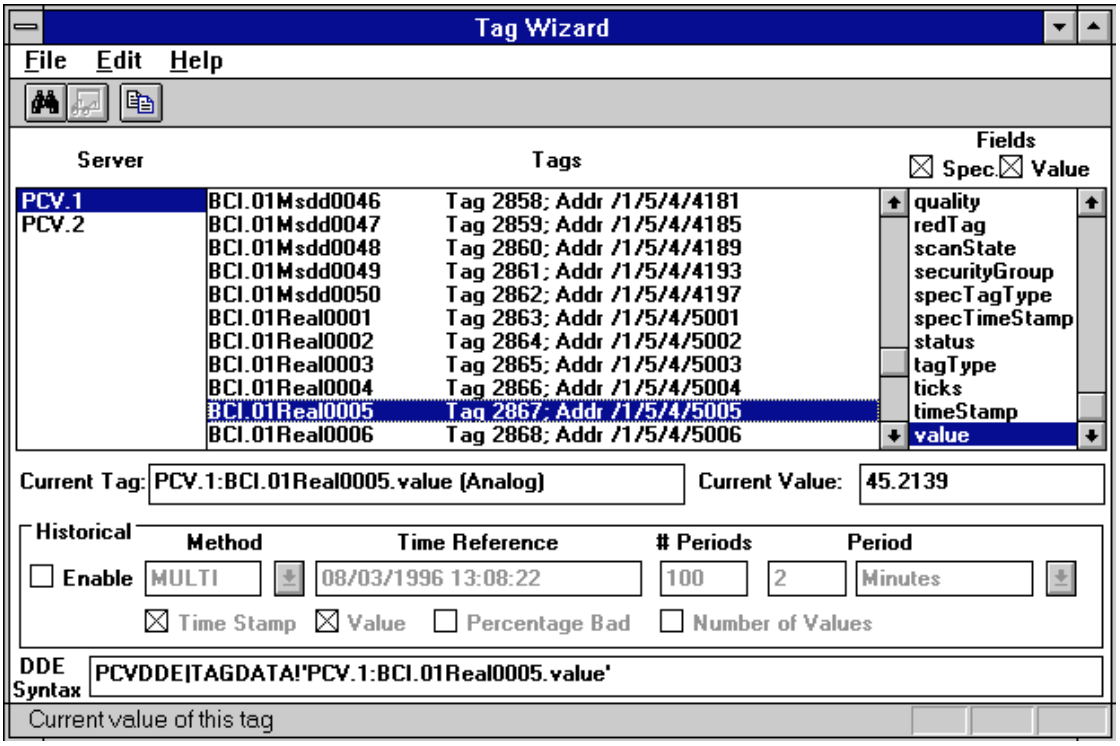

Figure 4-3. Tag Wizard Window (in RealTime Update Mode)

The primary function of the Tag Wizard is to act as a ***Browsing Tool*** for users interested in performing ad hoc queries. With the Tag Wizard, you can view a network of LAN-90 PCV servers, and see a list of the tags configured on each of these servers. You can choose a tag, and see a list of database fields which correspond to the type of tag you have chosen. If you wish, you can select one of these fields, and see the current value of that field, in real-time.

In historical mode, you can formulate historical queries, and actually view the data resulting from one of these queries. Once the query is complete, you can copy the results to the clipboard for use in other software packages.

The Tag Wizard is also a DDE ***Formatting Tool***. As the LAN-90 PCV system is browsed, or as historical queries are formulated, a DDE Syntax statement is built. Once a valid statement has been constructed, you can copy the DDE link request to the clipboard. This link can then be pasted into documents of other software packages. In this way, it is not necessary for you to become familiar with the syntax of DDE requests.

The Tag Wizard makes use of the facilities provided by the PCV Network Agent and the PCV Server Monitor, so it is required that these two programs be running whenever the Tag Wizard it used. It is not required that the PCV DDE Server be running in order for the Tag Wizard to function.

Servers, Tags and Fields

The Tag Wizard automatically displays the names of all of the LAN-90 PCV Servers on the LAN-90 network. This list is read directly from the Server Monitor. Double clicking on any of the server names in this list produces a list of the tags configured on that server. If the selected server is not currently communicating, the message *No Server Communication* is displayed.

The tag list contains the names and descriptions of all of the tags configured in the selected LAN-90 PCV server. These tags are shown in order by index. ***Empty tag indices are not shown.***

Double clicking on an entry in the tag name list produces a list of all of the fields available for data retrieval. This field list is dependent on the type of tag, i.e., only the fields relevant for the given tag's type are provided in this list. Two other items influence this list:

The Historical Enable Option

If this option is selected, the Tag Wizard begins formulating an Historical Data request. In this mode, only a subset of fields is available for querying.

