

Wonderware Operations Integration - Supervisory ABTCP OI Server G-2.1 (Version 4.0) Help



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Schneider Electric Software, LLC
26561 Rancho Parkway South
Lake Forest, CA 92630 U.S.A.
(949) 727-3200

<http://software.schneider-electric.com/>

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CHAPTER 1

Getting Started

This document describes the Wonderware® Operations Integration™ ABTCP OI Server, and the device and protocol environment in which it works. It includes application-level and bus-level communications protocols, item naming conventions, and OI Server features.

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About the ABTCP OI Server

The Wonderware ABTCP OI Server (referred to as the OI Server through the remainder of this user's guide) is a Microsoft® Windows® application program that acts as a communications protocol server. This OI Server is hosted by the OI Server Manager, a Microsoft Management Console (MMC) snap-in, which is part of the ArcestrA System Management Console (SMC) suite of utilities.

This OI Server allows other Windows application programs access to data in PLCs (also referred to as devices) attached to an Ethernet network. The OI Server requires a TCP/IP package that supports the WinSock interface standard. It can access data directly via the Ethernet in programmable controllers such as SLC-5/05, Ethernet PLC-5, etc. While the OI Server is primarily intended for use with Wonderware InTouch® Version 7.11 Patch 02 and later, it may be used by any Microsoft Windows program capable of acting as a DDE, FastDDE, SuiteLink™, or OPC client. The server can operate in either stand-alone mode or with ArcestrA through Device Integration objects.

This OI Server documentation covers only the information you need to configure and run the OI Server component. See the documentation that comes with the related components for details on their operation. You can find installation instructions in a help file on the distribution CD. Many high-level functions and user-interface elements of the OI Server Manager are universal to all OI Servers, and only the documentation for the OI Server Manager contains descriptions of those universal functions/UI elements. Therefore, reading the documentation for both the MMC and the OI Server Manager is critical to understanding this user's guide. To read the documentation about the MMC and OI Server Manager, click the **Help Topics** on the SMC **Help** menu. An Adobe Acrobat version of the OI Server Manager documentation (OI ServerManager.pdf) is provided.

Note: The shortcut menu items described in this document typically represent only a subset of any actual shortcut menu. Most items in each shortcut menu are standard Windows commands. See the MMC Help for more information about those commands.

Supported Client Protocols

The client applications connect to the ABTCP OI Server using following protocols:

- *OPC* on page 8
- *SuiteLink* on page 8
- *DDE/FastDDE* on page 8

OPC

OPC (OLE for Process Control) is a non-proprietary set of standard interfaces based upon Microsoft's OLE/COM technology. This standard makes possible interoperability between automation/control applications, field systems/ devices and business/office applications. Avoiding the traditional requirement of software/application developers to write custom drivers to exchange data with field devices, OPC defines a common, high performance interface that permits this work to be done once, and then easily reused by HMI, SCADA, control and custom applications. Over the network, OPC uses DCOM (Distributed COM) for remote communications.

SuiteLink

SuiteLink uses a TCP/IP-based protocol and is designed specifically to meet industrial needs such as data integrity, high throughput, and easier diagnostics. This TCP/IP standard is supported on Windows NT and Windows NT-technology-based operating systems (for example, Windows 2000, Windows XP, and Windows 2003).

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 provides the following features:

- Value Time Quality (VTQ) places a timestamp 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 operating system's performance monitor. This feature is critical for the operation 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.

DDE/FastDDE

DDE/FastDDE communication protocols allow communication between a client and a server. DDE protocol is developed by Microsoft whereas FastDDE protocol is proprietary to Wonderware.

Note: On Windows Vista and later operating systems, Local DDE is supported only when the OI Server is configured in desktop mode and activated from its executable file or launched from InTouch. Local DDE is not supported when the OI Server is activated from the System Management Console (SMC).

DDE

DDE is a communications protocol 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

FastDDE provides a means of packing many proprietary Wonderware Dynamic Data Exchange 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.

Supported Device Protocols

The ABTCP OI Server is designed to provide direct connectivity to the family of Allen Bradley PLC5 and SLC500 controllers. It uses TCP/IP (Transmission Control Protocol/Internet Protocol) bus-level protocol to communicate with all devices across an Ethernet network.

TCP is the lower-level transport and data-link vehicle for data delivery over an IP network. It provides reliable connection-oriented full-duplex data stream transport. IP is the basic protocol for the Internet which uses an IP address scheme to send data in packets across networks.

Supported Devices

The ABTCP OI Server provides connectivity to the following Allen-Bradley controllers:

- PLC-5 Controllers: all Ethernet PLC-5 programmable controllers (1785-series).
- SLC500 Controllers: all SLC 5/05 processors accessible from the Ethernet using the built-in EtherNet/IP interface.

Licensing for ABTCP OI Server

The ABTCP OI Server supports the activation-based licensing to acquire the license both locally and remotely.

For more information on activation-based licensing, see "Centralized (Activation-Based) Licensing" in the OI Server Manager Help.

ABTCP OI Server Installation Prerequisites

For more information about ABTCP OI Server installation prerequisites, see "Installing an OI Server" in the OI Server Manager Help.

Silent Installation of ABTCP OI Server

The ABTCP OI Server G-2.1 (v4.0) supports silent (command line) installation. This feature enables non-interactive installation of the ABTCP OI Server.

Silent Installation Syntax:

The basic syntax of the silent installation command consists of the full path to the Silent_Install_Setup.bat file (typically the DVD drive designation on your local computer), and the command line switch for silent installation/un-installation.

```
<DVD>: CD-ABTCP>Silent_Install_Setup.bat /<argument>
```

The usage instructions can be retrieved by the following command line:

```
<DVD>: CD-ABTCP>Silent_Install_Setup.bat /?
```

The above command line returns the supported operations - install and uninstall. The /install and /uninstall switches completely disable the graphical user interface of Silent_Install_Setup.bat. There is no input from or feedback to the end user.

To install the ABTCP OI Server (Silent Installation)

1. Open a command prompt using **Run as administrator**
2. Run the batch file set up with the **/install** switch.

```
C: CD-ABTCP>Silent_Install_Setup.bat /install
```

3. Wait for the system to display the confirmation message - **Silent installation completed successfully.**

To uninstall the ABTCP OI Server (Silent Uninstallation)

1. Open a command prompt using **Run as administrator**
2. Run the batch file set up with the **/uninstall** switch.

```
C: CD-ABTCP>Silent_Install_Setup.bat /uninstall
```

3. Wait for the system to display the confirmation message - **Silent uninstallation completed successfully.**

CHAPTER 2

Configuring the ABTCP OI Server

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Determining the ABTCP OI Server Hierarchy

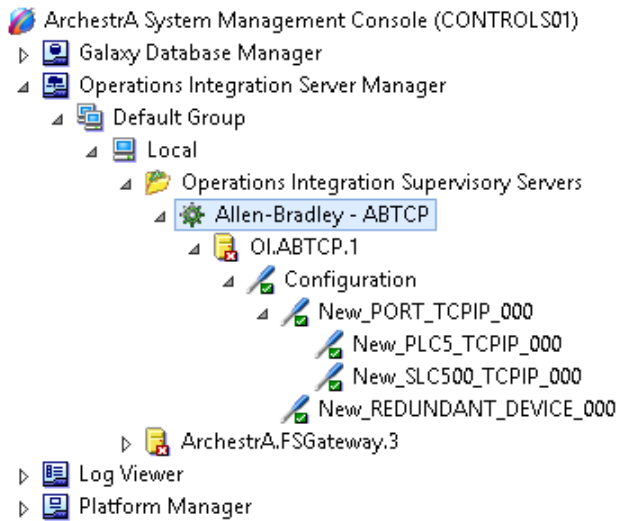
Each OI Server is identified by a unique program name (ProgID) under the SMC. The ProgID for the ABTCP OI Server is: OI.ABTCP.1. You can find it under the local node of the default group of the OI Server Manager, on the computer where the OI Server is installed.

You do not need to install the OI Server Manager on the same computer as the OI Server. When you access the OI Server remotely, you will not find the OI Server node under the local node. You must locate and identify the OI Server on a computer in one of the node groups.

To find the OI Server

1. Start the System Management Console (From the Windows **Start** menu, point to **Programs, Wonderware**, and then click the **System Management Console** icon ).
2. In the OI Server Manager tree, under the **Local** node, navigate to the ABTCP OI Server. For general information about working in this snap-in environment, see the OI Server Manager Help.

The following diagram depicts the ABTCP OI Server hierarchy:



To determine the ABTCP OI Server Hierarchy

Before configuring your OI Server, you should determine the hierarchical structure of your network/PLC environment to establish communications to each of the controllers. The ABTCP hierarchy in the OI Server starts with the PORT_TCPIP object, followed by supported ABTCP controllers.

1. Start the **System Management Console**.
2. In the OI Server Manager tree, under the **Local** node, navigate to the ABTCP OI Server.
3. Expand the OI Server, and then click **Configuration**.

The **Global Parameters** tab appears in the details pane.

4. Configure all the global parameters as required for this OI Server. The default **Poke Mode** settings for the OI Server is **Optimization mode**. For more information about the **Global Parameters** dialog box, including descriptions of the different poke modes, see the OI Server Manager Help.

Note: Any global parameters fields that appear disabled are not supported for the OI Server.

5. When the ABTCP hierarchy build is completed, you can start configuring the respective devices for communications.
 - You can create the desired device groups in the **Device Groups** section with each of the PLC objects.
 - You can create the desired device items under the **Device Items** section with each of the PLC objects.

Object Naming Convention within a Hierarchy

1. The format of the default name of an hierarchy object is

`New_<ObjectName>_###`

where,

<ObjectName>: name of the object type

- ###:** numeric value starting from "000" enumerated sequentially per hierarchy object
2. The hierarchy object name can contain up to 32 characters.
 3. The link name for the OPC items is constructed by assembling the respective object names of the nodes along the hierarchy tree in the logical order, starting from the data source root down to the leaf. Therefore, the link name is always unique.

Setting Up the ABTCP OI Server for the First Time

If you are setting up a OI Server for the first time, perform the following tasks in the order listed:

1. Start the **System Management Console**.
2. In the OI Server Manager tree, under the **Local** node, navigate the ABTCP OI Server.
3. Configure the global parameters. See "Configuring Global Parameters" in the OI Server Manager help.
4. Add and configure ports and devices. See applicable configuration set-up in *Configuring Port Objects for ABTCP OI Server* on page 14.
5. Add one or more device groups. See *Device Group Definitions* on page 21.
6. Add device items. See *Device Item Definitions* on page 22.
7. Activate the OI Server. See "Activating/Deactivating the OI Server" in the OI Server Manager help.
8. Troubleshoot any problems. See *Troubleshooting the ABTCP OI Server* on page 43.

