Wonderware® Siemens 3964R I/O Server

User's Guide

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Wonderware

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Wonderware Siemens 3964R I/O Server

Introduction

The Wonderware® Siemens 3964R I/O Server (referred to as the server through the remainder of this user's guide) is a Microsoft® Windows® application program that acts as a communication protocol server. It allows other Windows application programs access to data within the SIMATIC® S5 and S7 family of PLCs (also referred to as devices). The server allows the PC to access a Siemens PLC through a CPU or CP which supports the 3964R protocol with RK512. While the server is primarily intended for use with Wonderware InTouch™ (version 3.01 or later), it may be used by any Microsoft Windows program capable of acting as a DDE, FastDDE, or SuiteLink™ client.

Communication Protocols

Dynamic Data Exchange (DDE) is a communication protocol developed by Microsoft to allow applications in the Windows environment to send/receive data and instructions to/from each other. It implements a client-server relationship between two concurrently running applications. The server application provides the data and accepts requests from any other application interested in its data. Requesting applications are called clients. Some applications such as InTouch and Microsoft Excel can simultaneously be both a client and a server.

FastDDE provides a means of packing many proprietary Wonderware DDE messages into a single Microsoft DDE message. This packing improves efficiency and performance by reducing the total number of DDE transactions required between a client and a server. Although Wonderware's FastDDE has extended the usefulness of DDE for our industry, this extension is being pushed to its performance constraints in distributed environments.

NetDDE™ extends the standard Windows DDE functionality to include communication over local area networks and through serial ports. Network extensions are available to allow DDE links between applications running on different computers connected via networks or modems. For example, NetDDE supports DDE between applications running on IBM® compatible computers connected via LAN or modem and DDE-aware applications running on non-PC based platforms under operating environments such as VMS™ and UNIX®.

SuiteLink uses a TCP/IP based protocol and is designed specifically to meet industrial needs such as data integrity, high-throughput, and improved diagnostics. This protocol standard is only supported on Microsoft Windows NT 4.0 and Windows 2000.

SuiteLink is not a replacement for DDE, FastDDE, or NetDDE. The protocol used between a client and a server depends on your network connections and configurations. SuiteLink was designed to be the industrial data network distribution standard and provides the following features:

- Value Time Quality (VTQ) places a time stamp and quality indicator on all data values delivered to VTQ-aware clients.

- Extensive diagnostics of the data throughput, server loading, computer resource consumption, and network transport are made accessible through the Microsoft Windows NT and Windows 2000 operating systems Performance Monitor. This feature is critical for the scheme and maintenance of distributed industrial networks.

- Consistent high data volumes can be maintained between applications regardless if the applications are on a single node or distributed over a large node count.

- The network transport protocol is TCP/IP using Microsoft's standard WinSock interface.

Accessing Remote Items via the I/O Server

The communication protocol addresses an element of data in a conversation that uses a three-part naming convention that includes the application name, topic name and item name. The following briefly describes each portion of this naming convention:

application name	The name of the Windows program (server) that will be accessing the data element. In the case of data coming from or going to Siemens equipment via this server, the application portion of the address is **S3964R**.
topic name	Meaningful names are configured in the server to identify specific devices. These names are then used as the topic name in all conversations to that device. For example, **S115U**.

> **Note** You can define multiple topic names for the same device (PLC) to poll different points at different rates.

item name	A specific data element within the specified topic. For example, when using this server, an item can be a relay, timer, counter, register, etc., in the PLC.

> **Note** The item/point names are predefined by the server. The term "point" is used interchangeably with the term "item" in this user's guide.

  ♿ For more information on item/point names, see the "Item Names" section later in this user's guide.

Configuring the I/O Server

Once the server has been installed, a small amount of configuration is required. Configuring the server automatically creates a configuration file named **S3964R.CFG**. This file stores the configuration information for the adapter cards or communication ports and all of the topic definitions (described in detail later).

The configuration file is automatically saved to the directory in which the server is installed unless a different directory is specified.

To perform the required configurations, start up the server by double-clicking on its icon. If the server starts up as an icon, double-click on the icon to open the server's window.

To access the options used for the various configurations, open the **Configure** menu:
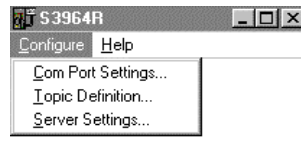
Note If any of the options appear grayed, then these options are not available with this software version.

Configuring a Communication Port

Use the **Communication Port Settings** option from the Configure Menu to configure the communication ports that will be used for communication with Siemens devices. When this option is selected, this dialog box will appear:

Communication Port Settings

Note All communication ports can be configured without leaving this dialog box. Repeat these steps; select a COM Port, set configuration, and click **Save**.

Select a communication port connected to the Siemens device.

Enter the amount of time (in seconds) that all PLCs connected via this communication port will be given to reply to commands from the server.

Note This timeout is sustained only when the PLC fails to respond. When the PLC is responding normally, there is no penalty. The default value of 1 second should be sufficient for most configurations.

Select the Baud Rate (serial bit rate) setting that matches the configuration of the Siemens device.
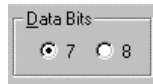
Select the number of Data Bits that matches the configuration of the Siemens device.

Select the number of Stop Bits that matches the configuration of the Siemens device. If the Baud Rate is greater than 300, the Stop Bits should be set to **1**.
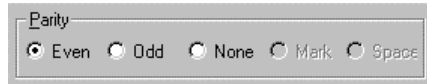
Select the Parity setting that matches the configuration of the Siemens device.

All devices on a single communication port must be configured with the same Baud Rate, Data Bits, Stop Bits, and Parity.

Click **Defaults** to reset the settings to their default values without saving changes.

Click **Save** to save settings for the selected COM Port. The dialog box will remain displayed giving you the option to configure additional COM Ports.

Click **Done** to close the dialog box. If the settings have not been saved, the following dialog box will appear:

Click **Yes** to save settings for the COM Port.

Click **No** to prevent saving the settings.

Click **Cancel** to return to the **Communication Port Settings** dialog box without saving the settings.

Note For most of these settings only one setting is allowed. All other possibilities are disabled.

Saving the I/O Server's Configuration File

If a configuration file does not currently exist in the configuration file directory, the server will automatically display the **Save Configuration** dialog box:
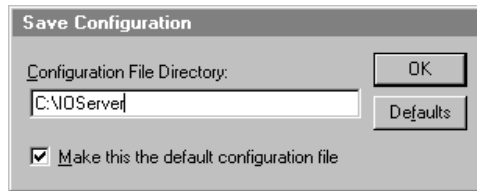
Save Configuration
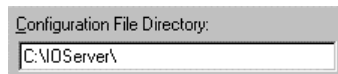
This field displays the drive\directory into which the server will save the current configuration file. To save the configuration file to a different directory, enter the path for that directory in this field.
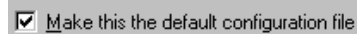
This option is selected and disabled on initial entry to the **Save Configuration** dialog box. This field becomes active if the Configuration File Directory is changed. Once enabled, selecting this option will record a new Configuration File path in the **WIN.INI** file. This option allows the server to find its configuration file automatically each time it is started.