Spec. and Value Options

These two options control the type of fields that are displayed. Specification fields are fields that are configured, and rarely change. Value fields are fields containing live data. You may select Spec., Value, or both types of fields.

Refer to the on-line help for complete information on the data fields that are supported. Double clicking on a tag name entry also causes the name of the tag, and the tag-type (in brackets) to be shown in the Current Tag box. If any field has been selected, the field name is also shown.

If you know the name of the tag you want to view, but you don't know the server name, or cannot find the tag in the tag list, you may use the **Find Tag** button. Selecting this function prompts you for the name of a tag. If the tag exists anywhere in the LAN-90 PCV system, it is automatically shown in the tag and server lists.

Once you have chosen a field, the current value of that field is displayed in the Current Value box.

Historical Data

Historical data requests can be formulated and previewed with the Tag Wizard. Preview can only work if the LAN-90 PCV server from which the data is being requested is actually collecting historical data.

To formulate a historical data request, select the Historical Enable check box. This enables a set of fields which are used to create the historical data request. See the section on ***Retrieving Historical Data*** for details about the different parameter fields. The last two fields are normally labeled # Periods and Period. When the EVENTS method is selected, these prompts change to # Events and Max Time Span to match the slightly different meaning these two fields have for the EVENTS method. Table 4-2 describes the different methods and the type of data each returns.

Once the desired historical data request has been formulated, you can use the **View Historical** button to preview the results of the request. This creates a temporary window containing the requested data. There is a limit of 32K bytes on the data returned; if the request is too large, the message ** No more room in string* will appear at the end of the data in the preview window.

> **NOTE:** That historical data preview of Symbolic Time Referenced data (TIMEREFs) is not supported by the Tag Wizard. Only absolute time references can be previewed.

Copying to the Clipboard

Another feature of the Tag Wizard is the ability to copy a DDE link into the clipboard, and then paste the link into other DDE-enabled applications. To do this, simply formulate a valid DDE request, and select the **Copy** button. The Tag Wizard automatically decides what is a valid DDE request and what is not. The DDE syntax is not displayed, and the copy button is dimmed, until all necessary parameters have been correctly set.

This feature works with both historical and current-data requests, and actually copies two things into the clipboard when you choose **Copy**:

On current data requests, the Tag Wizard copies both the DDE link, and the current value into the clipboard. If the destination application supports DDE, you can do a **Paste Special** or **Paste Link** to paste the DDE link into your application. Alternatively, if the application does not support DDE, or you do a regular **Paste** operation, only the current value is pasted into the application. In this case, the value is NOT a live value, but a copy of the value when the DDE link was copied to the clipboard.

Note that some spreadsheet programs, such as Microsoft Excel, will not allow you to edit the individual cells of a live data array, as would be created if you did a **Paste Link** of historical data. In cases where you need to edit individual cells, you may want to do a regular **Paste** operation instead.

Historical data requests work in the same fashion. The Tag Wizard copies the DDE link into the clipboard, which allows a Paste Special or Paste Link of dynamic data into your application. If, prior to doing the Copy, you also performed a View Historical request, the results of this request are also copied to the clipboard. In this way, you may paste the results of Historical Data requests into non-DDE aware applications, using the normal Paste operation. Once again, this results in a STATIC copy of the data, and not a DDE link.

SAMPLES

classCONNECT/DDE comes with a set of sample programs, which demonstrate how classCONNECT/DDE may be used in conjunction with various other software packages, such as Microsoft Excel. These samples are contained in the "\samples" directory, which is created by the Setup program when you install classCONNECT/DDE. The "\samples" directory may also contain shortcuts and other useful programs that may make life easier when first learning to use classCONNECT/DDE.

To get a full description of the contents of the "\samples" directory, run the **Samples-Help** program in the classCONNECT/DDE program group.

Please note that these samples are provided only to illustrate techniques you may wish to use when writing your own programs and utilities. While some of the sample programs provided may be useful to you, they are not guaranteed to be error free, and care should be used when incorporating them into your own software applications.

SECTION 5 - GLOSSARY

GLOSSARY

DDE (Dynamic Data Exchange)

A Microsoft communications standard provided by MS Windows and supported by many applications.

Enhanced Data Collection System

The LAN-90 PCV database comprising a set of console tags whose values, states and other information are maintained in real-time.

Host (TCP/IP Host)

All computers running TCP/IP software are called TCP/IP Hosts.

LAN-90 Process Control View (PCV)

The software package comprising the operator console, data acquisition and local area network software developed and manufactured by Elsag Bailey Process Automation running on the QNX operating system.