Before Configuring the ABTCP OI Server

Before attempting to configure your OI Server:

1. Determine the hierarchical structure of your network/controller environment.
2. Verify the following items:
 - A PC is set up with the necessary network cards, and is connected to the necessary networks.
 - The ethernet adapter and TCP/IP software is installed on your computer.
To install the ethernet adapter and TCP/IP software, follow the instructions provided by the manufacturer.
 - The Windows administration account is created or identified.
 - The OI Server and any other Wonderware software such as the OI Server Manager is installed with the proper licenses. For more information, see the License Utility documentation on the distribution CD.
 - The client software is installed.
 - The device(s) is/are connected (networked) and, if necessary, programmed.

The OI Server configuration accepts either Host Names or IP addresses directly.

- To configure using host names, define the host names for all PLCs on the Ethernet by modifying the host files. For information about the location of the hosts file and the format of its contents, refer to the documentation provided by Microsoft.

- The rule file provides the version information. All configuration files will be available at the following location:

C:\ProgramData\Wonderware\OI-Server\Operations Integration Supervisory Servers\OI.ABTCP<InstanceName>****

where,

<InstanceName> : name of the ABTCP OI Server instance (For example: Base instance is OI.ABTCP)

Before configuring the OI Server, you should know:

- device network configuration and addresses
- data items needed for the client application
- device name/topic name/group name
- desired update intervals

Configuring Port Objects for ABTCP OI Server

Network Communication Bridge/Interface Modules are the communication links between the ABTCP OI Server and its supported Allen-Bradley controllers. You must create these links within the OI Server Manager hierarchy to bridge/route control and information data between different networks to target controllers.

This is accomplished by creating "Port Objects". These port objects simulate the physical hardware layout and must be built to establish communications to each of the controllers. Once you have built the ABTCP hierarchy, you can configure the respective devices for communications. Finally, you can create the desired device groups for each controller.

Before you add these ports in the SMC, identify your hardware topology to the devices being connected. Once you have established this hierarchy, you can add, rename, or delete port objects to accurately represent how your network is organized.

Configuring PORT_TCPIP Connection

The ABTCP OI Server hierarchy in the OI Server Manager starts with the PORT_TCPIP connection, followed by the supported communication-interface/gateway modules that allow the OI Server to access the supported networks and devices. The logical endpoint for each branch of the ABTCP hierarchy tree is always a **Processor Type** node which represents the controller device.

The following sections detail the steps necessary to configure your OI Server port objects according to your network type.

To add PORT_TCPIP connection from the Configuration branch

1. Right-click **Configuration**, and select **Add PORT_TCPIP Connection**.
An object called **New_PORT_TCPIP_000** is created.
2. Rename the newly created object as appropriate.

The **Port_CIP_000 Parameters** configuration view is displayed.

Only one TCPIP object is allowed per ABTCP OI Server, and is added by default when you first install the OI Server. If you subsequently clear your configuration hierarchy, you must create this TCPIP port object.

This configuration view has two parameters, one of which is configurable:

- **Port type:** Default value is TCP/IP (non-configurable).
- **Maximum outstanding messages:** The number of messages that the OI Server can send to an IP address before getting acknowledgement from that destination.
 - The default value is 4.
 - The valid range is 1 to 20.

Configuring Port Objects

From the **New_PORT_TCPIP_000** branch of the OI Server hierarchy, the following objects can be created:

- PLC5_TCPIP Connection
- SLC500_TCPIP Connection

Configuring PLC5_TCPIP Connection

The PLC5_TCPIP object represents the PLCs - PLC5/20E through PLC5/80E PLCs.

To add the PLC5_TCPIP connection to your ABTCP hierarchy

1. Right-click the **New_PORT_TCPIP_000** object, and select **Add PLC5_TCPIP Connection** from the shortcut menu.

A **New_PLC5_TCPIP_000** object is created.

2. Rename the newly created object as appropriate.

Note: You can add up to 1024 of each type object to the hierarchy.

3. The **PLC5_TCPIP Parameters** configuration view is displayed.

Node Type: PLC5_TCPIP Delimiter: .

New_PLC5_TCPIP_000 Parameters | Device Groups | Device Items

Processor type:

Host name:

Data block size: Bytes

Connection timeout: MSec

Reply timeout: Sec

Supports PID and string files

Supports unsolicited 'CLIENT' messaging

To configure the PLC5_TCPIP connection

The PLC5_TCPIP parameters configuration view has seven parameters, six of which are configurable.

- **Processor type:** Default value is PLC-5 (non-configurable).
- **Host Name:** Enter the host name or IP address of the destination. The default value is LocalHost.
 - The field cannot be blank.
 - The number of characters cannot be more than 255.
 - The host name is defined in the system host file, which is usually located at **WINNT\system32\drivers\etc\hosts**.
- **Data block size:** The number of data bytes that can be sent in a message for this hierarchy.
 - For reading blocks:
The default value is 2000 bytes.
The valid range is 2 to 2000.
 - For writing blocks:
The maximum writing block is 220 bytes, and not configurable.
- **Connection timeout:** The time allowed to establish a socket connection to a target device.
 - The default value is 2000 milliseconds.
 - The valid range is 1000 to 20000 milliseconds.

- **Reply timeout:** The time (in seconds) the OI Server will wait for the acknowledgement after it sends out a message. The message will be resent when time-out occurred.
 - The default value is 15.
 - The valid range is 1 to 300 seconds.
- **Supports PID and string files:** Select the check-box if using a 1785 PLC-5 that supports PID, ASCII String, Block Transfer, and SFC Status Files. By default, it is selected.
- **Supports unsolicited 'CLIENT' messaging:** Select the check-box to enable the OI Server to receive unsolicited "CLIENT" data updates from the selected PLC. By default, it is selected.
 - The OI Server is enabled automatically to accept normal, "Peer-to-Peer" unsolicited data updates without this flag set to true.
 - Select the check-box if the MSG instructions programmed inside the PLC/Host is configured with "CLIENT" as the target station, rather than a specific IP address on the network.

Configuring SLC500_TCPIP Connection

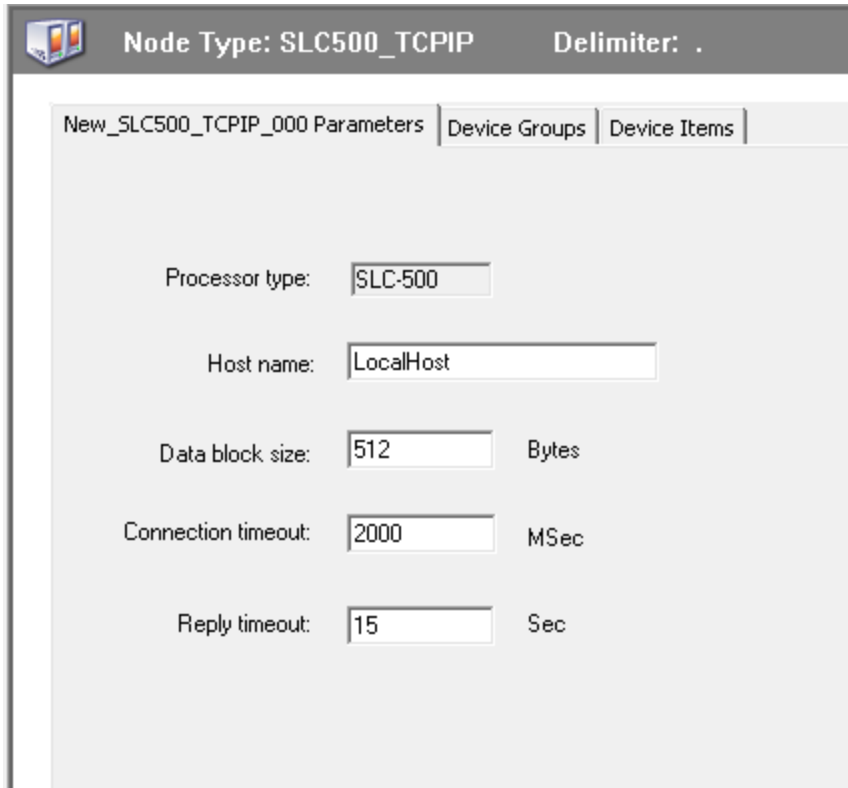
The SLC500_TCPIP object is used to configure the SLC-500 processor on an Ethernet direct connection. It represents the logical endpoint to the hardware hierarchy.

To add the SLC500_TCPIP object to your ABTCP hierarchy

1. Right-click the **New_PORT_TCPIP_000** object, and select **Add SLC500_TCPIP Connection**.
A **New_SLC500_TCPIP_000** object is created.
2. Rename the newly created object as appropriate.

Note: You can add up to 1024 of each type object to the hierarchy.

3. The **SLC500_TCPIP Parameters** view is displayed.



The screenshot shows a configuration window for SLC500_TCPIP. The window title is "Node Type: SLC500_TCPIP Delimiter: .". Below the title bar, there are three tabs: "New_SLC500_TCPIP_000 Parameters", "Device Groups", and "Device Items". The "Parameters" tab is selected. The configuration fields are as follows:

Parameter	Value	Unit
Processor type	SLC-500	
Host name	LocalHost	
Data block size	512	Bytes
Connection timeout	2000	MSec
Reply timeout	15	Sec

To configure the SLC500_TCPIP object

This configuration view has five parameters, of which four are configurable:

- **Processor type:** Default value is SLC-500 (non-configurable).
- **Host Name:** Enter the host name or IP address of the destination. The default value is LocalHost.
 - The field cannot be blank.
 - The number of characters cannot be more than 255.
 - The host name is defined in the system host file, which is usually located at **WINNT\system32\drivers\etc\hosts**.
- **Data block size:** The number of data bytes that can be sent in a message for this hierarchy.
 - For reading blocks:
The default value is 510 bytes.
The valid range is 2 to 510.
 - For writing blocks:
The maximum writing block is 220 bytes, and not configurable.
- **Connection timeout:** The time allowed to establish a socket connection to a target device.
 - The default value is 2000 milliseconds.
 - The valid range is 1000 to 20000 milliseconds.