Note When the server initially starts up, it attempts to locate its default configuration file by first checking the **WIN.INI** file for a previously specified path. If a path is not present in the **WIN.INI** file, the server will assume that the current working directory is to be used.

Click **Defaults** to reset the settings to their default values without saving changes.

Click **OK** to save the configuration file to the specified directory.

Saving Multiple Configuration Files

There is no limit to the number of configuration files that you can create as long as they are saved in separate directories. However, all cfg files must have the name S3964R.CFG. This allows you to have multiple configuration files that can be accessed by using a special switch (/d:). For example, to start the server using a configuration file located in a different directory, click the **Start** button on the Taskbar, then choose **Run** and enter the following in the **Open** combo box:

S3964R /d:c:\directoryname

Configuring a Topic Definition

Use the **Topic Definition** option from the Configure menu to create new, modify, or delete topic definitions. One or more topic definitions must exist for each PLC that the server will communicate with. Each topic definition must contain a unique name for the PLC associated with it. When this option is selected, the **Topic Definition** dialog box will appear:
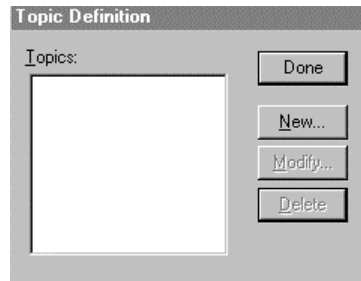
Topic Definition

Note Once topics have been defined, their names will be listed in the **Topics** section of this dialog box.

Click this button to close the dialog box and accept any new definitions, modifications or deletions made.

To modify or view an existing topic definition, select its name in the list and click on this button. The **S3964R Topic Definition** dialog box (described below) will appear displaying the selected topic definition.

To delete an existing topic definition, select its name in the list and click on this button. (A message box will appear prompting you to confirm the deletion.)

To add a new topic definition, click on this button. The **S3964R Topic Definition** dialog box will appear:

S3964R Topic Definition

Enter a unique name (up to 32-characters long with the first character being alphabetic) for the PLC in this field.

Note When communicating with InTouch, this **exact** name is used as the topic name in the Access Name definition.

The communications port currently associated with this topic will appear in this field. To select a different port, click on the down arrow to open the list of communication ports. Click on the name of the communications port to be associated with this topic.

Enter the address on the communications card in the PLC chassis.

Enter the frequency (in milliseconds) that the server will read (poll) the items/points associated with this topic.

Set the option S7 Item Syntax on if you want to use this syntax insted of S5 Item syntax (e.g. if connecting to Step 7 PLC's).

Optimized Writes ☐

Set the option Optimized Writes on if you want to increase the speed of poking and don't need to retain the poke order.

Forced Read Modify Write ☐

Set the option Forced Read Modify Write on if you want to have a polling before every poke of Bits or Bytes. If this option is switched of only the first value will be polled and combined with the following pokes.

Note Different items/points can be polled at different rates by defining multiple topic names for the same PLC and setting different update rates for each topic.

Once all the entries have been made, click on the **OK** button to accept the entries and close the dialog box. Click on the **Cancel** button to close the dialog box without saving changes. The **Topic Definition** dialog box will reappear:
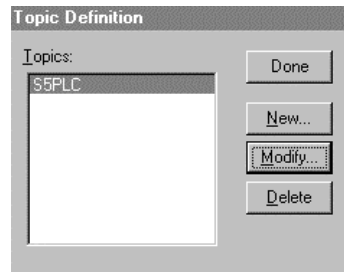
Click **Done** to close the dialog box.

Configuring the I/O Server Settings

Use the **Server Settings** option from the Configure menu to change the protocol timer, network using Wonderware NetDDE, change the default configuration file path, or to enable the server to start automatically as a Windows NT service.

Note When configuring the server on Windows NT, the user must be logged on with system administrator privileges. This will ensure that updates to the system registry may be performed.

When the **Server Settings** option is selected, the **Server Settings** dialog box will appear:
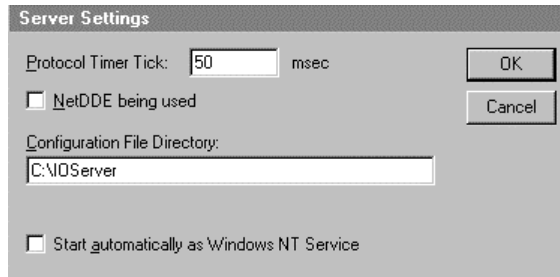
Server Settings

Enter the frequency (in milliseconds) that the server is to check for data to process. This should be approximately two to four times faster than the fastest rate desired to update data from the equipment.

Note The default protocol timer tick value will vary between servers.

Select this option if you are networking using Wonderware NetDDE.

To create a new default configuration file, enter the complete path for the directory in which the file is to be saved in this field. This new path will automatically be written to the **WIN.INI** file and the server will use this path to load its configuration file the next time it is started.

Note There is no limit to the number of configuration files created. However, each must be saved in a different directory. When using the server with InTouch, we recommend that you save the configuration file in your application directory. For more information on the Configuration File, see "Saving the I/O Server's Configuration File" in this user's guide.

☐ Start automatically as Windows NT Service

Enabling this option will cause the server to start as a Windows NT service.

Windows NT offers the capability of running applications even when a user is not logged on to the system. This is valuable when systems must operate in an unattended mode. Enabling this option and rebooting the system will cause the server to run as a Windows NT service. However, to view configuration information or to reconfigure the server, the user must log on to the system. Any server related problems that may arise such as missing adapter cards, licensing failures or device drivers not loading will not be visible to the user until a log on is performed. Disabling this option and rebooting the system will cause the server to run as a Windows NT application program once again.

Note It is highly recommended that the server is configured and communicating successfully prior to running it as a Windows NT service.

Click **Cancel** to close the dialog box without saving changes.

Click **OK** to accept the server settings. The following message box will appear:

Changes have been applied. They will take effect the next time the server is started.
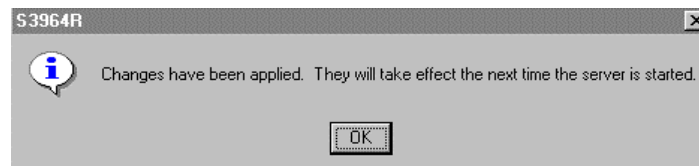
Click **OK** to close the dialog box.

Note You must restart the server for the changes to take effect.

Accessing I/O Server Help

The Help menu contains three options that are used to access help for the server.

The following briefly describes the Help menu options.

Contents

This option is used to display the table of contents for the Help file.

How to Use Help

This option is used to access a list of basic instructions for using the Help file.

About S3964R

This option is used to access miscellaneous information regarding the server, such as the software version, the copyright information, license information, etc.