ODBC (Open DataBase Connectivity)

ODBC is an open, vendor-neutral interface for database connectivity that provides access to a variety of PC, minicomputer and mainframe systems, including Windows-based systems and the Apple® Macintosh® in an easy, consistent manner. It has wide support from the leading database vendors, allowing access to virtually all databases, as well as many other vendors pledging ODBC support of their tools.

QNX

QNX is a the real-time operating system upon which LAN-90 PCV is built. QNX is provided by QNX Software Systems, Ltd.

TCP/IP (Transmission Control Protocol/ Internet Protocol)

A defacto standard used by most UNIX systems and available for MS Windows systems that allows dissimilar computer systems to exchange data electronically.

Winooski Library

The Windows Socket Library, or WinSock for short, is a library of functions used by applications software for communicating with remote computers using TCP/IP. The WinSock Dynamic Link Library (DLL) running on each MS Windows computer is supplied with the TCP/IP communications software, and must comply with the WinSock standard, as defined by Microsoft.

APPENDIX A - ENHANCED DATA COLLECTION SYSTEM (EDCS) OVERVIEW

INTRODUCTION

The LAN-90 PCV Enhanced Data Collection System (EDCS) is the component of PCV responsible for collecting, filtering and storing historical data. When classCONNECT/DDE makes requests for historical information from LAN-90 PCV, the data is served by the EDCS. The following section describes the rational and objectives of the EDCS, as well as briefly outlining its operation.

EVENT DATA VS. SAMPLED DATA

In the original LAN-90 PCV trending system (i.e., PCV 5.0 and earlier), trends were based on live values of a trended tag sampled at periodic intervals. Between samples, however, the tags value could change several times. This could sometimes lead to an aliasing effect, introduced into the sampled data by missing these intermediate changes.

The EDCS was created to record all changes to each tag's live value, and not just sample a tag's value at fixed intervals. Since changes occur at random times, a timestamp is recorded along with each change to a tag's live value. The combination of timestamp and recorded value is subsequently referred to as an "event".

FILTERING AND STATISTICS

The live collection component of the EDCS is capable of recording and storing a continuous stream of event data from the LAN-90 PCV's real-time Database. Event data for each tag must be streamed in ascending timestamp order. Another component of the EDCS handles any non-sequential timestamped event data.

The EDCS introduces the concept of historical collection classes to LAN-90 PCV. Each class defines the method of collecting, filtering, aging, storing and archiving event data for one or more tags. As shown in Figure A-1, the Historical Class Configuration Screen provides fields for each of these methods.

A class can be defined for a group of tags with common collection needs. Each tag in the group acquires the collection scheme when they are assigned to the class. Any change to the collection scheme is automatically inherited by the tags belonging to the class.

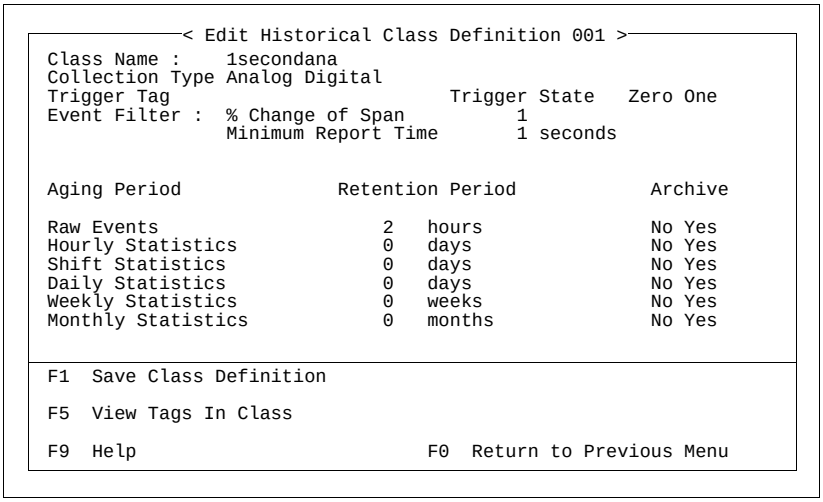

Figure A-1. Historical Class Configuration Screen

The EDCS defines three types of data collection: *analog, digital* and *manual/import.* Only certain of the historical class configuration fields are available with each collection type. Unavailable fields are dimmed on the Historical Class Configuration screen.

With *analog* collection, all fields are enabled to allow full collection capabilities. With *digital* collection, only the “Trigger Tag”, “Trigger State”, “Minimum Report Time” and “Raw Events” fields are enabled. The “% Change of Span” field is dimmed since a digital value has no span, only states. Statistics are not actively calculated for a digital. Only one *manual/import* collection class can be defined. As the name suggests, this collection type is meant for storing manually entered or imported event data which may not be in time stamp order. Only the Raw Events field is un-dimmed since no additional processing is done with the incoming event data other than storing and archiving.