- **Reply timeout:** The time (in seconds) the OI Server will wait for the acknowledgement after it sends out a message. The message will be resent when time-out occurred.
 - The default value is 15.
 - The valid range is 1 to 300 seconds.

Configuring Device Redundancy

The OI Server Manager provides the ability to assign redundant device for fail-over protection in the event of device failure. Two devices must be configured in the same OI Server having identical item syntax.

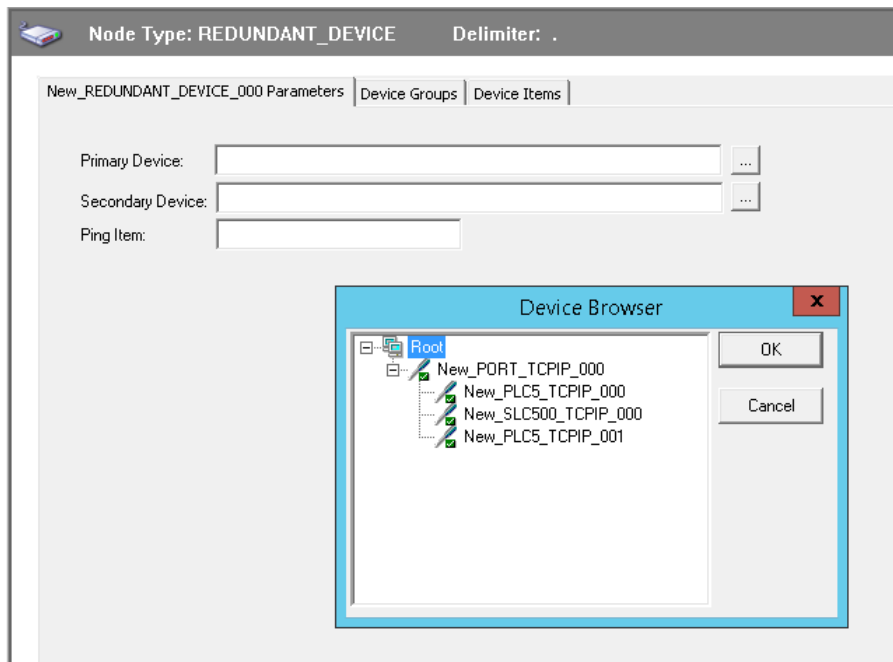
Primary and secondary devices will be setup in the REDUNDANT_DEVICE object in the SMC, along with a common item name (ping item) shared by each device to determine device status.

To setup up a REDUNDANT_DEVICE from the configuration branch

1. Set-up a primary device and hierarchy in the OI Server Manager in the SMC.
2. In the **Device Items** tab, create at least one device item that can be shared between the primary and secondary devices to determine device status.
3. Set up a secondary device on the same OI Server. Once again, create an identical device item within the secondary device so that device status can be determined.
4. Select and right-click on the **Configuration** node, and select **Add REDUNDANT_DEVICE Object**.

An object called **New_REDUNDANT_DEVICE_000** is created. Rename the newly created object as appropriate.

5. In the **New_REDUNDANT_DEVICE_000 Parameters** configuration screen, specify the primary and secondary devices. Alternately, click the browse (...) button to view the **Device Browser** screen, that allows you to select the primary and secondary devices.



6. Specify the **Ping Item** which is a valid tag in both the primary and secondary controllers to determine the connection status for \$SYS\$Status.

The ping item can be a static item in the device such as a firmware version or processor type. If the ping item is invalid or does not exist in the controller, the failover operation may not work correctly as the value of \$SYS\$Status may continue to stay as FALSE in the standby device.

7. Click **Save** to save the hierarchy node configuration.

Note: Unsolicited message configuration is not supported from the device redundant hierarchy.

Multi-Instance and Cloning

The ABTCP OI Server supports multiple server instances. You create additional server instances and even clone existing server instances in those server groups.

Note: Creating multiple instances requires a Professional level license.

For a detailed step-by-step description of creating a new instance, or cloning an existing instance of the OI Server, see "Instantiating Data Sources" in the OI Server Manager Help.

CHAPTER 3

Device Groups and Device Items

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Device Group Definitions

The **Device Groups** tab in the **New_<Name>PLC_000 Parameters** configuration view is used to create new, modify, or delete device group definitions for an object. For DDE/SuiteLink communications, one or more device group definitions must exist for each PLC that the OI Server will communicate with.

To view the **Device Groups** dialog box, click the **Device Groups** tab in the **New_<Name>PLC_000 Parameters** configuration view. The **Device Groups** tab allows you to:

- Add, define, and delete device groups
- Configure default update intervals
- Edit update intervals for the objects

Note: When you select another part of the OI Server tree hierarchy, you are prompted to save the modifications to the configuration set.

The **Device Groups** tab has two columns - **Name** and **Update Interval (ms)**

- **Name:** alias name to the actual data source items. Enter a unique name for each new device group added/created.

For DDE/SuiteLink, it is strongly recommended that each device group (topic) definition contain a unique name for the PLC associated with it. The OPC, however, has the flexibility to use any names, including duplicate names, for the device group definitions.

- **Update Interval (ms):** frequency, in milliseconds, that the WEBSVC OI Server acquires data from the topics associated with that device group. Different topics can be polled at different rates from a PLC by defining multiple device group names for the same PLC and setting a different update interval for each device group.

To create or add device groups

1. Right-click anywhere in the **Device Groups** configuration view, and select **Add**.

A device group is created, and it is numerically named by default. For example: Topic_0, Topic_1, and so on.

2. To change the default name, double-click on it and enter the new name.

To edit the update interval

- Double-click on the **Update Interval** entry and update with the new value.

Or

- Right-click the **Update Interval** entry and click **Modify Update Interval**.

An update interval default to 10,000 is automatically added when a device group is created. For trigger-based polling, set the **Update Interval** to zero.

To rename a device group

1. Right-click on the device group to be renamed, and select **Rename**.
2. Enter the new device item name.
3. To apply the change, press **Enter** or click anywhere in the configuration view.

To delete a device group

- Right-click on the device group to be deleted and select **Delete**.

The device group and its corresponding update interval are deleted from the configuration view.

To configure default update intervals

- Right-click on the device group , and select **Config Default Update Interval** and update with the new value.

Device Item Definitions

The **Device Items** tab in the **New_<Name>PLC_000 Parameters** configuration view is used to define aliases to actual PLC items. The **Device Items** tab allows you to:

- Create new device item definitions for PLC items
- Modify the existing device items
- Delete device items.
- Export/Import CSV file

Each device item definition should contain a unique name for the PLC associated with it.

The **Device Items** tab has two columns - **Name** and **Item Reference**:

- **Name**: defines the alias names to actual PLC items. When you create or add a new device item, enter a unique name.
- **Item Reference**: actual PLC item names, linked to the created aliases.

For example (Name, Item Reference):

Time, n7.0

Float, f8.1

Configuring the item names in the **Device Items** tab enables OPC Item browsing. When the OI Server is running and an OPC client requests item information, the configured items will show up under the PLC hierarchy node.

Note: Device items have the precedence in addressing items in the controller device at runtime. Items requested from the client is searched in the **Device Items** name list first before the controller.

To create or add device items

1. Right-click anywhere in the **Device Items** configuration view, and select **Add**.
A device item is created, and it is numerically named by default. For example, Item_0, Item_1, and so on.
2. To change the default name, double-click and enter the new name.
Enter a unique name for the new device item.

To add item references

1. In the **Item Reference** column, double-click the same horizontal line as the selected device item and enter the actual data source item name.
2. To apply the change, press **Enter** or click anywhere in the configuration view.

Note: OI Server-specific system items and not System items are valid item reference.

To rename a device item

1. Right-click on the device item, and select **Rename**.
2. Enter the new device item name.
3. To apply the change, press **Enter** or click anywhere in the configuration view.

To delete a device item

- Right-click the device item to be deleted, and select **Delete**.
The device item and its corresponding data source item name are deleted from the configuration view.

To clear all device items

- Right-click anywhere in the **Device Items** configuration view, and select **Clear All**.
All the device items listed in the configuration view, including their corresponding data source item names are deleted.

Note: When you select another part of the OI Server tree hierarchy, you are prompted to save the modifications to the configuration set.

Exporting and Importing OI Server Item Data

After configuring the device items, **Export** and **Import** commands enable you to export and import the OI Server item data to and from a CSV file. This allows you to perform an off-line, large-scale edit on the item data configured for a controller, and import what has been edited back into the controller configuration. These features provide you with the following capabilities:

- Archive lists of device items.

- Bring an archived list of device items into the **Device Items** dialog box when you need to utilize or reconfigure any of the device items on the archived list.
- Perform an off-line, large-scale edit on the item data configured for a PLC.
- Import what has been edited back into the PLC configuration.

To export OI Server item data to a CSV file

1. Right-click anywhere in the **Device Items** configuration view, and select **Export**.
The **Save As** dialog box appears.
2. Accept the default options, and save the file.
3. The file name defaults to "PLC Hierarchyname.csv" within the current-system-configured default directory. Rename, if desired.

The file can now be edited off-line in Microsoft Excel. It contains one row for each item configured with two columns - **Name** and **Item Reference**.

To import OI Server item data from a CSV file

1. Right-click in the **Device Items** configuration view, and select **Import**.
The **Open** dialog box appears.
2. The file name defaults to the .csv file extension within the current-system-configured default directory.
3. Browse and select the specific CSV file you want to import, and click **Open**.
The OI Server Manager will import the file and deposit it in the **Device Items** box.

To import device item data that has been edited off-line

1. Right-click anywhere in the **Device Items** dialog box.
2. Clear all the item data you wish to replace with the edited .csv file by selecting the **Clear All** command.
 - To confirm the deletion of data, click **Yes**.
3. Select the **Import** command from the shortcut menu.
 - The **Open** dialog box appears.
4. The file name defaults to the .csv file extension within the current-system-configured default directory.
5. Browse and select the specific CSV file you want to import, and click **Open**.
The OI Server Manager will import the file and deposit it in the **Device Items** box.

During the imported file processing:

- New item references are added based on unique names.
- If there are duplicate names, you can replace the existing entry with the new entry, or ignore the new entry.

When the OI Server is running and an OPC client requests item information, the imported configured items shows up under the controller hierarchy node.