Your FactorySuite system license information can be viewed through the license viewing utility that is launched from the **About** dialog box.

For more information on the license viewing utility, see your FactorySuite System Administrator's Guide.

Item Names (S5 Item Syntax)

The Siemens 3964R I/O Server supports item/point names that are consistent with the point naming convention used by Siemens 3964R CPs. The tables below list the item/point names supported by the server:

Data Blocks/Extended Range Data Blocks

Data Format	Items		Suffix	Tag Type	Range
Bit	D<B,X>*m*	D*n*.*b*		Discrete	0 or 1
String	D<B,X>*m*	S*n*.*z*		Message	2 to 128
Left Byte	D<B,X>*m*	DL*n*		Integer	0 to 255
			KF	Integer	-128 to 127
Right Byte	D<B,X>*m*	DR*n*		Integer	0 to 255
			KF	Integer	-128 to 127
Word	D<B,X>*m*	DW*n*		Integer	0 to 65535
			KF	Integer	-32768 to 32767
			BCD	Integer	-999 to 999
			KC	Integer	0 to 999
			KT	Message	0.0 to 999.3
Double Word	D<B,X>*m*	DD*k*		Integer	-2147483648 to 2147483647
			BCD	Integer	-9999999 to 9999999
			KG	Real	floating point

Note All data blocks are Read/Write (*m*=2 to 255, *n*= 0 to 255, *b*=0 to 15, *k*= 0 to 254, *z*=length of character string). The string must contain an even number of characters, e.g., 2, 4, 100, 128, etc.

Flags

Data Format	Items	Suffix	Tag Type	Range
Bit	F*m.b*		Discrete	0 or 1
	M*m.b*		Discrete	0 or 1
Byte	FY*m*		Integer	0 to 255
	FB*m*		Integer	0 to 255
	MB*m*		Integer	0 to 255
		KF	Integer	-128 to 127
Word	FW*n*		Integer	0 to 65535
	MW*n*		Integer	0 to 65535
		KF	Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		KC	Integer	0 to 999
		KT	Message	0.0 to 999.3
Double Word	FD*k*		Integer	-2147483648 to 2147483647
	MD*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999
		KG	Real	floating point

Note All flags are Read Only (*m*= 0 to 255, *n*= 0 to 254, *b*= 0 to 7, *k*= 0 to 252).

Inputs

Data Format	Items	Suffix	Tag Type	Range
Bit	*In.b*		Discrete	0 or 1
	E*n.b*		Discrete	0 or 1
Byte	IB*n*		Integer	0 to 255
	EB*n*		Integer	0 to 255
		KF	Integer	-128 to 127
Word	IW*m*		Integer	0 to 65535
	EW*m*		Integer	0 to 65535
		KF	Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		KC	Integer	0 to 999
		KT	Message	0.0 to 999.3
Double Word	ID*k*		Integer	-2147483648 to 2147483647
	ED*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999

Note All Inputs are Read Only (*n*= 0 to 127, *m*= 0 to 126, *k*= 0 to 124, *b*= 0 to 7).

Outputs

Data Format	Items	Suffix	Tag Type	Range
Bit	Q*n.b*		Discrete	0 or 1
	A*n.b*		Discrete	0 or 1
Byte	QB*n*		Integer	0 to 255
	Ab*n*		Integer	0 to 255
		KF	Integer	-128 to 127
Word	QW*m*		Integer	0 to 65535
	AW*m*		Integer	0 to 65535
		KF	Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		KC	Integer	0 to 999
		KT	Message	0.0 to 999.3
Double Word	QD*k*		Integer	-2147483648 to 2147483647
	AD*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999

Note All Outputs are Read Only (*n*= 0 to 127, *m*= 0 to 126, *k*= 0 to 124, *b*= 0 to 7).

System Data Area

Data Format	Items	Suffix	Tag Type	Range
Word	RS*n*		Integer	0 to 65535
	BS*n*		Integer	0 to 65535
		KF	Integer	-32768 to 32767
		BCD	Integer	-999 to 999
		KC	Integer	0 to 999
		KT	Message	0.0 to 999.3

Note All System Data Area types are Read Only (*n*= 0 to 255).

Absolute Address

Data Format	Items	Suffix	Tag Type	Range
Word	AS*h*		Integer	0 to 65535
		KC	Integer	0 to 999
		KT	Message	0.0 to 999.3

Note All Absolute Addresses are Read Only (*h*= 0 to FFFF (hex)).

Timers

Data Format	Items	Suffix	Tag Type	Range
Word	T*n*		Real	0.0 to 9990.0

Note All Timers are Read Only (*n*= 0 to 255).

Counters

Data Format	Items	Suffix	Tag Type	Range
Word	C*n*		Integer	0 to 65535
	Z*n*		Integer	0 to 65535

Note All Counters are Read Only (*n*= 0 to 255).

Item/Point Naming Examples

The following examples show the correct format for item/point names:

DB11DW7BCD
> data block 11
> data word 7
> value in controller is represented in BCD and has a range of -999 to 999

DX87DL14KF
> extended range data block 87
> left byte of data word 14
> value in controller is binary and has a range of -128 to 127

DB87DR14
> data block 87
> right byte of data word 14
> value in controller is binary and has a range of 0 to 255

FD17KG   or   **MD17KG**
> flag double word 17
> value in controller is binary floating point

I106.3   or   **E106.3**
> bit 3 of input byte 106

FW29KC   or   **MW29KC**
> flag word 29
> value in controller is in counter constant format

DB7DW55KT
> data block 7
> data word 55
> value in controller is in timer constant format

DB5S6.10
> data block 5
> starting data word 6
> 10 character strings

T5
> timer 5
> value in controller is in timer constant format

C20
> counter 20
> value in controller is in counter constant format

Note Do not enter blank spaces in the item names.

Item Names (S7 Item Syntax)

The Siemens 3964R I/O Server supports the S7 item/point names that will be translated internal into S5 item/point names. This means not all S7 items/points can be used by this server. The tables below list the item/point names supported by the server:

Data Blocks

Data Format	Items	Suffix	Tag Type	Range
Bit	D<B>*x*,X*m.b*		Discrete	0 or 1
String	D<B>*x*,S*m,z*		Message	2 to 128
	D<B>*x*,STRING*m,z*		Message	2 to 128
Byte	D<B>*x*,B*m*		Integer	0 to 255
	D<B>*x*,BYTE*m*		Integer	0 to 255
Char	D<B>*x*,CHAR*m*		Integer	-128 to 127
Word	D<B>*x*,W*n*		Integer	0 to 65535
	D<B>*x*,WORD*n*		Integer	0 to 65535
		KT	Message	0.0 to 999.3
Integer	D<B>*x*,INT*n*		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
Double Word	D<B>*x*,D*k*		Integer	0 to 2147483647
	D<B>*x*,DWORD*k*		Integer	0 to 2147483647
Double Integer	D<B>*x*,DINT*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-2147483648 to 2147483647
Real	D<B>*x*,REAL*k*		Real	+-3.4e38

Note All data blocks are Read/Write (*x*=3 to 255, *m*= 0 to 255, *b*=0 to 7, *n*= 0 to 254, *k*=252, *z*=length of character string, *n* and *k* must be even). The string must contain an even number of characters, e.g., 2, 4, 100, 128, etc.