Collection of event data can be continuous or triggered by the state of a digital tag. Specifying the Trigger Tag and the Trigger State lets you define which tag and the state that tag must be in to trigger data collection. When the Trigger Tag goes into its Trigger State, the current state of the Triggered tag is recorded. All events for the Triggered tag are then recorded until the Trigger Tag leaves its Trigger State, at which point a “No Data” event is recorded for the Triggered Tag, and event recording is stopped. No Data events are reported by classCONNECT/DDE with the same format as “Bad” values. When collecting, tags assigned to the analog and digital historical collection classes can also be filtered. A filtered event is generated only if the current event value compared with the last value (when or after the minimum report time has expired), has exceeded a percentage of the tags span.

For a station-type tag, separate filters are maintained for the process variable, set point, control output and ratio index. The % Change of Span and the Minimum Report Time fields allow you to define the filtering characteristics. Only analog value and digital change-of-state events are filtered; all other events (alarm, status, etc.,) bypass the filter and are always recorded.

The minimum report time filter "holds" events until the difference between the last recorded event and the current time equals or exceeds the filter time. Any events received while a filter is active overwrites the currently held event. Once the filter has expired, the held event is released with its original time stamp. This event is then recorded and treated as the last recorded event.

Statistics can be calculated for tags assigned to an analog-type collection class. If no filtering is defined, incoming raw events are used, otherwise, internal filtered events are used.

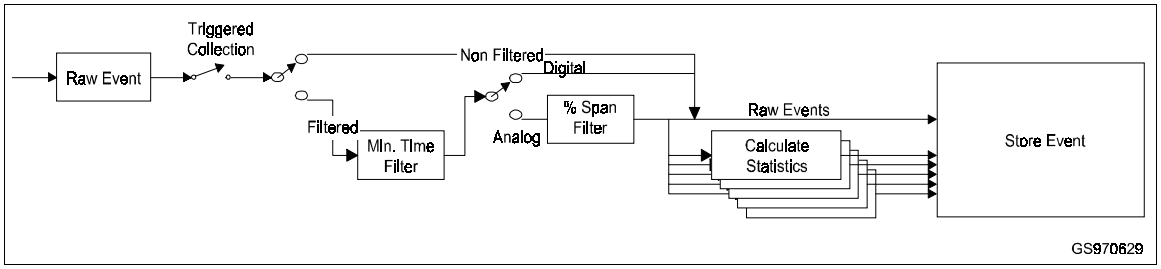

Figure A-2. EDCS Data Flow

STORAGE

If the retention period for the Historical Class is non-zero, events for each tag are cached in RAM until either the RAM buffer is filled or a maximum time has passed. Events are cached for quick look-ups by other components of the LAN-90 PCV system. When flushed, the events are stored by the Historical Storage Server to a file on the hard disk.

The storage server maintains hourly event files, for example, 10:00 to 11:00. Events are stored in ".ef" (event file) files until they are aged. An event file is aged half an hour after it is completed, so, for example the 10:00 - 11:00 file is aged at 11:30. Part of the aging cycle converts and shrinks the event file into a ".cef" (compressed event file) file. The next part of the aging cycle copies the events for tags which must be archived into another compressed event file. This archive event file is submitted to the archive management system. The final part of the aging cycle removes events from the compressed event files which exceed the retention period.

DATA RETRIEVAL

The EDCS provides many facilities for retrieving event data. Raw event data, periodic data and statistical data between a given start and end time can be retrieved. Periodic data is event data sampled over a given time. Statistics including percentage bad, number of events, sum, sum squared, minimum value and time and maximum value and time are calculated over a given time interval. A retrieval request can also be completed by retrieving event data from archives.

Event data exists in several places within the LAN-90 PCV system. The time period of the retrieval request determines which places are searched in order to complete the request.

Searches may be done on:

1. The memory cache within the live collection server. This area is searched only when the start time of the request is close to the current time.

2. On-line event files and compressed event files managed by the storage server. This area is examined when the search period is within the retention period.

3. Files being delivered to the archiver are placed into a temporary area until the archiver gets around to storing it. This temporary area is checked next, just in case the archiver is busy or off-line.

4. Archived event and imported trend files managed by the archive management system. This area is examined when the search period is beyond the current retention period. If the disk on which the needed archive files are found is mounted, the archived files are accessed directly in order to retrieve the events to complete the request. If the request indicates that off-line archived files should be searched, the retrieval system queries the archive catalog for a list of archived files and volumes on which the files are stored. If desired, the retrieval system then asks for the archive system to mount each volume one at a time. As each volume is mounted, the retrieval request is gradually completed.