Scan-based Message Handling

The Wonderware OI Servers are based on the concept of polling a hardware device for information. This polling is driven by a need which is expressed in the form of requests from one or more clients. The rate at which the OI Server polls a particular device for a specific piece of information is defined in the device group (topic definition) inside the OI Server, using a parameter called the **Update Interval**. When setting this parameter, there is always a trade-off between the update speed of the device group and the resulting decrease in system responsiveness.

For DDE/SuiteLink, once a particular piece of information is requested by a client, the OI Server formulates its own request and sends that request to the hardware device. The OI Server then waits for a response to its request. Once the information is received, the OI Server passes that information back to the client, and repeats the process until all clients have ceased requesting information.

For OPC, in addition to the the above process, the OPC Client also utilizes the **Update Interval** parameter.

If you set the **Update Interval** to a value close to 0 seconds for fast response, you might encounter a slow response time as every point is polled at this rate. Hence, it is recommended to set the update interval to a more reasonable value. You could also create multiple device groups for each device, setting the **Update Interval** to different values. Assign different items to different device groups depending on how quickly the values change and how quickly you want to see an update of those changes.

For items that change very infrequently but also require very fast updates, like alarms, set the update interval to a very small value. For an immediate response, set the **Update Interval** to 1 (one). See the *Unsolicited Message Handling* on page 25.

Unsolicited Message Handling

In the world of PLCs and OI Servers, it is obvious that a PLC will know when a critical event has occurred before the OI Server will have a chance to poll for that data. Therefore, it would seem natural that if a critical event occurs, the PLC should have the capability to inform the OI Server immediately, without having to wait for the OI Server to poll it.

This is the role of an unsolicited message. Once a PLC has determined that a critical condition exists, it can generate a message immediately sent to the OI Server without a prior request from the OI Server. The unsolicited message implementation requires both the messaging instructions properly programmed in the PLC logic and the device group appropriately configured in the OI Server.

The Allen-Bradley processors, specifically the 1785 PLC-5, are capable of producing unsolicited messages that the Wonderware OI Servers can understand.

There are two types of unsolicited messages supported by the ABTCP OI Server:

- **Peer-to-Peer:** This method involves IP-address-to-IP-address communications. Configure which computer (by its IP address) receives unsolicited messages in your client application. Two instances of peer-to-peer unsolicited messages are generated by the OI Server:
- **Client Messaging** (general broadcast): This method involves a general broadcast of the unsolicited message onto the Ethernet network. Only the first node on the network that is capable of receiving the message gets it.

- If this option is not enabled, the OI Server will ignore all client messages sent out from the PLC.
- If this option is enabled, the OI Server will attempt to respond to the PLC when it gets the first client message from the PLC. Note that if the response is accepted by the PLC, the PLC will send unsolicited messages exclusively to the OI Server thereafter.

For both types of unsolicited messages:

- If the update interval for a topic is 0 (zero), the server polls this topic only once at the start. After that, only an unsolicited message will update the data.
- If the update interval for a topic is >0 (zero), the server updates the data for a particular item immediately upon receiving an unsolicited message for the item. The OI Server also updates the data at every update interval period.

Note: For a more specific Allen Bradley definition of peer-to-peer and client-messaging unsolicited messaging, refer to the Ethernet AB PLC-5 Family documentation.

To receive unsolicited messages

- Set the Update Interval of the device group to 0.

To access the settings for device groups

1. Click on the PLC's name in the **Configuration** hierarchy of your OI Server, and select the **Device Groups** tab.
2. Double-click the **Update Interval** column of the desired device group and enter the number 0 (zero).
3. To save the configuration change, click **Save**.

CHAPTER 4

Item Names

The Wonderware ABTCP OI Server currently supports item names that follow the conventions described for PLC-5 and SLC 500. This chapter describes the item naming conventions for these devices.

For any file type described in this section, in which the .field defines the item as discrete, any /bit designation is ignored.

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PLC-5 Item Naming

The general format of item names for data from 1785 PLC-5 controllers matches the naming convention used by the programming software. The following is the format:

```
[$] identifier [file #] : element [.field] [/bit]
```

where

\$: optional.

identifier: identifies the file type.

file #: file number (0 - 999 decimal).

File 0: Output, File 1: Input, File 2: Status

element: element number within the file.

For Input and Output files, it is also called rack-and-group number, and must be 0 - 277 octal.

For all other file types, it must be 0 - 999 decimal.

.field: valid only for Counter, Timer, Control, ASCII String, PID, SFC Status, and Block Transfer files.

/bit: valid for all file types except ASCII String and Floating Point.

For Input and Output files it must be 0 - 17 octal.

For all other file types it must be 0 - 15 decimal.

Note: The parts of the name shown in square brackets ([]) are optional.

The table summarizes the valid file types, the default file number for each type, and the fields allowed (if any).

Identifier	File Type	Default File #	.fields
O	Output	0	

I	Input	1	
S	Status	2	
B	Binary	3	
T	Timer	4	.PRE, .ACC, .EN, .TT, .DN
C	Counter	5	.PRE, .ACC, .CU, .CD, .DN, .OV, .UN,
R	Control	6	.LEN, .POS, .EN, .EU, .DN, .EM, .ER, .UL, .IN, .FD
N	Integer	7	
F	Floating Point	8	
A	ASCII	none	
D	BCD	none	
ST	ASCII String*	none	.LEN
PD	PID*	none	.ADRF, .ADRE, .BIAS, .CA, .CL, .CT, .DB, .DO, .DVDB, .DVN, .DVNA, .DVP, .DVPA, .EN, .ERR, .EWD, .INI, .KD, .KI, .KP, .MAXI, .MAXO, .MAXS, .MINI, .MINO, .MINS, .MO, .OLH, .OLL, .OUT, .PE, .PV, .PVDB, .PVH, .PVHA, .PVL, .PVLA, .PVT, .SO, .SP, .SPOR, .SWM, .TIE, .UPD
SC	SFC Status*	none	.DN, .ER, .FS, .LS, .OV, .PRE, .SA, .TIM
BT	Block Transfer* (Read-Only)	none	.EN, .ST, .DN, .ER, .CO, .EW, .NR, .RW, .TO, .RLEN, .DLEN, .FILE, .ELEM

* Available only on certain PLC-5 models. Check the Processor Manual for the model being used.

Output File Items

O[n]:e[/b]	n represents the file number (optional). If specified, it must be 0 (zero).
	e indicates the element number in the file.
	b specifies the bit (0 - 15 decimal). /b may be omitted, if necessary, to treat the I/O group as a numeric value.

Note: The elements in I/O modules are sequentially mapped into a memory table, and are different from the item names in the PLC programming software. See *Addressing SLC I/O Modules*.

Examples:

O0:0/0

\$O:2/15

O:3 4BCD(for 16-bit 7-segment display)

Input File Items

I[n]:e[/b]	n represents the file number (optional). If specified, it must be 1.
	e indicates the element number in the file.
	b specifies the bit (0 - 15 decimal). /b may be omitted if necessary to treat the I/O group as a numeric value.

Note: The elements in I/O modules are sequentially mapped into a memory table and are different from the item names in the PLC programming software. See *Addressing SLC I/O Modules*.

Examples:

I1:0/0

I:2/15

I:3 4BCD(for 16-bit thumbwheel input)

Status File Items

S[n]:e[/b]	n represents the file number (optional). If specified, it must be 2.
	e indicates the element number in the file.
	b indicates the bit (optional). If specified, it must be 0 - 15 decimal.

Note: For a complete description of the Status file information, refer to the SLC-500 Family Processor Manual (Allen-Bradley Publication).

Examples:

S2:6(major error fault)

S2:13(math register)

S:1/5(forces enabled)

Binary File Items

B[n]:e/b or B[n]/m	n represents the file number (optional). If not specified, it is assumed to be 3. If specified, it must be 3 or 9 - 255 decimal.
	e specifies the element (word) number within the Binary file. It must be 0 - 255 decimal.
	b specifies the bit number within the word. In the first form (where :e is present), the bit number must be 0 - 15 decimal.
	m also represents the bit number. However, in the second form, no word numbers are specified and the bit number may be 0 - 4095.

Examples:

B:33

B:6/4(same bit as B/100)

B3/4095(same bit as B:255/15)

Timer File Items

T[n]:e[.f]/[b]	n represents the file number (optional). If not specified, it is assumed to be 4. If specified, it must be 4 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Timer file. It must be 0 - 255 decimal.
	.f identifies one of the valid Timer fields. The valid fields for Timer Files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. All of the fields of a timer can be accessed by specifying the .f fields. However, it is possible to use /b to single out a bit in the .PRE or .ACC fields (which are words). The bit number must be 0 - 15 decimal.

Examples:

T4:0.ACC

T4:3.DN

T4:1.PRE

Counter File Items

C[n]:e[.f][/b]	n represents the file number (optional). If not specified, it is assumed to be 5. If specified, it must be 5 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Counter file. It must be 0 - 255 decimal.
	.f identifies one of the valid Counter fields. The valid fields for the Counter Files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. Specifying the .f fields can access all of the fields of a counter. However, it is possible to use /b to single out a bit in the .PRE or .ACC fields (which are words). The bit number must be 0 - 15 decimal.

Examples:

- C5:0.ACC
- C5:3.OV
- C5:1.PRE

Control File Items

R[n]:e[.f][/b]	n represents the file number (optional). If not specified, it is assumed to be 6. If specified, it must be 6 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Control file. It must be 0 - 255 decimal.
	f identifies one of the valid Control fields. The valid fields for the Control files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. All of the fields of a Control file can be accessed by specifying the .f fields. However, it is possible to use /b to single out a bit in the .LEN or .POS fields (which are words). The bit number must be 0 - 15 decimal.

Examples:

- R6:0.LEN
- R6:3.EN
- R6:1.POS

Integer File Items

N[n]:e[/b]	n represents the file number (optional). If not specified, it is assumed to be 7. If specified, it must be 7 or 9 - 255 decimal.
	e specifies the element number within the Integer file. It must be 0 - 255 decimal.
	b is optional. If specified, it indicates the bit (0 - 15 decimal).

Examples:

N7:0

N7:0/15

N7:3

Floating Point File Items

F[n]:e	n represents the file number (optional). If not specified, it is assumed to be 8. If specified, it must be 8 - 255 decimal.
	e specifies the element number within the Floating Point file. It must be 0 - 255 decimal.

Examples:

F8:0

F8:3

ASCII File Items

An:e[/b]	n represents the file number (not optional) and must be 9 - 255 decimal.
	e specifies the element number within the ASCII file. It must be 0 - 255 decimal. Each element in an ASCII file contains two ASCII characters.
	b is optional. If specified, it indicates bit (0 - 15 decimal).