Flags

Data Format	Items	Suffix	Tag Type	Range
Bit	FX*m.b*		Discrete	0 or 1
	MX*m.b*		Discrete	0 or 1
Byte	FB*m*		Integer	0 to 255
	MB*m*		Integer	0 to 255
	FBYTE*m*		Integer	0 to 255
	MBYTE*m*		Integer	0 to 255
Char	FCHAR*m*		Integer	-128 to 127
	MCHAR*m*		Integer	-128 to 127
Word	FW*n*		Integer	0 to 65535
	MW*n*		Integer	0 to 65535
	FWORD*n*		Integer	0 to 65535
	MWORD*n*		Integer	0 to 65535
		KT	Message	0.0 to 999.3
Integer	FINT*n*		Integer	-32768 to 32767
	MINT*n*		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
Double Word	FD*k*		Integer	0 to 2147483647
	MD*k*		Integer	0 to 2147483647
	FDWORD*k*		Integer	0 to 2147483647
	MDWORD*k*		Integer	0 to 2147483647
Double Integer	FDINT*k*		Integer	-2147483648 to 2147483647
	MDINT*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999
Real	FREAL*k*		Real	+-3.4e38
	MREAL*k*		Real	+-3.4e38

Note All flags are Read Only (*m*= 0 to 255, *b*= 0 to 7, *n*= 0 to 254, *k*= 0 to 252).

Inputs

Data Format	Items	Suffix	Tag Type	Range
Bit	I*m.b*		Discrete	0 or 1
	E*m.b*		Discrete	0 or 1
	IX*m.b*		Discrete	0 or 1
	EX*m.b*		Discrete	0 or 1
Byte	IB*m*		Integer	0 to 255
	EB*m*		Integer	0 to 255
	IBYTE*m*		Integer	0 to 255
	EBYTE*m*		Integer	0 to 255
Char	ICHAR*m*		Integer	-128 to 127
	ECHAR*m*		Integer	-128 to 127
Word	IWw*nn*		Integer	0 to 65535
	EWw*nn*		Integer	0 to 65535
	IWORD*n*		Integer	0 to 65535
	EWORD*n*		Integer	0 to 65535
		KT	Message	0.0 to 999.3
Integer	IINT*n*		Integer	-32768 to 32767
	EINT*n*		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
Double Word	ID*kn*		Integer	0 to 2147483647
	EDd*nk*		Integer	0 to 2147483647
	IDWORD*k*		Integer	0 to 2147483647
	EDWORD*k*		Integer	0 to 2147483647
Double Integer	IDINT*k*		Integer	-2147483648 to 2147483647
	EDINT*k*			-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999

Note All Inputs are Read Only (*m*= 0 to 255, *b*= 0 to 7, *n*= 0 to 254, *k*= 0 to 252).

Outputs

Data Format	Items	Suffix	Tag Type	Range
Bit	Q*m.b*		Discrete	0 or 1
	A*m.b*		Discrete	0 or 1
	QX*m.b*		Discrete	0 or 1
	AX*m.b*		Discrete	0 or 1
Byte	QB*m*		Integer	0 to 255
	AB*m*		Integer	0 to 255
	QBYTE*m*		Integer	0 to 255
	ABYTE*m*		Integer	0 to 255
Char	QCHAR*m*		Integer	-128 to 127
	ACHAR*m*		Integer	-128 to 127
Word	QWw*nn*		Integer	0 to 65535
	AWw*nn*		Integer	0 to 65535
	QWORD*n*		Integer	0 to 65535
	AWORD*n*		Integer	0 to 65535
		KT	Message	0.0 to 999.3
Integer	QINT*n*		Integer	-32768 to 32767
	AINT*n*		Integer	-32768 to 32767
		BCD	Integer	-999 to 999
Double Word	QD*kn*		Integer	0 to 2147483647
	ADd*nk*		Integer	0 to 2147483647
	QDWORD *k*		Integer	0 to 2147483647
	ADWORD *k*		Integer	0 to 2147483647
Double Integer	QDINT*k*		Integer	-2147483648 to 2147483647
	ADINT*k*		Integer	-2147483648 to 2147483647
		BCD	Integer	-9999999 to 9999999

Note All Outputs are Read Only (*m*= 0 to 255, *b*= 0 to 7, *n*= 0 to 254, *k*= 0 to 252).

Timers

Data Format	Items	Suffix	Tag Type	Range
Word	TREAL*n*		Real	0.0 to 9990.0

Note All Timers are Read Only (*n*= 0 to 255).

Counters

Data Format	Items	Suffix	Tag Type	Range
Word	C*n*		Integer	0 to 65535
Word	Z*n*		Integer	0 to 65535

Note All Counters are Read Only (*n*= 0 to 255).

Item/Point Naming Examples

The following examples show the correct format for item/point names:

DB20,X6.1
　　S7 item corresponds to S5 item DB20D3.9

DB20,X7.1
　　S7 item corresponds to S5 item DB20D3.1

DB100,B4
　　S7 item corresponds to S5 item DB100DL2

DB100,B5
　　S7 item corresponds to S5 item DB100DR2

DB100,CHAR8
　　S7 item corresponds to S5 item DB100DL4KF

DB30,W10
　　S7 item corresponds to S5 item DB30DW5

DB40,INT20
　　S7 item corresponds to S5 item DB40DW10KF

DB100,D4
　　S7 item corresponds to S5 item DB100DD2

DB100,DINT4BCD
　　S7 item corresponds to S5 item DB100DD2BCD

DB100,REAL4
　　S7 item correspont to S5 item DB100DD2KG

FDINT17　　or　　**MDINT17**
　　S7 item corresponds to S5 item FD17

IDINT17　　or　　**EDINT17**
　　S7 item corresponds to S5 item ID17

Note Do not enter blank spaces in the item names.

Monitoring the Status of Communications with a PLC

For each topic name (PLC), there is a built-in discrete item that can be used to monitor the status of communications with the PLC. The discrete item, **Status,** is set to **0** when communication with the PLC fails and is set to **1** when communication is successful.

Using the Status Item in Excel

The status of the PLC communications can be read into Excel by entering the following DDE reference formula in a cell on a spreadsheet:

=S3964R|S115U!Status

where:

S3964R	Is the server application name.
S115U	Is the exact topic name defined in the server for the PLC.
Status	Built-in discrete item used to monitor the status of communications with the PLC.

Monitoring the Status of Communications with InTouch

InTouch supports built-in topic names called DDEStatus and IOStatus that are used to monitor the status of communications between the server and InTouch. For more information on the built-in topic names DDEStatus and IOStatus, see your online "InTouch User's Guide".