When raw event data is requested, it is always requested over a certain period. The first event returned will always have a timestamp that is less than or equal to the requested start time. This is done so that the state of the tag at the requested start time can be determined. Events are then returned until either:

1. The requested number of events have been returned.

2. The requested end time has been reached.

3. There are no more recorded events to return.

If, for some reason, data is not available for a particular period of time, then a Bad Value event is returned indicating the start of the bad period.

When periodic event data is requested, the retrieval system samples the raw events. The first periodic event is the last event stored before the starting search time. The sample period is added to the start time to give a current search time. The next sample is the last event stored before the current search time. The period is successively added until the query is completed.

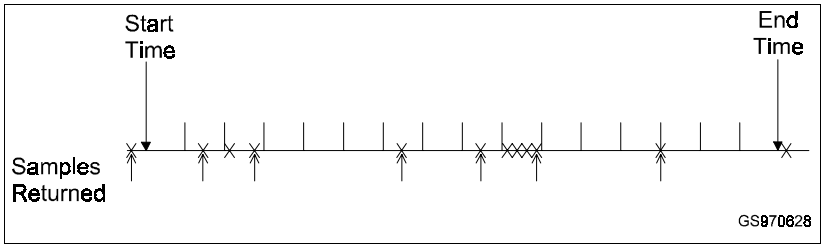

Figure A-3. Converting Events to Periodic Samples

NOTE: Periodic sample requests are not currently supported by classCONNECT/DDE.

The purposes of statistical calculations are to allow the user to query the EDCS for values useful in further calculations, as well as to permit the collection of values over a long period of time and reduce storage requirements. Even after raw events have been discarded by the EDCS, the Calculated values may be maintained. There are five time periods over which statistics are calculated: hour, shift*, day, week and month. Shorter periods may be requested, but these are derived from raw events at the time of the request. Longer periods are derived from the shorter ones. All times within the EDCS are recorded in milliseconds. Several statistical values are maintained for each period including:

- **Total number of events over the period** * - This value is simply incremented each time a new event (good or bad) occurs.
- **Minimum good value over the period** - During the period, the minimum and maximum values are recorded, as well as the times at which they occurred.
- **Time of minimum good value** *.
- **Maximum good value over the period.**
- **Time of maximum good value** *.

- **Amount of time the values were bad over the period** * - The amount of time that the tag was bad is recorded.

- **Weighted summation of the good values over the period** - This is calculated by the equation:

$$\sum_{k=1}^{n} V_k t_k$$

Where:

n	is the total number of samples.
k	is the sample number.
V_k	is the value of the kth sample.
t_k	is the duration over which the value stayed at V_k, in seconds.

The equation is the summation of each event's value multiplied by the length of time the event existed. The length of time the event existed is either the time since the last event or the beginning of the period.

- **Weighted summation of the good values squared over the period** - This is calculated by the equation:

$$\sum_{k=1}^{n} V_k^2 t_k$$

- The equation is the summation of each event's value squared multiplied by the length of time the event existed.

* Not supported by classCONNECT/DDE

To picture how weighting a value by time makes a difference to more complex calculations, the illustration below shows a hypothetical series of events. In this illustration, four events occur within a 60 second period.

Without taking time into consideration, the average for the events is:

$$\frac{20 + 30 + 20 + 10}{4} = 20$$

Taking time into consideration, the average is given by the equation below.

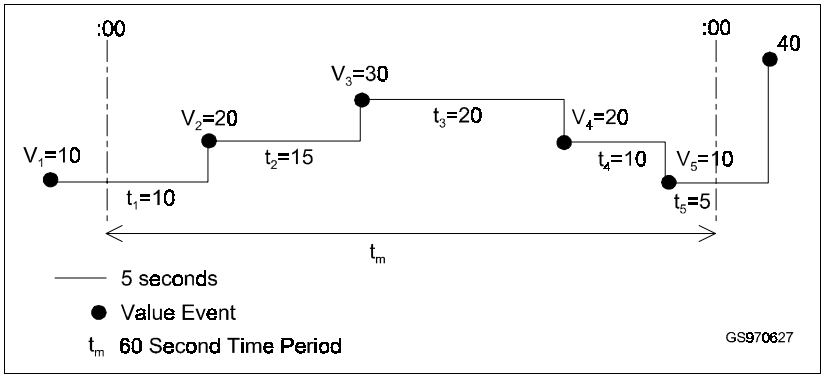

Figure A-4. Gather Calculations for a Hypothetical Series of Events

$$\frac{\sum_{k=1}^{n} V_k t_k}{t_m - t_b}$$

Where:

- t_m is the total amount of time in the period, in seconds.
- t_b is the total amount of time that the tag was bad during the period t_m, in seconds.