Examples:

A20:3

A10:0/0

BCD File Items

Dn:e[/b]	n represents the file number (not optional) and must be 3 - 999 decimal.
	e specifies the element number within the BCD file. It must be 0 - 999 decimal. Each element in a BCD file contains a number between 0 - 9999.

	b is optional. If specified, it indicates the bit (0 - 15 decimal).
--	---

Examples:

D20:3

D10:0/3

ASCII String Section Items

STn:e	n represents the file number (not optional) and must be 9 - 255 decimal.
	e specifies the element number within the String file. It must be 0 - 255 decimal. Each element in a String file contains an ASCII string with a maximum length of 78 characters.

Examples:

ST9:0

ST9:200

Block Transfer Section Items

BTn:e[.f][/b]	n represents the file number (not optional) and must be 3 - 999 decimal.
	e specifies the element number (three words per element) within the Block Transfer file (0 - 999 decimal).
	f identifies one of the valid Block Transfer fields. The valid fields for Block Transfer items are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. Specifying the .f fields can access all of the fields of a Block Transfer. However, it is possible to use /b to single out a bit in the .FILE or .ELEM fields (which are words). For Block Transfer files, the bit number must be 0 - 15 decimal.

Note: Block Transfer files are read-only.

Examples:

BT9:0.EN

BT9:3.RLEN

BT9:3.FILE

PID Section Items

[m]PD[n]:e.f[/b]	m indicates the module to access. If not specified, it is assumed to be 0 (zero), which selects the Resource Manager. If specified, it must be 0 (zero) or the thumbwheel setting for a Logic Processor.
	n represents the file number. If not specified, it is assumed to be 0 (zero). If specified, the file number must be 0 - 9999 decimal.
	e specifies the element number within the PID file. It must be 0 - 9999 decimal.
	.f identifies one of the valid PID fields. The valid fields for PID files are listed in the table. If PID field .ADDR is needed, use .ADRM for module, .ADRE for element, or .ADRF for file.
	b is optional and is normally not used. Specifying the .f fields can access all of the fields of a PID. If specified, it indicates the bit (0 - 15 decimal).

WARNING! Access to PID files may degrade the OI Server's performance, due to the extreme size of the PID element (82 words each). If accessing only a few PIDs at one time, performance will not be affected greatly. However, if accessing a few fields of many PIDs at once, it may be faster to move the needed fields to an intermediate file (Floating Point or Binary) and let the OI Server access the intermediate files.

Examples:

1PD:0.SP
 1PD9:3.OLH
 0PD1:0.INI

SFC Status Section Items

SCn:e.f[/b]	n represents the file number (not optional) and must be 3 - 999 decimal.
	e specifies the element number within the SFC Status file. It must be 0 - 999 decimal.
	f identifies one of the valid SFC fields. The valid fields for SFC files are listed in the table.
	b is optional and is normally not used. Specifying the .f fields can access all of the fields of an SFC. For SFC Status items, the bit number must be 0 - 15 decimal.

Examples:

SC9:0
 SC9:0.PRE
 SC9:0.SA

SLC-500 Item Naming

The general format of item names for data from SLC-500 controllers matches the naming convention used by the programming software. The format is as follows:

```
[$] identifier [file #] : element [.field] [/bit]
```

where

\$: optional.

identifier: identifies the file type.

file #: identifies the file number.

File numbers 0 - 8 decimal are reserved for predefined file types as listed in the table.
All other file numbers, 9 - 255 decimal, are open to all file types.

element: element number within the file.

For Input and Output files, it must be 0 - 30 decimal.
For all other file types, it must be 0 - 255 decimal.

.field: valid only for Counter, Timer and Control files

/bit: valid for all file types except ASCII String and Floating Point.

Must be 0 - 15 decimal.

Note: The parts of the name shown in square brackets ([]) are optional.

The table summarizes the valid file types, the default file number for each type, and the .fields allowed (if any).

Identifier	File Type	Default File #	.fields
O	Output	0	
I	Input	1	
S	Status	2	
B	Binary	3	
T	Timer	4	.PRE .ACC .EN .TT .DN
C	Counter	5	.PRE .ACC .CU .CD .DN .OV .UN .UA
R	Control	6	.LEN .POS .EN .DN .ER .UL .IN .FD
N	Integer	7	
F	Floating Point*	8	
A	ASCII*	none	
ST	ASCII String*	none	

*Available only on certain SL-500 models. Check the Processor Manual for the model being used.

Output File Items

O[n]:e[/b]	n represents the file number (optional). If specified, it must be 0 (zero).
	e indicates the element number in the file.
	b specifies the bit (0 - 15 decimal). /b may be omitted, if necessary, to treat the I/O group as a numeric value.

Note: The elements in I/O modules are sequentially mapped into a memory table, and are different from the item names in the PLC programming software. See *Addressing SLC I/O Modules*.

Examples:

O0:0/0

\$O:2/15

O:3 4BCD(for 16-bit 7-segment display)

Input File Items

I[n]:e[/b]	n represents the file number (optional). If specified, it must be 1.
	e indicates the element number in the file.
	b specifies the bit (0 - 15 decimal). /b may be omitted if necessary to treat the I/O group as a numeric value.

Note: The elements in I/O modules are sequentially mapped into a memory table and are different from the item names in the PLC programming software. See *Addressing SLC I/O Modules*.

Examples:

I1:0/0

I:2/15

I:3 4BCD(for 16-bit thumbwheel input)

Addressing SLC I/O Modules

The elements (words) in I/O modules are mapped into a memory table. If the Analog I/O modules are being used, then the point naming will differ from the point naming in the programming software. The OI Server item name must be computed from the sum total of words used by the previous input or output blocks. The operator can use the programming software Data Monitor to look at the memory map of the I file or O file to verify your address. If the address is unsure, or if the PLC configuration is likely to change, copy the points in question to the N table or B table, and access the data from there.

The naming conventions used in the Allen-Bradley programming software are not supported by the Allen-Bradley Ethernet Direct OI Server. The addressing convention is similar to that of the PLC-5 family processors.

To derive the correct address for each I/O point, see *Diagram System* on page 37. Also, see the following topics to complete addressing the SLC I/O modules.:

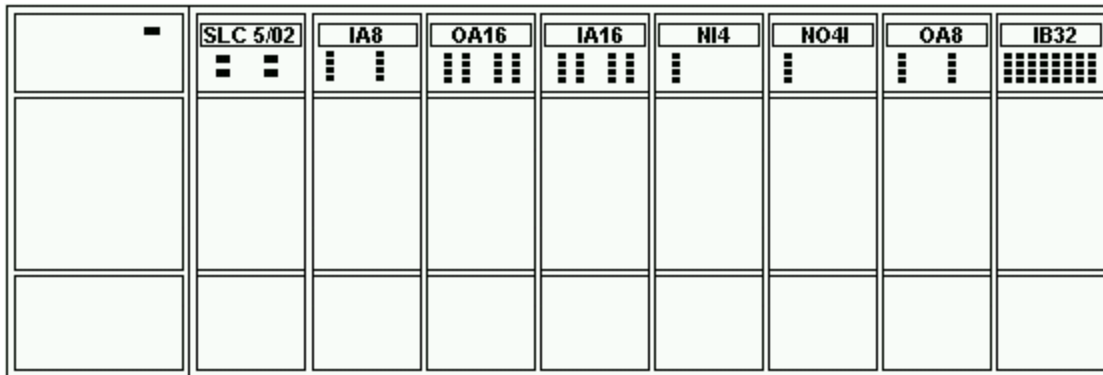
Label I/O Modules with "Word Counts" on page 37

Sequentially Number the Input Modules on page 38

Sequentially Number the Output Modules on page 38

Diagram System

Addressing of the I/O points begins by drawing a schematic of the system. The following figure is a diagram of the SLC-5/02 system.



The far left unit is the power supply. From left to right, the modules are:

1747-L524	SLC-5/02 Module Processor
1746-IA8	8-point 120VAC input module
1746-OA16	16-point 120VAC output module
1746-IA16	16-point 120VAC input module
1746-NI4	4-point 20mA analog input module
1746-NO4I	4-point 20mA analog output module
1746-OA8	8-point 120VAC input module
1746-IB32	32-point DC input module

Label I/O Modules with "Word Counts"

The address of any point within the I/O data table space, in an SLC processor, is the sum of the words occupied by previous modules (to the left in the rack) of the same type. Therefore, to determine the correct address for any particular point in the I/O data table, the number of words each module will consume must be known, as listed in the table below.

Number of Words	Module	
0	1747-L524	SLC-5/02 Module Processor
1	1746-IA8	8-point 120VAC input module
1	1746-OA16	16-point 120VAC output module
1	1746-IA16	16-point 120VAC input module
4	1746-NI4	4-point 20mA analog input module
4	1746-NO4I	4-point 20mA analog output module
1	1746-OA8	8-point 120VAC input module
2	1746-IB32	32-point DC input module

Note: In the preceding table, the minimum number of words which can be consumed by a module is 1 (16-bits). This is due to the memory scheme of all Allen-Bradley processors.