Using DDEStatus and IOStatus in Excel

The status of communication between the server and InTouch can be read into Excel by entering the following DDE reference formula in a cell on a spreadsheet:

=view|DDEStatus!S115U

or

=view|IOStatus!S115U

where:

View	Is the name of the InTouch View application.
[DDE][IO]Status	Built-in topic name used to monitor the status of communications between the server and InTouch.
S115U	The exact topic name defined in the server for the PLC.

Reading Values from the I/O Server into Excel

Values may be read directly into Excel spreadsheets from the server by entering a DDE formula into a cell using the following format:

=applicationname|topicname!itemname

Example formula:

=S3964R|S115U!DB10DW20KF

where:

S3964R	Is the name of the server application name.
S115U	Is the exact topic name defined in the server for the PLC.
DB10DW20KF	Is the actual location in the PLC that contains the data value. This is the item name.

In this example, each time the value of **DB10DW20KF** changes in the PLC, the server will automatically send the new value to the cell containing the formula in Excel.

Note Refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Writing Values to the I/O Server from Excel

Values may be written to the server from Microsoft Excel by creating an Excel macro that uses the **POKE** command. The proper command is entered in Excel as follows:

channel=INITIATE("applicationname","topicname")

=POKE(channel,"itemname", Data_Reference)

=TERMINATE (channel)

=RETURN()

The following describes each of the above **POKE** macro statements:

channel=INITIATE("applicationname","topicname")

Opens a channel to a specific topic name (defined in the server) in a particular application name (the executable name less the .EXE) and assigns the number of that opened channel to **channel.**

Note By using the **channel=INITIATE** statement the word **channel** must be used in the **=POKE** statement instead of the actual cell reference. The **"applicationname"** and **"topicname"** portions of the formula must be enclosed in quotation marks.

=POKE(channel,"itemname", Data_Reference)

POKEs the value contained in the **Data_Reference** to the specified item name (actual location in the PLC) via the **channel** number returned by the previously executed **INITIATE** function. **Data_Reference** is the row/column ID of the cell containing the data value.

=TERMINATE(channel)

Closes the channel at the end of the macro. Some applications have a limited number of channels therefore, they should be closed when finished. **Channel** is the channel number returned by the previously executed **INITIATE** function.

=RETURN()

Marks the end of the macro.

Note Refer to the **.XLM** sample Excel poke macro provided on the server program disk. Also refer to the Microsoft Excel manual for complete details on entering Remote Reference formulas for cells.

Troubleshooting I/O Server Communication Problems

This section provides you with some simple steps that can be taken to ascertain and correct communication problems. The problems described here represent the most probable causes of communication failure.

Note This is a general troubleshooting guide and for the sake of brevity we cannot cover every possible source of communication problems.

Debugging Communication Between InTouch and an I/O Server

This section explains the most common error situations that can occur when attempting to establish communication between InTouch and a server.

Servers are Window applications that communicate with I/O, PLCs, and/or other data sources. If a server supports either the Microsoft Dynamic Data Exchange (DDE) or the Wonderware SuiteLink protocol, it is capable of communicating with the Wonderware InTouch program.

Note All Wonderware Version 7.0 or later servers support both DDE and SuiteLink. However, the SuiteLink protocol is only supported on the Windows NT (Version 4.0 or later) operating system.

Servers respond to data requests made by other applications. Requesting applications are called clients. When WindowViewer acts as a client and requires the value of an item, it contacts the server and requests the item's value. The server will report the value and update WindowViewer only if a change occurs. All WindowViewer data requests provide information relating an item to a register, coil number, or I/O data point understood by the server. The server uses the information to automatically handle all messages to and from I/O, hardware devices (PLC), and/or other data sources.

Note We highly recommend starting all the servers required by the InTouch application before starting WindowViewer. InTouch (versions prior to 7.0) will display the **Initiating DDE Conversation** message box for each uninitiated conversation.

For example:

> If you start up WindowViewer and cannot successfully establish a conversation with a server, the following Initiating DDE Conversation dialog box will appear:
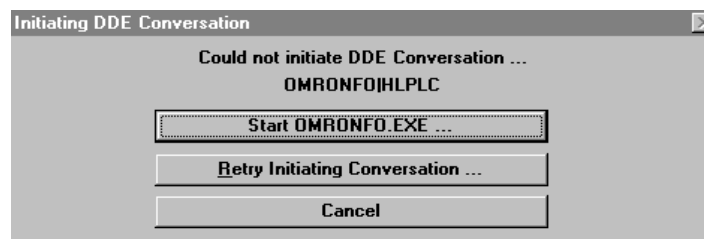
The information in the second line indicates that you have at least one I/O type tagname defined in your Tagname Dictionary that is associated with an Access Name that defines OMRONFO as the Application Name, and HLPLC as the Topic Name. Make note of exactly how the application and topic names are spelled.

⍟ This example only applies when using a version of InTouch prior to InTouch 7.0.

To troubleshoot communication problems between WindowViewer and the server, perform the following steps as listed below.

➢ **Verify the I/O Server is running.**

1. Start the server program.

2. Verify the server is running by checking to see if it is in the Windows Task List.

   On Windows NT, click the right mouse button on the Windows Taskbar and select Task Manager from the menu. Click the Applications tab to view all currently running applications. Or press the CTRL+SHIFT+ESC keys.

   On Windows 95, press the ALT+TAB keys while holding down the ALT key.

   On Windows 3.1 or Windows for Workgroups, press the CTRL+ESC keys.

➢ **If the I/O Server is running, verify the I/O Server's program name is correct in all WindowMaker Access Name definitions.**

1. Switch to (or start) WindowMaker. Select Access Names from the Special Menu, the Access Name Definitions dialog box appears listing all Access Names defined in the WindowMaker.

2. In the Access Names list, select the Access Name referencing the server and click Modify. The Modify Access Name dialog box will appear.

3. Verify the server's program name in the Application Name box is correct. If it is wrong then correct it and click OK , else click Cancel.

   ⍟ The server's exact "executable name" <u>must</u> be typed in the Application Name box in all Access Name definitions. The ".exe" extension is <u>not</u> used.

   ⍟ If you are debugging a remote tagname reference, also verify that the node name for the remote computer in the Node Name box is correct.

4. Repeat steps 2 & 3 and verify the server program name is correct in all Access Names that use it.

➢ **If you still cannot establish a conversation, verify the exact topic name used in the WindowMaker Access Name definitions are defined in the I/O Server program.**

1. Close WindowViewer if it is running. (The server cannot be configured if WindowViewer is running.)

2. Start the server program.

3. From the server's Configure menu, select Topic Definition, the Topic Definition dialog box appears listing all topic names defined in the server.

4. Verify that the topic name exists and is spelled <u>exactly</u> the same (including spaces) as the topic name referenced in the WindowMaker Access Name definition.

   ⍟ Blank spaces cannot follow the topic name in either the server's Topic Definition or the Access Name definition.