The numerator of the equation is the weighted sum of the values. The denominator is the amount of time the events were good over the period. All time durations are specified in seconds. From this equation, the average for the event is:

$$\frac{10x10 + 20x15 + 30x20 + 20x10 + 10x5}{60 - 0} = 20.83$$

From this example, it is clear that calculations weighted by time must be performed to provide accurate results for more complex calculations.

classCONNECT/DDE provides further calculations based on the ones supported by the EDCS:

- **% Bad over the period** - This number is calculated by classCONNECT/DDE by dividing the amount of bad time over the period by the total duration of the period.
- **Number of good samples over the period** - This number actually reflects the amount of time that the tag was good over the specified period, in seconds.

- **Average good value over the period** - The value is calculated by classCONNECT/DDE by dividing the weighted summation of good values over the period by the number of good samples over the period.

APPENDIX B - TROUBLESHOOTING

ODBC SETUP

Under normal conditions, the classCONNECT/DDE setup program will install the ODBC administrator and configure a data source for use by applications such as the Tag Wizard and the PCV DDE Server. If the ODBC software did not get installed properly, you may see one or more of the following problems when you try to start the Tag Wizard or the PCV DDE Server:

- The TagWizard and/or the PCV DDE Server will not start.
- They give an error like *unable to create empty document*.
- They display a dialog requesting the name of an ".mdb" file.

To correct these problems, follow these steps:

Step 1 Check for the ODBC Administrator

Check the MS Windows Program Manager for an ODBC group. If the group does not exist, then check under the Control Panel (found in the Main Program group).

If the ODBC Administrator icon (Figure B-1) is not found, then proceed to Step 2.

If the ODBC Administrator is found, run the ODBC Administrator and skip to Step 3.

Figure B-1. ODBC Administrator icon

Step 2 ODBC Administrator Is Not Installed

If the ODBC Administrator is not present in any program group or in the Control Panel, it is likely that it did not get installed. To install ODBC, insert the disk labeled classCONNECT/DDE - ODBC into your disk drive. Create a temporary directory on the drive that classCONNECT/DDE is installed on and copy the contents of the classCONNECT/DDE - ODBC disk to it.

From within the Command Shell or File Manager, go to the ODBC directory in this temporary directory and run the **setup.exe** program.

If setup fails to start correctly, copy the following files from your Windows directory into the current ODBC directory, and try again:

COMMDLG.DLL
CTL3D.DLL
VER.DLL
WINHELP.EXE
WINHELP.HLP

Once the ODBC setup has started, press **Continue** to continue with the installation. At the Install Drivers dialog (Figure B-2), select **Access Data (*.mdb)** and click **OK**.

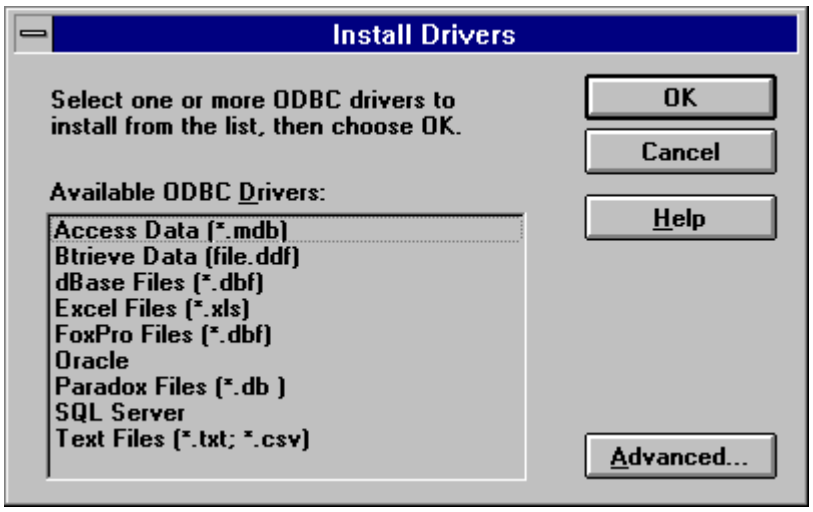

Figure B-2. ODBC Install Drivers Dialog

The setup program may ask if you want to update an older version of the driver if it did exist previously. If this happens, click **OK**.

After the ODBC files have been successfully installed, the setup will prompt you to set up a data source for the driver. Use the following steps to configure the data source for the ODBC setup dialogs.

Step 3 ODBC Administrator Is Installed - Checking the Data Source

If ODBC is being installed, or was already installed and being run, the Data Sources must be checked for the appropriate entry. To check the Data Source, view the ODBC Data Sources dialog (Figure B-2), and see if there is one called ***fielddef (Access Data (*.mdb)).***

If the ***fielddef*** entry already exists, skip to Step 7, otherwise continue to Step 4.