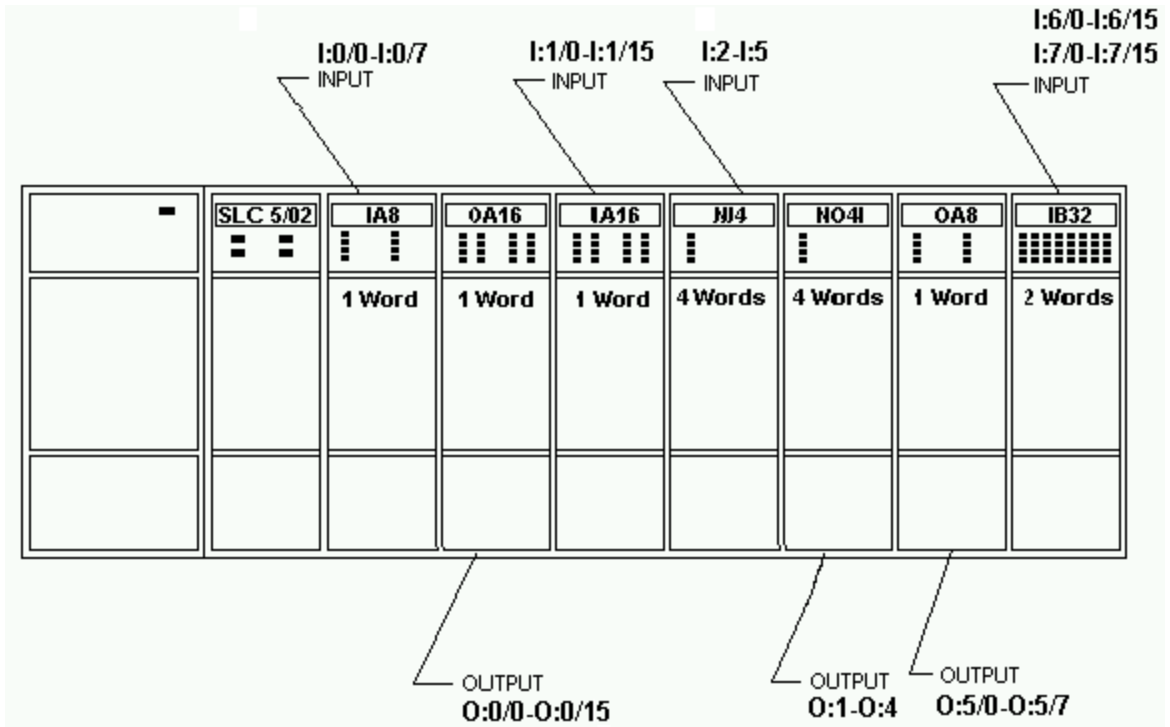
Sequentially Number the Input Modules

The first input module's addressing should start with "I:0." As previously noted, this module consumes one datatable word. Therefore, the addressing of the next INPUT module encounter, moving from left to right, will begin with "I:1," regardless of the module's physical location.

Sequentially Number the Output Modules

The first output card encountered is the OA16. Although it is not in the first slot, its address will be "O:0" ("OHH, colon, ZERO"). This module consumes one datatable word. Therefore, the addressing of the next OUTPUT module, moving from left to right, will begin with "O:1," regardless of the module's physical location.

I/O Diagram



Status File Items

S[n]:e[b]	n represents the file number (optional). If specified, it must be 2.
	e indicates the element number in the file.
	b indicates the bit (optional). If specified, it must be 0 - 15 decimal.

Note: For a complete description of the Status file information, refer to the SLC-500 Family Processor Manual (Allen-Bradley Publication).

Examples:

- S2:6(major error fault)
- S2:13(math register)
- S:1/5(forces enabled)

Binary File Items

B[n]:e/b or B[n]/m	n represents the file number (optional). If not specified, it is assumed to be 3. If specified, it must be 3 or 9 - 255 decimal.
	e specifies the element (word) number within the Binary file. It must be 0 - 255 decimal.

	b specifies the bit number within the word. In the first form (where :e is present), the bit number must be 0 - 15 decimal.
	m also represents the bit number. However, in the second form, no word numbers are specified and the bit number may be 0 - 4095.

Examples:

B:33

B:6/4(same bit as B/100)

B3/4095(same bit as B:255/15)

Timer File Items

T[n]:e[.f][/b]	n represents the file number (optional). If not specified, it is assumed to be 4. If specified, it must be 4 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Timer file. It must be 0 - 255 decimal.
	.f identifies one of the valid Timer fields. The valid fields for Timer Files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. All of the fields of a timer can be accessed by specifying the .f fields. However, it is possible to use /b to single out a bit in the .PRE or .ACC fields (which are words). The bit number must be 0 - 15 decimal.

Examples:

T4:0.ACC

T4:3.DN

T4:1.PRE

Counter File Items

C[n]:e[.f][/b]	n represents the file number (optional). If not specified, it is assumed to be 5. If specified, it must be 5 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Counter file. It must be 0 - 255 decimal.
	.f identifies one of the valid Counter fields. The valid fields for the Counter Files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.

	b is optional and is normally not used. Specifying the .f fields can access all of the fields of a counter. However, it is possible to use /b to single out a bit in the .PRE or .ACC fields (which are words). The bit number must be 0 - 15 decimal.
--	--

Examples:

- C5:0.ACC
- C5:3.OV
- C5:1.PRE

Control File Items

R[n]:e[.f]/[b]	n represents the file number (optional). If not specified, it is assumed to be 6. If specified, it must be 6 or 9 - 255 decimal.
	e specifies the element number (three words per element) within the Control file. It must be 0 - 255 decimal.
	f identifies one of the valid Control fields. The valid fields for the Control files are listed in the table. If .f is omitted, it is assumed to be the word containing the status bits.
	b is optional and is normally not used. All of the fields of a Control file can be accessed by specifying the .f fields. However, it is possible to use /b to single out a bit in the .LEN or .POS fields (which are words). The bit number must be 0 - 15 decimal.

Examples:

- R6:0.LEN
- R6:3.EN
- R6:1.POS

Integer File Items

N[n]:e[.b]	n represents the file number (optional). If not specified, it is assumed to be 7. If specified, it must be 7 or 9 - 255 decimal.
	e specifies the element number within the Integer file. It must be 0 - 255 decimal.
	b is optional. If specified, it indicates the bit (0 - 15 decimal).

Examples:

- N7:0
- N7:0/15

N7:3

Floating Point File Items

F[n]:e	n represents the file number (optional). If not specified, it is assumed to be 8. If specified, it must be 8 - 255 decimal.
	e specifies the element number within the Floating Point file. It must be 0 - 255 decimal.

Examples:

F8:0

F8:3

ASCII File Items

An:e[/b]	n represents the file number (not optional) and must be 9 - 255 decimal.
	e specifies the element number within the ASCII file. It must be 0 - 255 decimal. Each element in an ASCII file contains two ASCII characters.
	b is optional. If specified, it indicates bit (0 - 15 decimal).

Examples:

A20:3

A10:0/0

ASCII String Section Items

STn:e	n represents the file number (not optional) and must be 9 - 255 decimal.
	e specifies the element number within the String file. It must be 0 - 255 decimal. Each element in a String file contains an ASCII string with a maximum length of 78 characters.

Examples:

ST9:0

ST9:200

CHAPTER 5

Troubleshooting the ABTCP OI Server

This chapter describes troubleshooting tools you can use to deal with the ABTCP OI Server problems you may encounter.

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Monitoring Connectivity Status with the PLC

The built-in discrete item, `$$SYS$$Status`, can be used to monitor the status of communications with the PLC. This item is set to:

- 0 (zero) when communications with the PLC fails.
- 1 (one) when communications is successful.

Note: In the case of a PLC disconnect, the OI Server will retry three times before entering into slow poll mode. In the case of reply time-out, the OI Server will go into slow poll mode immediately.

DDE Item Reference Syntax

Enter the following DDE item reference syntax in the appropriate place in your client:

```
=ABTCP|ABPLC!$$SYS$$Status
```

where:

ABTCP: name of the OI Server application

ABPLC: exact device group defined in the OI Server for the PLC

\$\$SYS\$\$Status: discrete item used to monitor the status of connectivity with the PLC

OPC Item Reference Syntax

Enter the following OPC item reference syntax when adding the item in your OPC client:

```
YourOPCAccessPath.$$SYS$$Status
```

where:

YourOPCAccessPath: assembly of hierarchy node names leading to a specific controller device

\$\$SYS\$\$Status: discrete item used to monitor the status of connectivity with the controller device

Note: For DDE/SuiteLink clients, \$\$SYS\$\$Status always comes from the leaf level of a OI Server hierarchy branch, which is the destination PLC node. For OPC clients, \$\$SYS\$\$Status can be accessed at all hierarchy levels. \$\$SYS\$\$Status at the root level of the whole hierarchy tree is always good, as it represents the quality status of the local computer itself. Hence, for practical application, OPC clients should reference \$\$SYS\$\$Status at any hierarchy levels other than the root.

Monitoring the Status of OI Server Conversations

The InTouch WindowViewer supports built-in topic names, called DDEStatus and IOStatus, that can be used to monitor the status of specific OI Server and legacy conversations. For example, let us assume that WindowViewer (VIEW) is communicating with the ABTCP OI Server to a PLC that has been defined in the OI Server with the topic name ABPLC.

The discrete items, DDEStatus and IOStatus, are set to 0 (zero) when this OI Server conversation failed, and to 1 (one) when this OI Server conversation is successful.

Using DDEStatus and IOStatus in Excel

The status of communications between the PLC and InTouch can be read into Excel by entering the following DDE item reference syntax in a cell on a spreadsheet:

```
=view|DDEStatus!ABPLC
```

or

```
=view|IOStatus!ABPLC
```

where,

view: name of the InTouch application

[DDE][IO] Status: built-in topic name used to monitor the status of communications between the OI Server and InTouch

ABPLC: exact topic name defined in the OI Server for the PLC

Reading Values from the OI Server into Excel

To read the values directly from the OI Server into the Excel, enter the DDE formula into a cell using the following format:

```
=applicationname|topicname!itemname
```

Example formula:

```
=ABTCP|ABPLC!'N7:0'
```

where,

ABTCP: name of the OI Server application

ABPLC: exact topic name defined in the OI Server for the PLC

N7:0: item name that also specifies the actual location in the PLC that contains the data value.

In this example, each time the value of N7:0 changes in the PLC, the OI 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 OI Server from Excel

To write values to the OI Server from Excel, create an Excel macro that uses the POKE command:

```
channel=INITIATE("applicationname","topicname")
=POKE(channel,"itemname", Data_Reference)
=TERMINATE (channel)
=RETURN ()
```

where,

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

- Opens a channel to a specific topic name (defined in the OI Server) in a particular application name (the executable name less the .exe).
- 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 "**application name**" and "**topic name**" 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: For more information on entering Remote Reference formulas for cells, refer to the **.XLM** sample Excel poke macro provided on the OI Server CD. You may also refer to the Microsoft Excel manual.

Error Messages

Generic OI Server error messages, ABTCP OI Server-specific error messages, and controller-specific error messages are supported. These error messages are sent to the Log Viewer. Use the Log Flag data to customize the type of messages logged to the Log Viewer. For more information about using log flags, see the Log Viewer documentation.

To troubleshoot OI Server problems, use the following error messages together with the OI Server Manager Diagnostics root data.

ABTCP OI Server Error Messages

The following table lists all the generic OI Server and ABTCP OI Server-specific error messages.