5. If the topic name is different, either correct it in the server or switch to WindowMaker and correct it in the Access Name definition.

6. Once you performed the above procedure, restart WindowViewer and switch to the server program. Data should now appear in the server's program window to indicate that WindowViewer and the server are communicating.

    [↷] The data in the server's program window indicates the read and write messages that the server is sending to and receiving from the PLC. (These are not error messages, only status messages are written to the server's program window.)

7. If no data appears in the server's program window, switch to the Wonderware Logger to check for error messages. For example, a common error message is:

    "Error for DDE: OMRONFO|HLPLC!<null>("item") Advise failed"

    This message appears when the item defined in one or more tagnames is invalid for the server.

    [↷] InTouch tagnames use specific naming conventions when accessing data from a server. The valid item names for all Wonderware servers are documented in their respective User's Guides. Typically, the item naming conventions used by each server are consistent with the names used by the equipment manufacturer.

    [↷] For more information on the Wonderware Logger, see your online "FactorySuite System Administrator's Guide."

➢ **If you are still experiencing problems, continue with the following troubleshooting section.**

Debugging Communication Between SuiteLink and an I/O Server

If you have successfully applied the debug techniques listed in the previous section and are still experiencing communication problems to a server that is attempting to communicate using the SuiteLink protocol, perform the following steps as listed below:

➢ **Verify the I/O Server supports the Wonderware SuiteLink protocol, that is, the I/O Server is version 7.0 or above.**

➢ **Try communicating to the I/O Server using the DDE protocol. If this is not possible, then proceed to the next troubleshooting section otherwise continue with the following steps:**

1. Verify Microsoft's TCP/IP stack is installed and configured properly.

    [↷] SuiteLink uses the Microsoft TCP/IP stack for its communications even if the client application and the server reside on the same node.

2. If you do not have an Ethernet card to bind to the TCP/IP stack, install the Microsoft Loop Back Adapter.

3. Install the Microsoft TCP/IP stack.

Debugging Communication Between an I/O Server and a PLC

This section provides you with simple steps to diagnose and correct server to PLC communication problems. The debug techniques listed below address both serial and board servers. Disregard any information that is not applicable to the server type that you are using.

When attempting to establish communication between a server and a PLC, if no data appears in the server's program window and the data items are not updating in WindowViewer, switch to the Wonderware Logger and check for error messages.

  ✍ For more information on the Wonderware Logger, see your online "FactorySuite System Administrator's Guide."

For example, some of the most common errors that may appear in the Wonderware Logger for serial servers are:

    Response Timeout
    WCRET =-2
    WakeUp=-2
    Receive Overrun
    Framing Errors

Note Unless specified otherwise, most serial communication based servers are full duplex. If you require a server for half duplex (one that monitors the CTS and RTS lines) or if you are not sure whether the PLC's protocol is full or half duplex, call your PLC supplier.

Also, during in-house server testing, we have found that the communication cards that use the National 16450 and 16550 UARTs seem to be less susceptible to level and timing problems. Cards based on other chips may work, but we recommend using the National cards. Some of the highly integrated UART chips (most notably, Winbond and UMC) have a tendency for their transmitters to hang, requiring re-initialization of the UART. If this occurs, you may have to restart the server or execute the Reinitialize I/O command from the Special menu in WindowViewer.

➢ **Check your cabling to the PLC.**

Is it wired correctly? Check for shorts, loose wires, broken wires, crossed wires, and so on.

  🖰 A continuity tester can be helpful here.

➢ **Verify the I/O Server's serial configuration settings (Parity, Stop Bits, Baud Rate, Handshaking and so on) against the settings in the hardware device.**

➢ **Verify the communication port is working properly in Windows.**

  1. Close the server program.

    🖰 If you are using a server that requires a TSR, you will not be able to verify that the port is functioning properly while the TSR is running. Stop all TSRs then continue with this procedure. If you confirm that the port functions properly without the TSR running, change your software interrupt (IRQ) to another number, for example, change 60 to 62.

    🖰 Also, if you are using an AT type computer, two devices cannot share interrupts. Verify that the communication port you are using has a unique interrupt setting.

2. On Windows 3.1 or Windows for Workgroups, start the Terminal program. On Windows 95 or Windows NT, start the HyperTerminal program.

3. Configure the Terminal (or HyperTerminal) program to use the same communication port with the same settings (baud rate, parity, stop bits and so on) as the hardware device.

4. Connect a null modem cable to a second computer's port.

5. On the second computer, start and configure the Terminal (or HyperTerminal) program with the same settings as the first computer.

6. Verify that you can send data between the two computers.

    [⟆] If you do not have two computers and the computer you are using has another port, start two instances of the Terminal (or HyperTerminal) program with each configured to their own port, then try communicating between them.

    [⟆] If you have an external modem, connect the modem to the communication port that you are testing and see if you can dial out.

7. If the communication port does not appear to be functioning properly, check your environment files (AUTOEXE.BAT, **CONFIG.SYS, SYSTEM.INI,** and **WIN.INI).** Look for suspicious programs or drivers that might be taking control of the port or its interrupt before the server is loaded. Always try to keep your environment files as clean as possible. If you are in doubt about an entry, comment it out.

8. If the previous step was unsuccessful, try another communications port or another computer.

Note A common misconception is that if you can connect to a PLC with a DOS program, that the same communication port will work in Windows - this is not the case! Windows is an entirely different environment than DOS.

➢ **What type of UART is on the COM port?**

If it is not a 16550, then you must lower your baud rate to 9600 or slower. Only the 16550 UART can sustain continuous, error free communications at speeds higher than 9600 baud. Other UARTs may work at speeds faster than 9600 baud, but errors may be written to the Wonderware Logger. For example, "Receive Overruns." To determine which UART you have, enter MSD at a DOS prompt, then choose COM Ports from the MSD menu.

➢ **If you are running Windows for Workgroups, verify the following:**

1. Verify the following lines are added to the [386 enh] section of your system.ini file that is located in your \Windows directory:

        EMMEXCLUDE=A000-EFFF
        COMxFIFO=0

    Where x specifies the COM port number. You need to add a separate COMxFIFO line for each serial port using a 16550 UART chip.

2. If you are running Windows for Workgroups (Version 3.1 or later), you need to download SERIAL.386 (this file fixes a Microsoft bug) from the Wonderware Bulletin Board System (714-727-0726) or from the Wonderware WEB site at: http://wondertech.wonderware.com.

    [⟆] The file is 10620 bytes and has a date of 2/17/94. It is contained in a self-extracting zip file called wg1001.exe. The file is located in the "PatchFix Library" on the Wonderware BBS in the File Transfers / Patchfix area.

⍦ The Wonderware Web site requires that you register before you will be given access.

3. If (1. and 2.) above do not work, verify the value of the ComBoostTime parameter in your **SYSTEM.INI** file. This parameter represents the number of milliseconds that a virtual machine can process a COM interrupt. (The default value is 2.) We do not recommend that you normally change this setting however, if you are receiving errors such as "Receive Overruns" or "WCRE=-2", try increasing the value to 20.