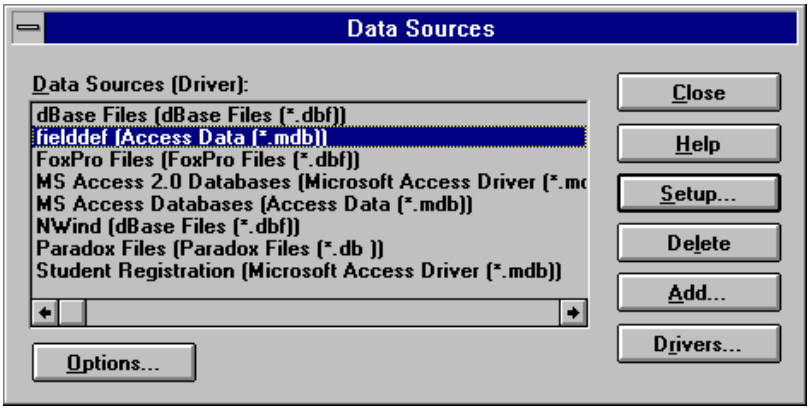

Figure B-3. ODBC Data Sources

Step 4 **Checking the Drivers**

If the "fielddef" data source is not configured, you will have to configure one. To do this, select **Add...** from the ODBC Data Sources dialog (Figure B-3). You will see the dialog shown in Figure B-4.

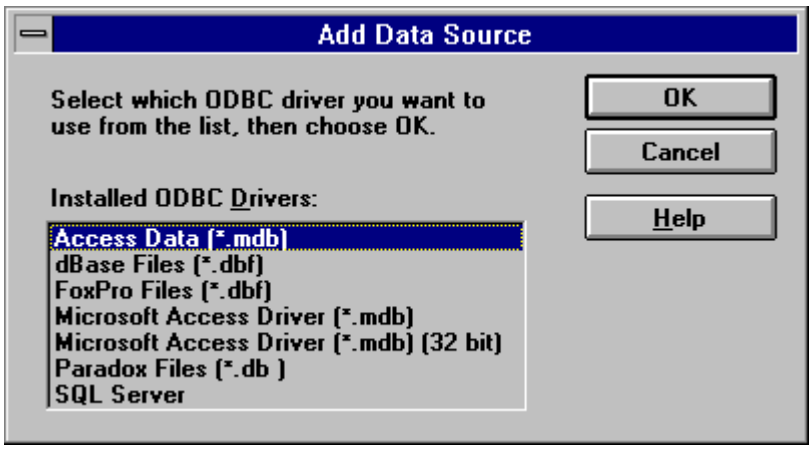

Figure B-4. Add Data Source Dialog

If the entry for Access Data exists, then skip to Step 6, otherwise continue to Step 5.

Step 5 **Adding the Access Data Driver**

If the ***Access Data (*.mdb)*** driver is not among the drivers listed in the Add Data Source dialog (Figure B-3), then click on **Cancel** and go back to the Data Sources dialog (Figure B-3). Click on the **Drivers...** button. You will see the Drivers dialog (Figure B-5).

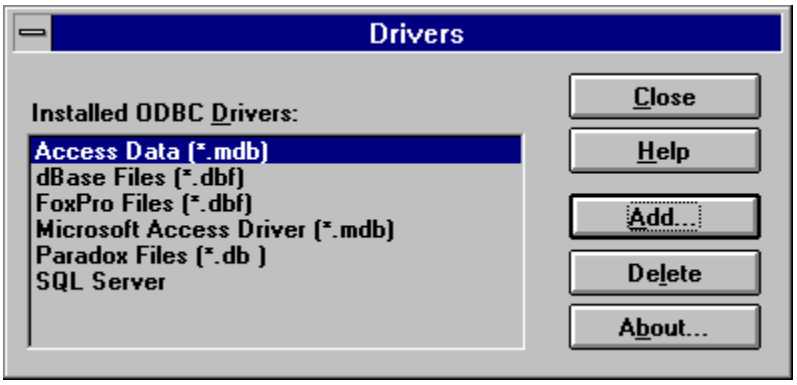

Figure B-5. ODBC Driver Selection

Click on the **Add...** button. This will prompt you for the location of the ODBC driver disk. This will be the classCONNECT/DDE - ODBC (disk 3) disk. If the drive is drive “a:”, the path will be “a:\ODBC”. If ODBC is being installed from a temporary directory, say “c:\temp”, then the path would be “c:\temp”. Once the drivers have been located, the Install Drivers dialog (as shown in Figure B-5) will be displayed.