Error Message	Explanation	Possible Cause	Solution
PLC connection attempt timed out, closing socket at <Time unit in ms>	The TCPIP socket was closed due to time-out when attempted to connect to the PLC.	<ol style="list-style-type: none"> 1. The network is not set up correctly or is having a problem. 2. The PLC is not set up or is having a problem. 	<ol style="list-style-type: none"> 1. Make sure the network is set up and running correctly. 2. Make sure the PLC is set up and running correctly.
PLC message timed out, revoking message <Message ID> at <Time unit in ms>	The message was revoked due to time-out while waiting for a response from the PLC.	<ol style="list-style-type: none"> 1. The network communications is having a problem. 2. The PLC is having a problem communicating. 	<ol style="list-style-type: none"> 1. Make sure the network is functioning. 2. Make sure the PLC is functioning.
runt Unsolicited msg packet received on <Host IP Address>	Invalid unsolicited message packet was received.	The PLC is not set up correctly.	Set up the PLC for unsolicited message communications.
Maximum number of socket <MAX> exceeded	Exceeded the maximum number of TCPIP sockets allowed.	The maximum number of sockets allowed is exceeded.	Free socket usage.
Error encountered initializing Unsolicited Data Port. No direct (i.e.: peer-to-peer) unsolicited data will be accepted.	Failed to create a TCPIP socket for the "peer-to-peer" unsolicited data used. Result: no unsolicited data can be accepted.	<ol style="list-style-type: none"> 1. The network communications is having a problem. 2. The PLC is having a problem communicating. 	<ol style="list-style-type: none"> 1. Make sure the network is functioning. 2. Make sure the PLC is functioning.
WSAStartup() returned <Error Code>	Error code returned by the failing WinSocket initialization routine.	Failed to initialize a Window Socket in the system, due to an internal system error.	Check the returned error code against the Microsoft error code list to fix the WinSock initialization problem.
Winsock description: <Description string>	<p>When the verbose flag is on, this message is displayed after the preceding WinSocket initialization failing message.</p> <p>This message contains a brief description for the error code returned.</p>	More description for the preceding failing WinSocket initialization routine.	Check the description and fix the problem according to Microsoft's error list.

Winsock sys status: <Status string>	When the verbose flag is on, this message is displayed after the preceding WinSocket initialization failing message. This message contains a brief status string for the error code returned.	More description for the preceding failing WinSocket initialization routine.	Check the description and fix the problem according to Microsoft's error list.
Rejected <PLC Type> ITEM = <Item Name> on plc <PLC Name with hierarchy path>	The item requested by the client was rejected.	1. The requested item syntax was incorrect. 2. The hierarchy PLC name was incorrect.	1. Correct the syntax of the item. 2. Correct the hierarchy path for the PLC name.
A floating point value read for Item: [ITEM] on Topic: [TOPIC] was NOT A VALID NUMBER (Negative Infinity), therefore, it was converted to -3.4e38	A bad negative floating value was read from the PLC. The value was changed by the OI Server to a known good value before sending it to the client.	Bad data was read.	None.
A floating point value read for Item: [ITEM] on Topic: [TOPIC] was NOT A VALID NUMBER (Positive Infinity), therefore, it was converted to +3.4e38	A bad positive floating value was read from the PLC. The OI Server changed the value to a known good value before sending it to the client.	Bad data was read.	None.
A floating point value read for Item: [ITEM] on Topic: [TOPIC] was NOT A VALID NUMBER (!NaN!), therefore, it was converted to +3.4e38	A bad positive floating value was read from the PLC. The OI Server changed the value to a known good value before sending it to the client.	Bad data was read.	None.
Could not find PLC node when creating message	Failed to find the PLC node from the hierarchy from the message.	When creating the message for the item, the OI Server cannot locate the PLC node. Possible corrupted or bad CFG file.	Check and correct the CFG file.

<p>Response code [CmdNum# from reply] different from command code [CmdNum# from original request]</p>	<p>The response message's command code does not match the original command code.</p>	<p>Either the PLC is bad or the communications between the PLC and the computer is bad – in such a way that wrong data is passing between the OI Server and the PLC.</p>	<p>Make sure the OI Server is running correctly. Make sure the PLC is running correctly. Restart both the PLC and the OI Server if needed.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: An address field has an illegal value - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message was correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Not enough address fields specified - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Too many address fields specified - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Addressed symbol not found - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Addressed symbol is > 8 or <= 0 length - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: This address does not exist in PLC - check Data Table definition inside PLC and make sure ALL requested points are defined.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: One or more points specified within this message do not exist in the PLC's Data Table - Please define, inside the PLC, the missing point(s).</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Cannot complete request; the situation inside the PLC and/or bridge devices has changed since the command started.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Data or File is too large - the packet the PLC is trying to send back is too large - check the Topic Configuration dialog.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Transaction size too large for protocol - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Access Denied; improper privilege - the PLC has refused us access to one or more of the data points in this message - check PRIVILEGE settings inside PLC.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: A resource is not available - A programming terminal may be connected to (communicating with) this PLC - please disconnect the programming terminal.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Write to read/write to a PLC that is already connected to a programming terminal.</p>	<p>Disconnect the programming terminal to the PLC and repeat the read/write operation.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Condition already exists; resource is already available - a loss of communications synchronization has occurred - if it continues, restart the OI Server.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. If error continues, restart the OI Server and repeat the read/write operation.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Command cannot be executed - the PLC has refused to execute the command we have sent to it - check the PLC type in the Topic Configuration dialog.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: No Access - the PLC has refused us access to one or more of the data points in this message - check PRIVILEGE settings inside the PLC.</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Cannot access the PLC.</p>	<p>Make sure the PLC is configured correctly. Repeat the read/write operation after correcting the configuration.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: The data type requested (see FileType parameter) may not match the data type for the specified file number inside the PLC.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: The PLC has rejected the format of our command - check the Topic Configuration dialog, the block sizes may be too large or the PLC type may be incorrect.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: At least one word of the PLC's Data Table we are requesting with this message has been marked for deletion by a programming terminal - this is illegal.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Data conversion error - check PLC configuration and PLC type selection inside the Topic Configuration dialog.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Remove I/O Scanner not able to communicate with 1771 rack adapter - check PLC for problems.</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Remove I/O Adapter cannot communicate with module - check PLC for problems.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: PLC's remote I/O scanner is unable to update the requested data because of a communications problem - check PLC for problems.</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Duplicated Label in Message and/or PLC - you should check PLC setup and Topic Configuration for errors.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly constructed and sent. Make sure the PLC is configured correctly.</p>

<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: File is open; another node owns it - a programming terminal may connected to (communicating with) this PLC - please disconnect the programming terminal.</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Write to read/write to a PLC that is already connected to a programming terminal.</p>	<p>Disconnect the programming terminal to the PLC and repeat the read/write operation.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Another node is the PLC program owner - a programming terminal may connected to (communicating with) this PLC - please disconnect the programming terminal.</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Write to read/write to a PLC that is already connected to a programming terminal.</p>	<p>Disconnect the programming terminal to the PLC and repeat the read/write operation.</p>
<p>ERROR - When topic: [TopicName] tried to Read/Write [DESC of the item] encountered the following error: Unknown Communication Error</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent. This is a "catch-all" error message.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Destination node (PLC) is out of buffer space - Therefore, the PLC is refusing to accept our messages</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>

<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote node is not acknowledging (ACK) our requests for data - Is the PLC on-line? Is the bridge device on-line?</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Duplicate token holder detected - two stations on the highway have the same address (this is illegal)</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Local port is disconnected - we may not be connected (physically) to the highway - check the cabling (wired incorrectly?) and _ALL_ connectors (loose?)</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server. Make sure cabling is correctly connected.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Application layer timed out waiting for a response</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>

<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Duplicate node detected - two stations on the highway have the same address (this is illegal)</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure the PLC is configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Station is off-line - the PLC we are attempting to contact is not on-line</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure all PLCs are configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Hardware fault - a hardware problem has prevented messages from being sent</p>	<p>When doing this read or write operation to the item, the operation failed because the message was incorrectly formatted. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure all PLCs are configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server. Make sure all the hardware is running and functioning correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Unknown Communication Error</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the PLC correctly.</p>	<p>Make sure all PLCs are configured and running correctly and successfully. Make sure the PLC is on line and is communicating with the OI Server. Make sure all the hardware is running and functioning correctly.</p>

<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Illegal command or format - check the Topic Configuration dialog, the block sizes may be too large, or the wrong PLC type may be selected</p>	<p>When doing this read or write operation to the item, the operation failed because the message was incorrectly formatted. The reason for failure is included in the message.</p>	<p>Bad request message was constructed and sent.</p>	<p>Make sure the request message is correctly formatted and sent. Make sure the PLC is configured correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote host will not communicate - PLC may not be on-line</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote host missing or down - PLC may not be on-line</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote host hardware fault - PLC has experienced a hardware fault</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>

<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Addressing problem or memory protection rungs (inside the PLC) have prevented us from retrieving the requested information</p>	<p>When doing this read or write operation to the item, the operation failed because the message was incorrectly formatted. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Function disallowed due to command protection inside the PLC, or the position of a hardware key on the PLC</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: PLC processor is in PROGRAM mode - it must be in RUN mode for us to be able to gather data</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all the PLCs and remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly. Make sure the PLC is not in the program mode, but rather is in the RUN mode.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Compatibility mode file missing or communication zone problem inside the PLC</p>	<p>When doing this read or write operation to the item, the operation failed because an incorrect format in the message was found. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all the PLCs and remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>