➢ **Verify the parameters for WWCOMTSR.**

Do <u>not</u> specify a receive and/or transmit buffer size of 8!

For example:

> Correct:
> COM1:0 COM2:1,2048,2048
> COM1:0 COM2:1

> Incorrect:
> COM1:0 COM2:1,8,8

➢ **Does your computer crash when you try to communicate through the COM port?**

If so, verify that each TSR has a unique software interrupt.

⍦ There is a utility, ShowSoft, available on the Knowledge Base CD that can assist you in determining the software interrupts that are available.

➢ **Does your computer lock up?**

Verify the COM port's IRQs do not conflict with each other or with any other communication boards in the computer.

➢ **If the PLC or field device has more than one COM port, verify that you are connected to the correct port.**

The COM port on your computer uses the RS-232 hardware communication standard. Meaning, you must connect the cable from the COM port to an RS-232 compliant device.

Note A common mistake is to connect to an RS-422 or RS-485 port on the PLC. To do this, you need an RS-232 to RS-422/485 conversion device.

If possible, use an external converter instead of a board-based converter that plugs into a slot in the computer. A board-based converter is typically more difficult to get working for inexperienced users. If a board-based converter is not set up properly, it can conflict with other communication boards in the computer such as, internal modems.
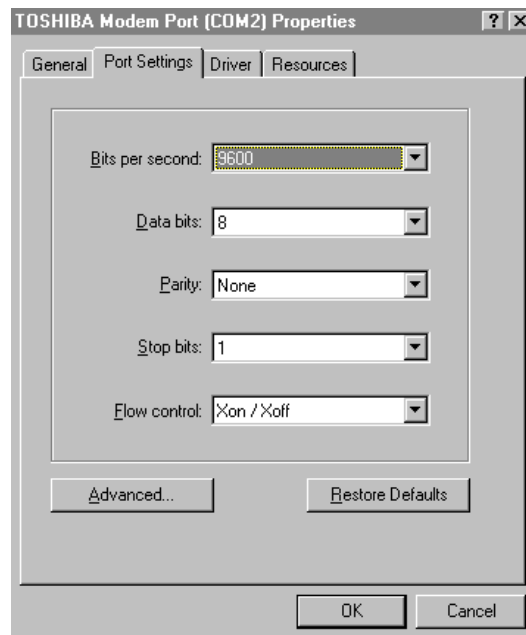
➢ **If you are using the Windows 95 operating system, verify the following:**

4. Click Start on the Windows Taskbar. Point to Settings, then click Control Panel in the menu. The Control Panel dialog box will appear.
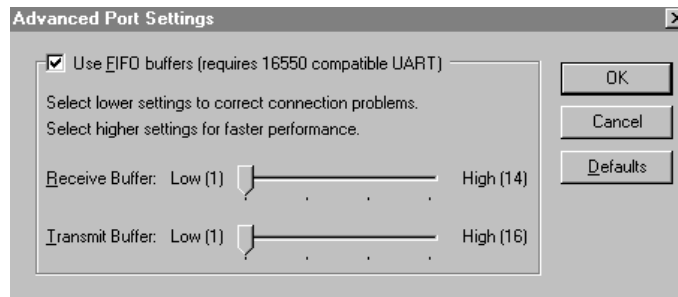
5. Double-click the System icon. The System Properties dialog box will appear.
    Click the Device Manager tab and select the COM port that you are using for the
    server. For example:
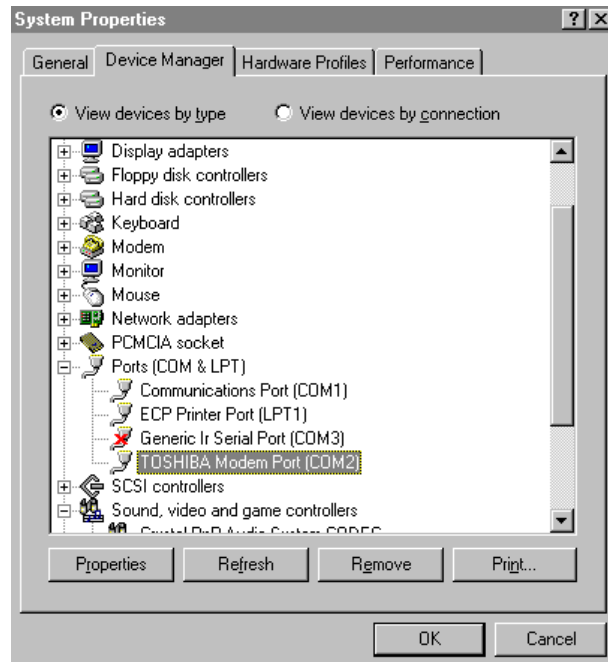
6. Click Properties. The Properties dialog box will appear. Click the Port Settings
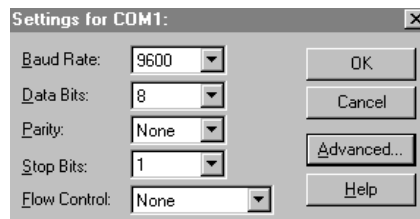   tab.

7. Click Advanced. The Advanced Port Settings dialog box appears:

Advanced Port Settings

☑ Use FIFO buffers (requires 16550 compatible UART)

Select lower settings to correct connection problems.
Select higher settings for faster performance.

Receive Buffer: Low (1) ————————— High (14)

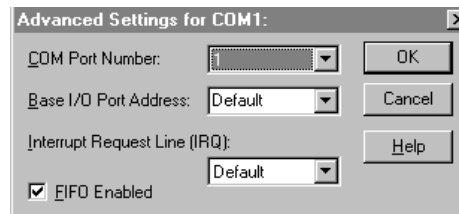Transmit Buffer: Low (1) ————————— High (16)

OK   Cancel   Defaults

8. Lower the default Receive Buffer and Transmit Buffer settings to their minimum. Lowering these settings may solve I/O communication problems for portable computers (notebook, or laptops) and framing errors for standard computers.

9. If you are using a 16550 UART chip, select the Use FIFO buffers (requires 16550 compatible UART) option. If you are not using a UART chip, make sure this option is not selected.

➢ **If you are using the Windows NT operating system, verify the following:**

1. Click Start on the Windows task bar. Point to Settings, then click Control Panel in the menu. The Control Panel dialog box will appear.

2. Double-click the Ports icon, the Ports dialog box will appear.

3. Select a port and click the Settings button. The Settings for COMx dialog box appears:

Settings for COM1:

Baud Rate: 9600
Data Bits: 8
Parity: None
Stop Bits: 1
Flow Control: None

OK   Cancel   Advanced...   Help

4. Click Advanced. The Advanced Settings for COMx dialog box appears:

Advanced Settings for COM1:

COM Port Number: 1
Base I/O Port Address: Default
Interrupt Request Line (IRQ):
   Default
☑ FIFO Enabled

OK   Cancel   Help

5. Set the Interrupt Request Line (IRQ) value to the minimum. Lowering this setting may solve I/O communication problems for portable computers (notebook, or laptops) and framing errors for standard computers.