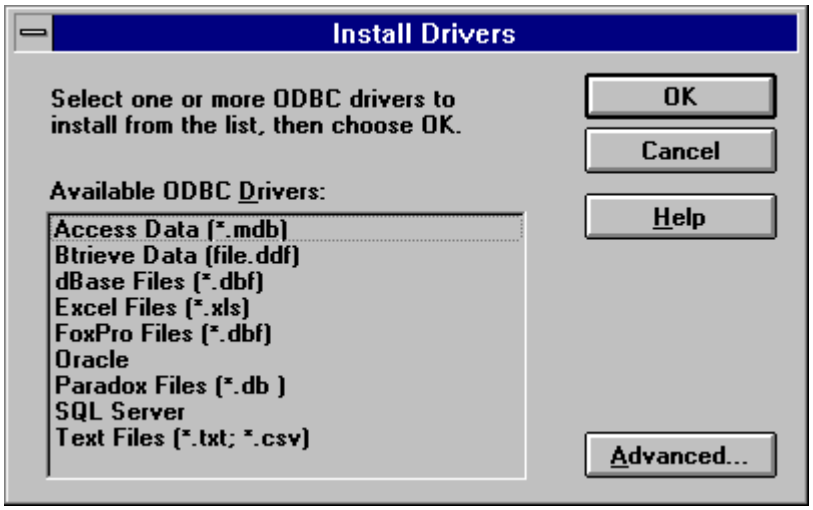

Figure B-6. ODBC Install Drivers Selection

Select the “Access Data (*.mdb)” driver and click **OK**. This will install the proper driver and you can continue with the data source setup. Click on **Close** from the Drivers dialog (Figure B-5). This will bring you back to the Data Sources dialog (Figure B-3). Select **Add...** again, and proceed to the next step.

Step 6 Adding the Data Source

From the Add Data Source dialog (Figure B-3), select **Access Data (*.mdb)** and click on **OK**. An empty version of the dialog in Figure B-6 will be displayed.

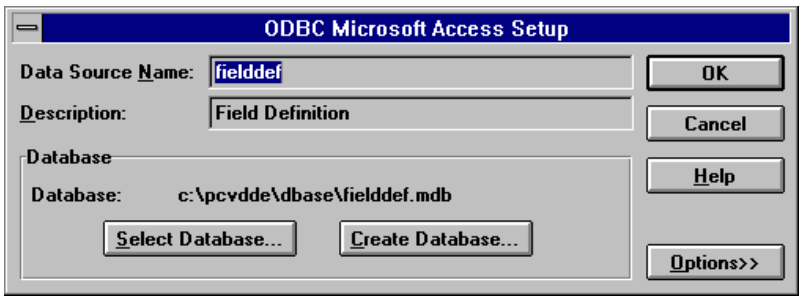

Figure B-7. ODBC Data Source Setup

The Data Source must be configured as shown in Figure B-6, with the Data Source Name "fielddef", and the Description "Field Definition". The Database must also be configured. This is done by clicking on **Select Database**. A dialog similar to Figure B-7 will be presented. Select the data source by selecting the drive that classCONNECT/DDE was installed on ("c:" or "d:"). Then select the "PCVDDE" directory, and the "DBASE" subdirectory. The database file "fielddef.mdb" should exist in this directory and should be the only database selected. Do not configure this data source with any other database file.

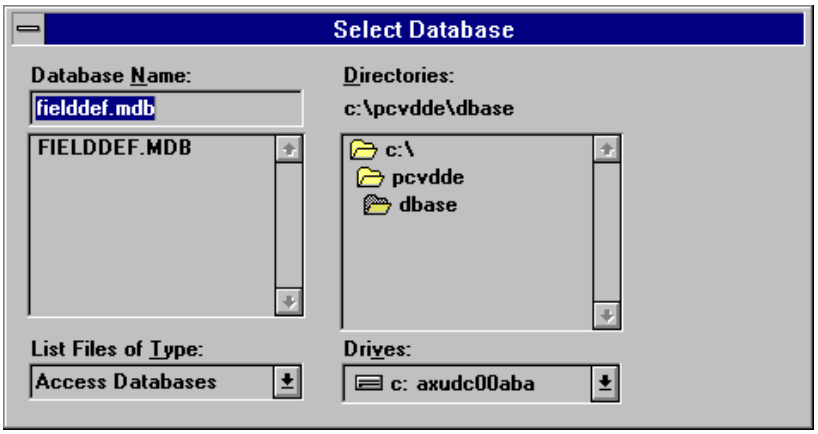

Figure B-8. Data Source Configuration

You have now completed the setup of the ODBC Data Source.

Step 7 Improperly Configured Data Source

If a "fielddef" entry already exists in the Data Sources dialog (Figure B-2), select it and click on **Setup....** The field definition database should be set up as shown in Figure B-6. Note that

the Database Source depends on where the classCONNECT/ DDE software was installed. Typically the database will be in “c:\pcvdde\dbase\fielddef.mdb”.

To change the database, click on **Select Database...** and select the database as described in Step 6, above.

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