<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote node (PLC or Bridge Device) cannot buffer the command we are trying to send it</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all the PLCs and remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly. Make sure the correct message to send to the remote PLC has been constructed.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Remote node (PLC or Bride Device) problem due to download - a download is most likely in progress, please wait until it is complete</p>	<p>When doing this read or write operation to the item, the operation failed because the message was incorrectly formatted. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly. Repeat the read/write operation after the download operation is completed.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Cannot execute command due to active IPBs inside the PLC</p>	<p>When doing this read or write operation to the item, the operation failed due to an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all PLCs and all remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>
<p>Error - When topic [TopicName] tried to Read/Write [DESC of the item] it encountered the following error:STS=[sts error code]: Cannot execute command due to active IPBs inside the PLC</p>	<p>When doing this read or write operation to the item, the operation failed because of an incorrect format in the message. The reason for failure is included in the message.</p>	<p>Cannot communicate with the remote PLC correctly.</p>	<p>Make sure all the PLCs and remote devices are configured and running correctly and successfully. Make sure all the hardware is working correctly.</p>
<p>recv() for [HostName] on port [PortNumber] failed</p>	<p>Failed to read from the Window Socket specified.</p>	<p>Failed to read from the Winsock.</p>	<p>Repeat the operation by restarting the OI Server.</p>

recd packet from [HostName] too big on port [PortNumber] (#of bytes received) bytes)	The received packet from the PLC exceeds the maximum packet size allowed for this type of protocol.	Incorrect data packet was read from the Socket.	Repeat the operation by restarting the OI Server.
connect() for [HostName] on port [PortNumber] refused	PLC has refused to make the connection via the WinSock.	Failed to make the connection with the PLC.	Reset the PLC and/or the OI Server and try again.
connect() for [HostName] on port [PortNumber] failed	Failed to make the connection with the PLC.	Failed to make the connection with the PLC.	Reset the PLC and/or the OI Server and try again.
attempt to resolve remote hostname [HostName] failed	Failed to resolve the HostName.	The HostName cannot be translated to a valid IP address internally.	Use a correct HostName.
A PLC (IP: [IPAddress]) attempted to send us an unsolicited data packet. But the maximum number of simultaneous unsolicited data connections [MAX socket] has already been reached. Data packet ignored.	The maximum number of sockets used for unsolicited data communications was reached. No more unsolicited data package will be accepted.	The maximum number of sockets used for unsolicited data communications was reached. No more unsolicited data package will be accepted.	Decrease the number of unsolicited data to communicate to the socket.
ABTCPAcceptedSocket::Initialize unable to associate an event with a handle	Unable to associate the event with a valid handle within the internal state computer.	Software internal error.	Restart the OI Server and try again.
Timeout waiting for initialization packet from PLC on an unsolicited data port connected to [HostName]	Time-out occurred while waiting for unsolicited data header from a PLC.	Failed to receive unsolicited data from a PLC.	Make sure the PLC is configured to send out unsolicited data correctly. Make sure the OI Server is functioning correctly.
Timeout waiting for data packet from PLC on an unsolicited data port connected to [HostName]	Time-out occurred while waiting for unsolicited data packet from a PLC.	Failed to receive unsolicited data from a PLC.	Make sure the PLC is configured to send out unsolicited data correctly. Make sure the OI Server is incorrectly functional.
Timeout waiting for an unknown event from PLC on an unsolicited data port connected to [HostName]	Time-out occurred while waiting for unsolicited data packet from a PLC.	Failed to receive unsolicited data from a PLC.	Make sure the PLC is configured to send out unsolicited data correctly. Make sure the OI Server is functioning correctly.

An error occurred attempting to complete the initialization of an unsolicited connection.	When the initialization portion of the unsolicited data was received, a Winsock error occurred.	Failed to receive the initialization portion of the unsolicited data packet from the PLC.	Make sure the PLC is configured to send out unsolicited data correctly. Make sure the OI Server is functioning correctly.
An error occurred attempting to receive the data portion of an unsolicited connection.	When the data portion of the unsolicited data was received, a Winsock error occurred.	Failed to receive the data portion of the unsolicited data packet from the PLC.	Make sure the PLC is configured to send out unsolicited data correctly. Make sure the OI Server is functioning correctly.
Minor Error: Winsock told us data was waiting for us, but when we checked it, the whole message wasn't there. Ignoring Winsock Message.	Winsock error occurred; ignore the event.	Winsock error occurred; ignore the event.	Ignore the event and the message.
State engine error. Received Unsol DATA packet, but socket was not waiting for one. Ignoring packet	Winsock error occurred; ignore the event.	Winsock error occurred; ignore the event.	Ignore the event and the message.

PLC-5 Error Messages

The error messages generated specifically for the PLC-5 family controllers are listed in the following table.

Error Message	Explanation	Possible Cause	Solution
item <ItemName> not valid, PLC does not have PID feature	PID feature is not supported for this PLC-5 configuration.	The PLC-5 configuration indicates that the PID feature is not supported.	Select the "Support PID" feature option for PLC-5, if the PLC supports the feature.
BINARY file number must be greater than 2	Incorrect format for this item. The Binary Item's File Number was smaller than 3 for PLC-5.	The Binary Item's File Number must be 3 or larger.	Only access the Binary Item with File Number equal to 3 or larger.
TIMER file number must be greater than 2	Incorrect format for the item. The Timer Item's File Number was smaller than 3 for PLC-5.	The Timer Item's File Number must be 3 or larger.	Only access the Timer Item with File Number equal to 3 or larger.
CONTROL file number must be greater than 2	Incorrect format for the item. The Control Item's File Number was smaller than 3 for PLC-5.	The Control Item's File Number must be 3 or larger.	Only access the Control Item with File Number equal to 3 or larger.

Error Message	Explanation	Possible Cause	Solution
INTEGER file number must be greater than 2	Incorrect format for the item. The Integer Item's File Number was smaller than 3 for PLC-5.	The Integer Item's File Number must be 3 or larger.	Only access the Integer Item with File Number equal to 3 or larger.
BCD file number must be greater than 2	Incorrect format for the item. The BCD Item's File Number was smaller than 3 for PLC-5.	The BCD Item's File Number must be 3 or larger.	Only access the BCD Item with File Number equal to 3 or larger.
PD file number must be > 8	Incorrect format for the item. The PID Item's File Number was 8 or smaller for PLC-5.	The PID Item's File Number must be 9 or larger.	Only access the PID Item with File Number equal to 9 or larger.
ST file number must be > 8	Incorrect format for the item. The ST item's File Number was 8 or smaller for PLC-5.	The ST Item's File Number must be 9 or larger.	Only access the ST Item with File Number equal to 9 or larger.
BT file number must be > 8	Incorrect format for the item. The BT item's File Number was 8 or smaller for PLC-5.	The BT Item's File Number must be 9 or larger.	Only access the BT Item with File Number equal to 9 or larger.
SC file number must be > 4	Incorrect format for the item. The SC item's File Number was 4 or smaller for PLC-5.	The ST Item's File Number must be 5 or larger.	Only access the ST Item with File Number equal to 5 or larger.
Cannot write to file BT[FileNumber]	Failed to write to a BT item for PLC-5.	For PLC-5, write operation to a BT item is not permitted.	Do not attempt to write to a BT item for PLC-5.

SLC 500 Error Messages

The following table lists all the SLC-500-controller-specific error messages.

Error Message	Explanation	Possible Cause	Solution
BINARY file number must be 3 or 9-255	Incorrect format for this item. The Binary Item's File Number was not 3 or 9-255 for SLC 500.	Binary Item's File Number must be 3 or 9-255.	Only access Binary Item with valid File Number.
TIMER file number must be 4 or 9-255	Incorrect format for the item. The Timer Item's File Number was not 4 or 9-255 for SLC 500.	Timer Item's File Number must be 4 or 9-255.	Only access Timer Item with valid File Number.

Error Message	Explanation	Possible Cause	Solution
COUNTER file number must be greater than 5 or 9-255	Incorrect format for the item. The Counter Item's File Number was not 5 or 9-255 for SLC 500.	Counter Item's File Number must be 5 or 9-255.	Only access Counter Item with valid File Number.
CONTROL file number must be greater than 6 or 9-255	Incorrect format for the item. The Control Item's File Number was not 6 or 9-255 for SLC 500.	The Control Item's File Number must be 6 or 9-255.	Only access the Control Item with the valid File Number.
INTEGER file number must be 7 or 9-255	Incorrect format for the item. The Integer Item's File Number was not 7 or 9-255 for SLC 500.	The Integer Item's File Number must be 7 or 9-255.	Only access the Integer Item with the valid File Number.
FLOAT file number must be 8 or 8-255	Incorrect format for the item. The Float Item's File Number was not 8 or 8-255 for SLC 500.	The Float Item's File Number must be 8 or 8-255.	Only access the Float Item with the valid File Number.

PLC-5 and SLC 500 Error Messages

The error messages listed in the following table pertain to both the PLC-5 and SLC 500 controllers.

Error Message	Explanation	Possible Cause	Solution
File numbers must be between 0 and 999	Incorrect format for the Item. The Item's File Number was out of range.	A bad item File Number was used.	Use a valid range for the Item's File Number.
OUTPUT file number must be 0	Incorrect format for the item. The Output Item's File Number was not 0.	The Output Item's File Number must be 0.	Only access the Output Item with a File Number equaling to 0.
INPUT file number must be 1	Incorrect format for the item. The Input Item's File Number was not 1.	The Input Item's File Number must be 1.	Only access the Input Item with a File Number that equals to 1.
STATUS file number must be 2	Incorrect format for the item. The Status Item's File Number was not 2.	The Status Item's File Number must be 2.	Only access the Status Item with a File Number equaling to 2.
FLOATING POINT file number must be greater than 2	Incorrect format for the item. The Floating Point Item's File Number was smaller than 3.	The Floating Point Item's File Number must be 3 or larger.	Only access the Floating Point Item with a File Number that equals to 3 or larger.

Error Message	Explanation	Possible Cause	Solution
FLOATING POINT file cannot have bit number	Incorrect format for the item. The Floating Point Item contained a bit number field.	The Floating Point Item must not contain a bit number field.	Only access the Floating Point Item without a bit number field.
ASCII file number must be greater than 2	Incorrect format for the item. The ASCII Item's File Number was smaller than 3.	The ASCII Item's File Number must be 3 or larger.	Only access the ASCII Item with a File Number equaling to 3 or larger.
BINARY file, bit>15 and element>0	Incorrect format for the item. The Binary Item contained an element number, but its bit number was larger than 15.	The valid format for a PLC-5 Binary Item is: B[FileNumber]: [Element]/[Bit], where Bit is from 0 to 15. In this case, the Bit field was larger than 15.	Only access the Binary Item with the valid range.
Unsupported file type [File Type]	Incorrect format for the item. An invalid Item Type was used.	There was no such Item Type name.	Use the valid Item Type.
[Sub-Element] not valid for type [FileType] files.	Incorrect format for the item. The Sub-Element is not valid for this File Type.	Wrong Item format with a wrong Sub-Element type.	Only access the valid item format with the correct Sub-Element type.
[Sub-Element not valid for type [FileType] section.	Incorrect format for the item. The Sub-Element is not valid for this section.	Wrong Item format.	Use only the valid item format.
Attempt to write read only item in file [FileNumber] element [Element#] subelement [Sub-Element#] ignored	Write operation failed due to an attempt to write to a read-only item.	An attempt to write to a read-only item caused the failure.	Do not attempt a write operation to a read-only item.