6. If you are using a 16550 UART chip, select the FIFO Enabled option. If you are not using a UART chip, make sure this option is not selected.

➢ **How long is your RS-232 cable?**

Fifteen meters (fifty feet) is the maximum practical length for the RS-232 standard.

➤ **Try using a different COM port for the I/O Server.**

➤ **If you are installing an I/O Server or configuring a board based I/O Server on a computer that is running the Windows NT operating system, verify that you are logged on with Administrator privileges.**

   ✍ Without Administrator privileges, the server and Server Install program <u>cannot</u> make the necessary edits to the Windows NT Registry during installation or board configuration of the server.

   7. Click Start on the Windows Taskbar. Point to Programs, then point to Administrative Tools (Common), and click User Manager in the menu. The User Manager dialog box will appear:
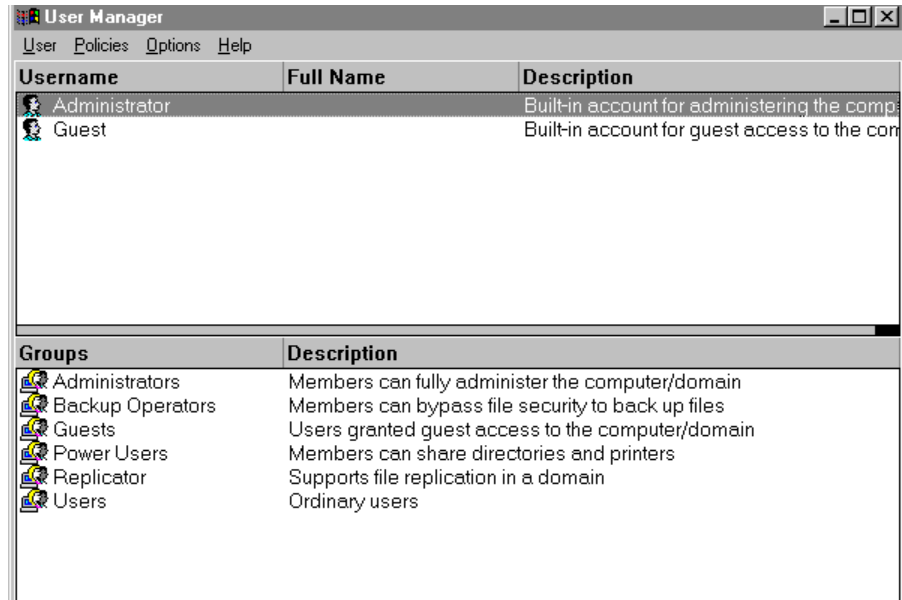
   8. Double-click the Username you typed in during log on.

   9. If the User Properties dialog box does not appear, you do <u>not</u> have Administrator privileges.

   10. If the User Properties dialog box does appear, click on the Groups button and verify "Administrators" is in the "Member of:" list.

➤ **If you experience occasional or random communication errors in the Wonderware Logger, for example, "Response Timeouts," check for noise.**

   Do the physical cables run past any known noise sources such as photocopiers, fluorescent lamps, fans, pumps, motors or generators? Are your cables properly shielded from its environment? With radio modems and satellite link ups, occasional communications errors in the Wonderware Logger are normal and to be expected as long as they do not adversely impact the flow of data.

➤ **Increase the Reply Timeout setting in the I/O Server to a value between 5 and 10 seconds.**

   Some communications errors result from not allowing the PLC or field device enough time to respond to the server's request for data.

➢ **Verify the PLC is properly configured and the cable is good by using the programming software for the PLC.**

When testing, run the programming software and communicate with the server at the same time.

   ᐧ The ability to perform this test depends upon the type of PLC that you are using.

➢ **Reinstall the I/O Server and verify that you are using the latest version.**

We continually improve our servers and using the latest version will guarantee the best results.

   ᐧ New versions of the Wonderware I/O Servers are released regularly on the Knowledge Base CD and they are also available to Comprehensive Support customers on the Wonderware Bulletin Board System (714-727-0726) or from the Wonderware WEB site at: http://wondertech.wonderware.com.

➢ **Move the I/O Server's configuration file to another location on the computer's hard drive. This will clear all configuration for the I/O Server, then reconfigure the I/O Server.**

   ᐧ Wonderware server configuration files are <u>typically</u> named exactly the same as the server's executable name but with the .CFG extension, e.g., **OMRONFO.CFG.** Refer to the Configuration File section of the server user's guide for the exact name of the configuration file.

➢ **If possible, reinstall the Windows operating system.**

Some of the files that are installed on your computer or the NT registry may have been corrupted or accidentally modified.

➢ **If these troubleshooting suggestions do <u>not </u>solve your problem, there may be a problem with your computer. There are many subtle differences between the various computer hardware brands. Try using a computer that is a different brand and select one that meets the following criteria:**

11. A different PC manufacturer. If this is not possible, try a different PC model from the same manufacturer.

12. The computer does not use an OEM (Original Equipment Manufacturer) version of Microsoft Windows. When you start up Windows, only the Microsoft Windows logo should display, not a logo from a hardware manufacturer. We highly recommend you use only a Microsoft Windows product. Contact your vendor to determine if installing an off-the-shelf copy of Microsoft Windows will cause any problems.

➢ **If you feel you have tested all possible situations that may be causing your failed I/O communications, contact your local Wonderware distributor for technical support.**

   ☞ For more information on obtaining technical support, see your online *FactorySuite System Administrator's Guide*.

Special Wonderware Logger Messages

The following messages may appear in the Wonderware Logger for the I/O Server:

Establish Link Error - Old Error Code 0x2711
Failed to establish the initial link to the COM (CP52x) card via the S3964R protocol.

Response Error - Old Error Code 0x2712
Failed to received the expected initial response from the COM (CP52x) card after the initial link was established.

Response Format Error - Old Error Code 0x2713
After the initial link was established and the expected initial repose was received, the subsequent char received was wrong (the subsequent char does not match the format expected).

Follow on Establish Link Error - Old Error Code 0x2714
Failed on the 'follow on' link establishment.

Response BCC Error - Old Error Code 0x2715
Failed to receive the BCC response from the COM (CP52x) card.

Note Server versions 4.11 or earlier will report Wonderware Logger error numbers 27xx in the following format: CP52X> REPTEL ERROR CODE 2712, SYSSTAT??.

Server version 5.0 and higher will report Wonderware Logger errors in error message format as displayed above and no longer use the 27xx error number format.

Siemens REPTEL Errors

All Siemens REPTEL errors will be reported in the Wonderware Logger with the following format:

Siemens CP52xREPTEL Error *XX*H
XX is the REPTEL error number reported. Please refer to the Siemens CP52X manual for the detailed REPTEL error listings, descriptions and suggested remedies.